Australian Sea Caught Prawns

CODE OF PRACTICE

Part 1 - Prawn Industry Quality Standard

Prawn Industry Quality Standard

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Prawn Industry Quality Standard

INTRODUCTION

Quality Policy

On behalf of the industry, the policy of the Australian Prawn Industry Association (APIA) is to promote Australian sea caught prawns harvested in ecologically sustainable fisheries that are of excellent quality and highly marketable. It is the industry's job to work with transporters, shippers, wholesalers and retailers to maintain the quality of the product so that customers know they are buying the world's best prawns.

This Code of Practice has been developed by APIA in conjunction with prawn fishers, prawn processors and their Associations to set a uniform national standard for prawn quality whilst ensuring food safety.

Our goal is to improve quality in every part of our industry. To survive we need it. Our customers demand it and our jobs depend upon it.

About this Code of Practice

The Code of Practice is in four parts:

Part 1 (this part) details the quality and food safety standards for vessel and on-shore operations. Adherence to these standards will maintain and enhance the reputation of Australian sea caught prawns in both the international and domestic markets. The Australian Sea Caught Prawn logo may only be used by operators complying with this standard.

Part 2 provides Best Practice information and advice for vessels packing and freezing at sea. Much of the information is also relevant for land based processing.

Part 3 details the quality and food safety requirements together with Best Practice information for vessels catching and landing fresh prawns, often referred to as 'wet boats'.

Part 4 consists of a guideline for the implementation of a quality and food safety program to ensure compliance with the standard. A floppy disc is included containing templates that may be modified to suit individual operations.

The guideline is consistent with the requirements for export Food Processing Accreditation issued by the Australian Quarantine and Inspection Service.

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Comments and suggestions are welcome and should be sent to:

The Australian Prawn Promotion Association Ltd
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Deakin West ACT 2600

Phone: (02) 6281 7220
Fax: (02) 6281 0438
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This Code of Practice was initially prepared by The Australian Prawn Promotion Association with funding provided by the Commonwealth Department of Industry Science and Tourism. Modifications and extensions to the Code were completed with financial assistance from The Fisheries Research and Development Corporation. Photographs were kindly provided by A. Raptis & Sons Pty Ltd; Marianne Barber; and Nor-West Seafoods Pty Ltd.

Prawn Industry Quality Standard

1 A) Quality Standards – Size Grading

Customers pay for and demand accurately graded prawns.

Prawn grades in commercial trade are based on a count per pound (lb) weight whilst weighing equipment in Australia is metric weighing grams and kilograms. The following table provides conversions for a number of grades commonly supplied in bulk packs.

Per Pound (lb)			Prawn Weights Grams (gm)	
Grade	Count		Min wt. per prawn	Max wt. per prawn
	Target	Max		
U/10	7	9	46 gm	over 46 gm
U/15	11	14	32 gm	over 32 gm
10/20	15	18	22 gm	44 gm
16/20	18	19	22 gm	28 gm
15/25	20	23	18 gm	30 gm
21/30	25	27	16 gm	20 gm
31/50	40	45	10 gm	14 gm

Other grades may be used provided these are agreed between the supplier and buyer. For instance, the 21/30 grade could be split 21/25 and 26/30.

Some alternative grades commonly used in fixed weight packs are given below.

Grade	Count		Min wt. per prawn	Max wt. per prawn
	Target	Max		
U/6	5 or less	5	76 gm	over 76 gm
6/8	6 - 8	8	54 gm	76 gm
9/12	10/11	12	38 gm	52 gm
13/15	13-15	15	30 gm	36 gm

Note: The prawn weights have been rounded to even numbers as scales often operate in two (2) gram intervals. See explanation in Part2 of this Code.

TOLERANCES

A) Customer Pack (Fixed Weight)

The customer expectation is that size graded prawns will always be within the declared grades. Recognising that this may not be achievable 100% of the time, a low level of out of grade prawns is tolerated.

The maximum tolerance for out of grade prawns is 5% by number

Examples of maximum numbers for out of grade prawns based on different sample weights are:

	2 kg Sample	3 kg Sample	5 kg Sample
U/10	2	3	5
U/15	3	5	8
10/20	4	7	11
16/20	4	7	11
15/25	5	8	14
21/30	7	10	16
31/50	11	16	27
U/6	1	2	3
6/8	2	3	4
9/12	3	4	7
13/15	3	5	8

The tolerance is based on the largest number of prawns permitted within each grade and therefore may be greater than 5%.

As the above figures have been rounded to whole numbers, if a 2 kg sample is borderline, take a further 1kg sample and check against the 3 kg standard.

B) Bulk Processing Pack

Prawns frozen at sea in bulk packs may be intended for further processing. Generally this consists of thawing and re-packing into a fixed weight carton. As the processors expect to re-pack the prawns into the same size grades as supplied, the same grade standards and tolerances, as customer packs should apply.

Some vessels are not equipped for accurate grading, or equipment may break down. For large catches of prawns there may not be time to carefully grade

before deterioration and rapid freezing of product to maintain quality is the priority.

For these reasons a higher tolerance is allowed by the Sea Caught Prawn Industry Quality Standard.

The maximum out of grade tolerance for bulk prawns is 12% by number.

Product may also be supplied ungraded, run of catch, or to any other standard agreed between the supplier and customer.

Examples of maximum numbers for out of grade prawns based on different sample weights are:

	2 kg Sample	3 kg Sample	5 kg Sample
U/10	5	7	12
U/15	7	11	18
10/20	11	16	26
16/20	11	16	26
15/25	13	20	33
21/30	16	24	40
31/50	26	40	66

Further information on grading can be found in Part 2 of this Code.

C) Fresh Prawns

Fresh prawns are landed by trawlers operating in close proximity to their base. The prawns are stored in bulk on board and may or may not have been graded or sorted.

As all product is processed and packed on land before shipment to customers, no grade standards or tolerances are set by this Code of Practice for the on board handling of prawns.

Depending upon the contractual arrangements between the vessels and the processors, sorting by species and for defects, plus grading for size may be required on board. Where standards are agreed vessels operating under the Sea Caught Prawn Industry Quality Standard must demonstrate compliance.

Part 3 of this Code is specific to 'wet boats'.

1 B) Quality Standards – Prawn Defects

Customers expect whole prawns to be intact, firm and free of black spot.

The target defect level in customer packs of whole prawns is zero. Defective prawns should be sorted from sound prawns and packed into cartons labelled "soft and broken".

A number of typical defects are described below and many of these are also illustrated in the accompanying photographs to aid in their identification.

Soft Shell

The prawn is soft to touch with the shell insufficiently hardened after moult. If unsure, place the last body segment before the tail between the thumb and forefinger and press down on the ridge. If the shell is firm or depresses but springs back to its original shape on releasing pressure the prawn is o.k. If the shell remains depressed, soft or crumbles the prawn is defective.

Loose Head

If the membrane attaching the head to the abdomen is broken and the head droops at more than a 45^0 angle the prawn is defective.

Note: **Dropped Head** where the membrane remains attached but may be stretched and the head droops at less than a 45^0 angle is not a defect.

Broken or Damaged Prawns

Prawns may be damaged in a number of ways from small injury marks on the shell to crushed heads and broken bodies. Examples of prawns considered to be defective are:

- prawn shell separated from the flesh and the flesh damaged
- prawn is missing the telson (tail spike); or more than one tail fan (uropod)
- cuts through the shell into the abdomen exposing the flesh
- rostrum and eyes missing

Note: Prawns with less than half of the rostrum or tips of the tail fans or one eye missing or small cuts in the shell not extending into the flesh are not defective.

Parasites

Parasites in prawns are defects, however if head parasites are removed without damage, the prawn is not defective.

Diseased Product

Normally prawn flesh should be clear (translucent). Diseased product has the appearance of cooked (white) flesh. This product must be discarded.

White Spot/Freezer Burn

Small patches on the head and shell are acceptable, but if all of one side is dehydrated the prawns must be rejected.

Black Spot

Black spot is a defect. Once formed, black spot will increase during subsequent handling and processing.

TOLERANCES

A) Customer Pack

The customer expectation is that all prawns are free from obvious defects. All prawns should be visually inspected before packing and defective prawns removed, therefore only a very low level of defects in final pack is tolerated.

The maximum tolerance for prawn defects is 3% by number

Note this is the total number of all defects combined i.e. soft shell + broken + dropped head + black spot, etc. = 3% maximum.

Based on the following size grades the maximum number of defect prawns for the specified sample size is:

	2 kg Sample	3 kg Sample	5 kg Sample
U/10	1	2	3
U/15	2	3	5
10/20	3	4	7
16/20	3	4	7
15/25	3	5	8
21/30	4	6	10
31/50	7	10	16
U/6	1	1	2
6/8	1	2	3
9/12	2	2	4
13/15	2	3	5

B) Bulk Processing Pack

All defective prawns should be removed and packaged separately as "soft and broken prawns".

Vessels with insufficient crew or space may not be able to visually sort to the level of accuracy required. Large catches may need to be packed and frozen to maintain quality before sorting can be completed.

For these reasons a higher defect tolerance is allowed by the Sea Caught Prawn Industry Quality Standard.

The maximum tolerance for soft and broken prawns is 6% by number

Prawns may also be supplied unsorted.

Based on the following size grades the maximum number of defect prawns for the specified sample size is:

	2 kg Sample	3 kg Sample	5 kg Sample
U/10	2	4	6
U/15	4	6	9
10/20	5	8	13
16/20	5	8	13
15/25	7	10	16
21/30	8	12	20
31/50	13	20	33

C) Fresh Prawns

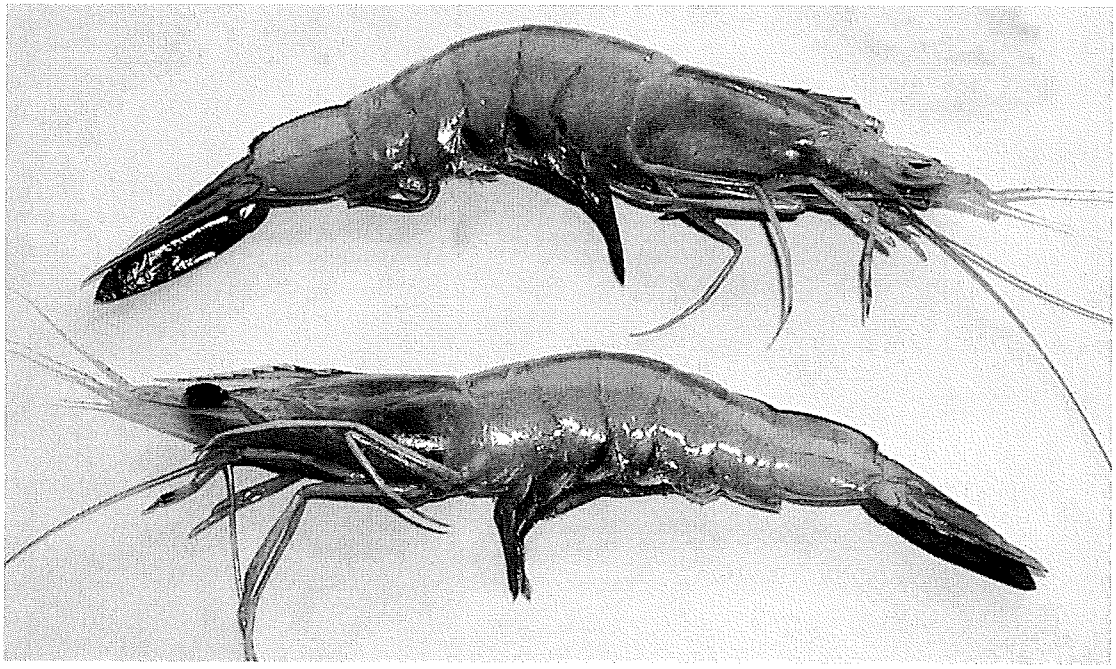
Fresh prawns are landed by trawlers operating in close proximity to their base. The prawns are stored in bulk on board and may or may not have been graded and sorted.

As all product is processed and packed on land before shipment to customers no defect tolerance is set by this Code of Practice.

Depending upon the contractual arrangements between the vessels and the processors sorting for soft and broken prawns may be required on board. Where standards are agreed the vessels operating under the Sea Caught Prawn Industry Quality Standard must demonstrate compliance.

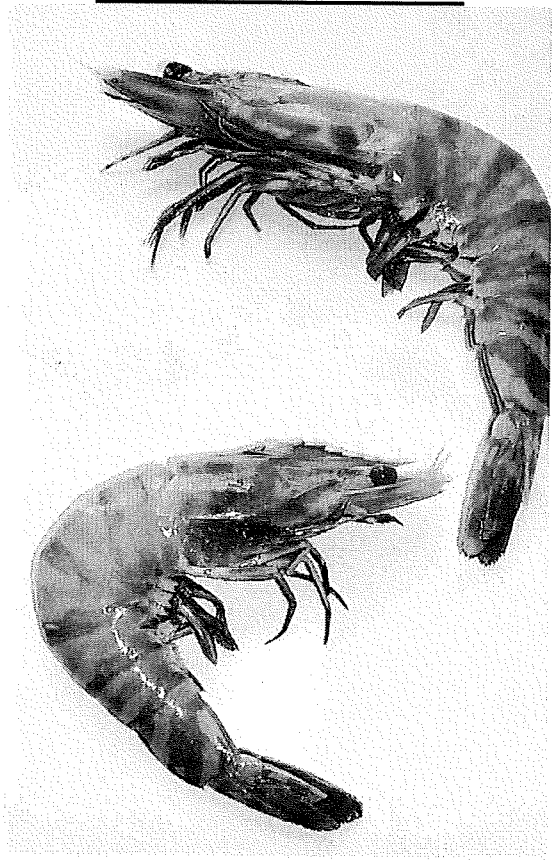
See also Part 3 of this Code.

BLACKSPOT



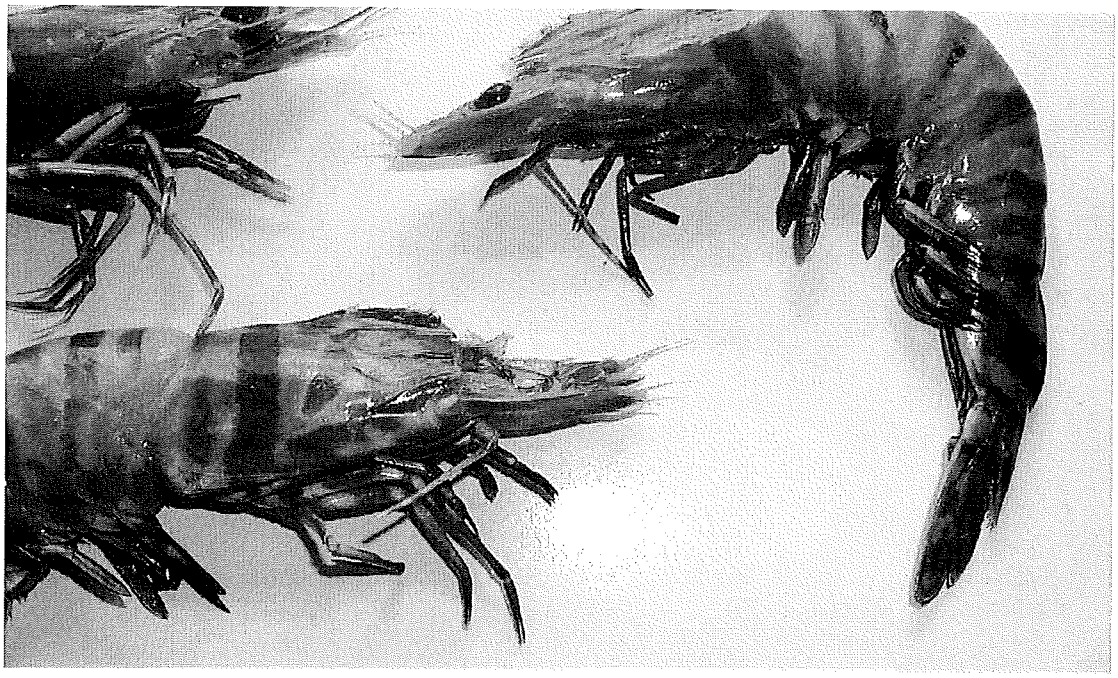
The prawns above show typical signs of black spot on the shell segments tail and head.

DAMAGED PRAWNS

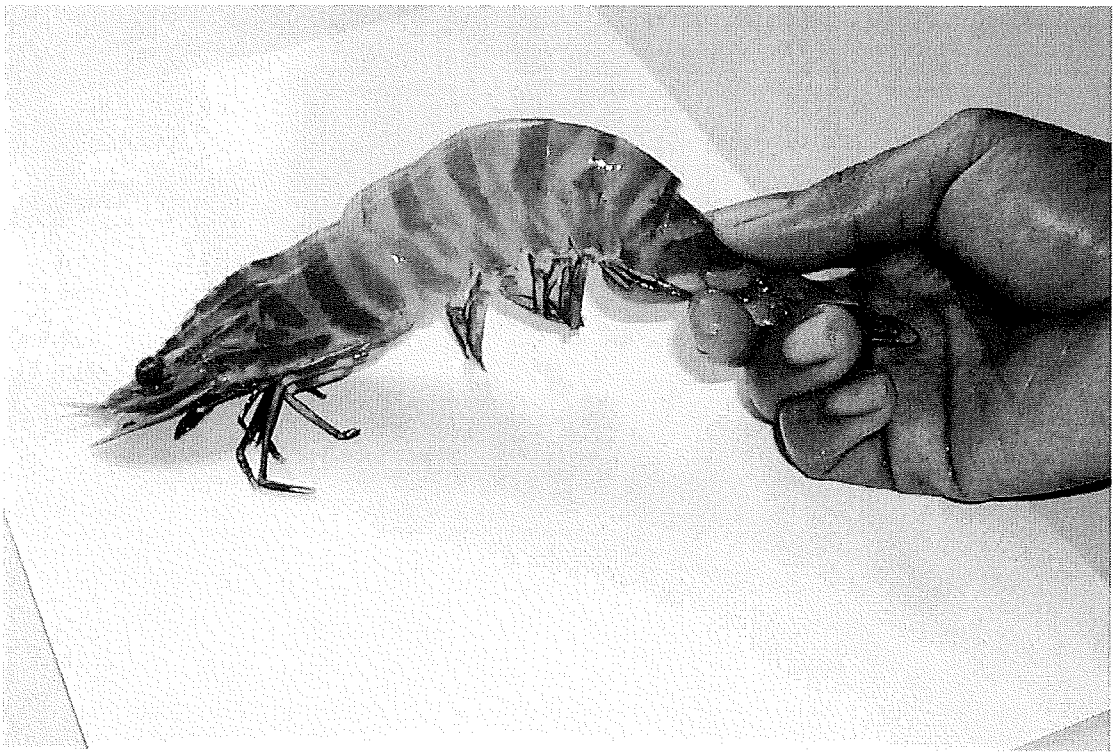


The prawn above left has been damaged through the shell into the flesh and must be rejected. The prawn on the right has only a tear in the shell and is o.k.

Both the prawns below are also rejected to soft and broken for damaged head. Note the eyes missing from the prawn on the left and most of the rostrum missing from the prawn on the right.

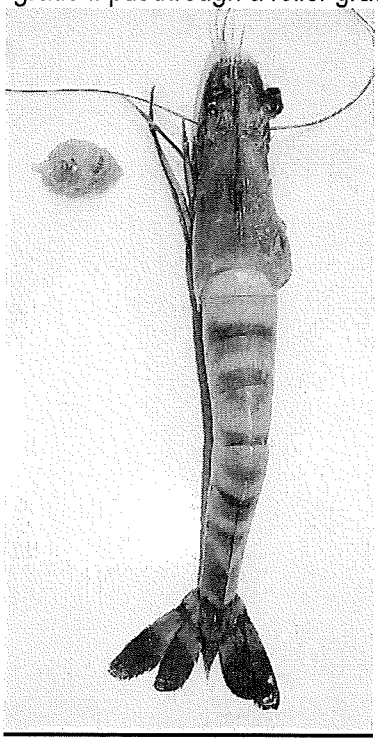


SOFT SHELL PARASITES

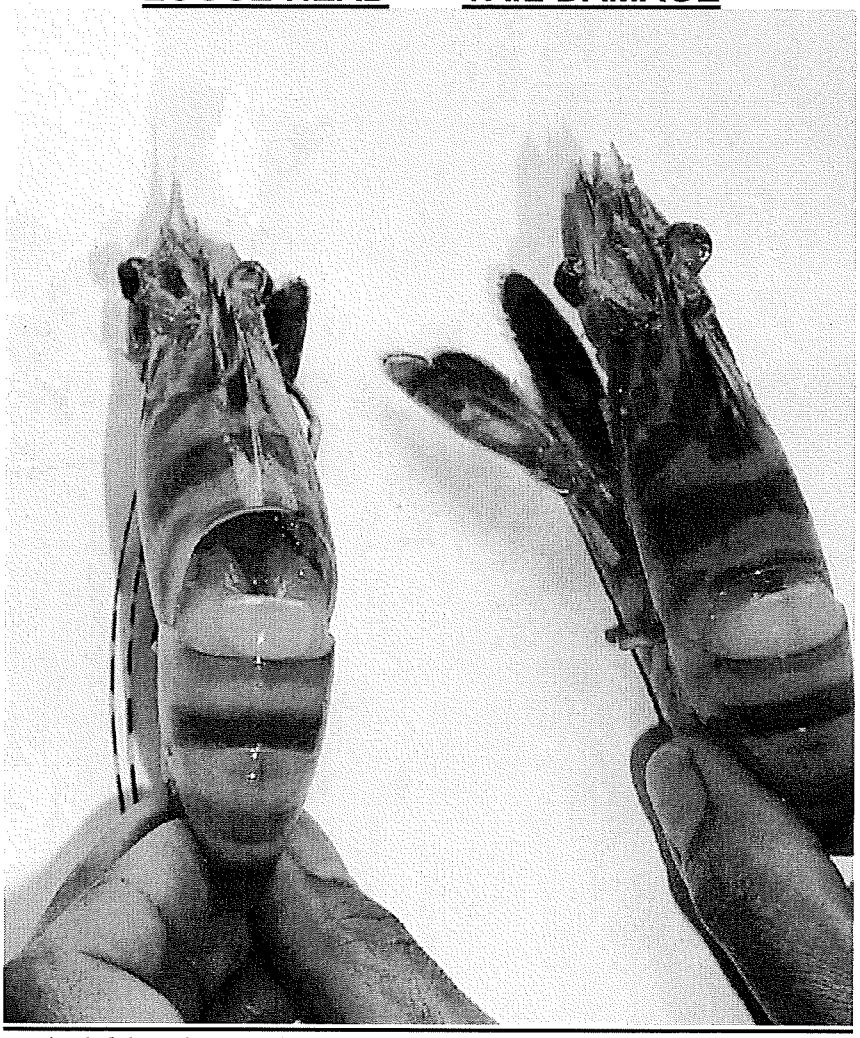


The picture above shows the technique for assessing soft shell. If the segment remains depressed after releasing the thumb the prawn is rejected as 'soft'.

The photograph below shows a parasite removed from the head. Note the bulge on the side of the head would cause a false grade if put through a roller grader.



LOOSE HEAD TAIL DAMAGE



The prawn on the left has the membrane broken and is a loose head defect. The prawn on the right has the membrane intact and is not a defect.

The prawns below show unacceptable tail damage. The prawn on the left has two tail fans (uropods) missing and one torn, whilst the prawn on the right is missing the telson (tail spike) and parts of the tail fans.

Prawn Industry Quality Standard

1 C) Foreign Matter/Wrong Species

Customers expect the contents described on the carton

Cartons of prawns should contain prawns of the designated species packed according to the description on the carton.

Cartons labelled as one species should not contain prawns of a different species.

If more than one species of prawns is packed the carton must be clearly labelled and sold as 'mixed species'.

Weed, shell, small fish, etc. should be removed during sorting.

Ice in cartons indicates insufficient draining of prawns before packing. The customer pays for prawns not water therefore ice in cartons is not permitted.

To prevent unnecessary rejection caused by the presence of a small amount of natural foreign matter, the Sea Caught Prawn Industry Quality Standard states:

The maximum tolerance is 1% by weight of all foreign matter, and wrong species.

Prawn Industry Quality Standard

1 D) Packing and Freezing

Customers demand a high quality product, accurately labelled and true to weight

A) Customer Fixed Weight Pack

The following information is required on all cartons:

- Description of contents e.g. Frozen Whole Prawns
- Species and grade
- Any additives used (ingredients)
- Brand name
- Name and address of producer
- Product of Australia
- Net Weight **
- Storage instructions e.g. keep frozen at or below -18^0C
- Catch/pack or freezing date
- Batch/serial number (alternative to catch date)
- Registered establishment number (if export)

** Net weight is the weight of prawns excluding the packaging. A standard allowance of 1 kg is frequently used to cover the weight of packaging and any prawn drip loss prior to freezing.

Part 2 of this Code describes weight control in more detail.

B) Bulk Processing Packs

The following information is required on all cartons:

- Species
- Grade (or company specific code)
- Additives used
- Vessel name/number
- Net weight **
- Date of catch/freezing

Note: If product is ungraded or unsorted, cartons must be marked with this information.

** Net weight need not be declared if random weight for further processing. A standard 1kg tare is assumed unless otherwise agreed between the buyer and supplier.

C) Freezing

Freezing of prawns must be rapid to maintain quality. Core temperatures of cartons should be below $-5^{o}C$ within 6-8 hours and below $-18^{O}C$ after 12 hours.

Once frozen, prawns must be stored in a room colder than $-20^{O}C$.

D) Chilled Prawns

Chilled prawns must be kept below $5^{O}C$ at all times and preferably close to $0^{O}C$. Packed chilled prawns whether cooked or raw should be labelled with the required storage conditions and a use by date.

Prawn Industry Quality Standard

2 A) Food Additives

Food additives may only be added where allowed by legislation and must be declared on the cartons.

Black Spot is the darkening of the head, shell and tail of prawns caused by a black pigment called melanin. This is a chemical reaction that occurs most rapidly in the presence of oxygen when prawns are warm.

The chemical most commonly used to prevent black spot is sodium metabisulphite, either alone or in combination with other chemicals. The use of sodium metabisulphite is allowed in both the domestic and export food regulations.

Limits on residual 'meta' measured as sulphur dioxide (SO_2) are imposed as it can cause allergic reactions in some people particularly anyone suffering from asthma.

The following standards apply:

		Raw Prawns	Cooked Prawns
Australia #	Maximum residual SO_2	30 ppm	NIL
Export	Maximum residual SO_2	100 ppm	30 ppm

Note; the Australian maximum SO_2 residual may be raised to the Export level in legislation planned for gazettal in November 2000.

In testing for residual sulphur dioxide measurements must be made using the flesh of the prawn only.

The use of the non-sulphite treatment 4-hexylresorcinol (the chemical in Everfresh) is permitted for uncooked prawns in both domestic and export sale. 4-hexylresorcinol is an additive and must be declared on the cartons.

The general permission for a food additive in the export regulations does not imply that the additive is permitted in all importing countries.

Other additives including colours and phosphates may be allowed by food regulations and the relevant standards should be checked before use.

Further information on additives can be found in Part 2 of this Code.

Prawn Industry Quality Standard

2B) Microbiological Standards

All prawns must be hygienically handled, wholesome and fit to eat.

Raw prawns are usually cooked before consumption. However raw prawns must be handled at all times to prevent contamination by bacteria, chemicals or foreign matter.

A specific microbiological standard for raw prawns is proposed in Australian regulations planned for gazettal in November 2000, and will be adopted in this Code when introduced.

Cooked prawns are ready to eat and therefore have strict microbiological limits. The export and Australian standards are:

	Cooked/Frozen	Cooked Chilled
Standard Plate Count (max)	1 x 10^5 per gm	1 x 10^6 per gm
Salmonella	NIL	NIL
E. coli (max)	9 per gm	10 per gm
Coagulase Positive Staphylococci (max)	500 per gm	500 per gm

Note, a nil tolerance for *Listeria monocytogenes* in cooked prawns is also proposed in the revised Australian regulations.

Prawn Industry Quality Standard

3 A) Construction, Hygiene and Handling

The condition of trawlers and factories, the cleanliness of equipment and the hygiene of individuals are critical to the processing of quality prawns that are safe to eat.

A) Construction

The construction of vessels, the location and construction of factories together with design features of equipment that come into contact with prawns is covered in various regulations and Codes of Practice.

For export vessels and premises, the Export Control Processed Food Orders must be complied with to maintain registration. Additional State or Federal requirements may also need to be met.

The Prawn Industry Quality Standard assumes compliance with these requirements and they are not separately detailed in this document.

B) Hygiene and Handling

The Prawn Industry Quality Standard requires that all crew and processing staff are aware of and carry out hygienic handling of prawns.

The following standards of personal hygiene are required:

- Hands must be washed after going to the toilet or returning to the process area after a break
- Cuts and sores must be kept covered when handling prawns
- Smoking must not be allowed anywhere near product
- No food/eating in the process area during processing
- Prevent contamination by foreign objects – tie back long hair, remove rings/watches, wear clean clothing, keep objects out of pockets

Prawns must be handled with care at all times. In particular, when cooking prawns any person handling cooked prawns must wear clean gloves, which are not used for handling raw prawns.

C) Cleaning

Cleanliness of equipment, surfaces, and amenities is also required.

Cleaning requirements must be established, and crew or staff trained in the use of chemicals and cleaning methods.

Material safety data sheets for chemicals must be kept on board.

Cleaning programs should also include checking for signs of pest activity such as cockroaches, rats or birds. A formal pest control program may be required.

D) Packaging

Packaging must be kept dry, clean and stored away from risk of contamination by pests, diesel or cleaning products. Packaging used for prawns must not be used for any other purpose.

Prawn Industry Quality Standard

3 B) Training

Only trained crew and staff can consistently process prawns correctly

It is a requirement of the Prawn Industry Quality Standard that all crew or staff are trained sufficiently to ensure they have the knowledge and capability to carry out their job.

In particular, crew and staff must be capable of preparing and packing product that meets this standard.

In the absence of formal training and certification it is the responsibility of owners/managers/skippers to verify the competence of employees.

Records of training and checks of competence must be kept.

Prawn Industry Quality Standard

3 C) Records/Food Safety Plan

Objective evidence of compliance with this standard requires records to be kept.

Part 4 of this Code of Practice provides guidelines for the implementation of a food quality and safety system to meet this standard, including a checklist of all requirements.

A brief description of the operations and the identified points of control for quality and food safety must be compiled as a Food Safety Plan.

The Food Safety Plan will be specific to a business or group of identically operating vessels. The templates provided with Part 4 of the Code of Practice may be used with modifications to match the activities of the particular business.

The Food Safety Plan must be consistent with the requirements of the AQIS Food Processing Accreditation (FPA) system of inspection.

Records must be kept for a minimum of three years and are subject to audit against the Prawn Industry Quality Standard.

Records of product packed by date and quantity may also be required for product trace and recall.

Records must also be kept of any customer complaints/comments and any actions taken to prevent recurrence, together with results of audits.

Australian Sea Caught Prawns

CODE OF PRACTICE

Part 2 - Prawn Processing & Freezing

Prawn Processing & Freezing

CONTENTS

Prawn Processing & Freezing

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1. Grading & Sorting

Grading and sorting the catch involves two separate tasks:

Grading means separating the catch into various size grades using the measurement of counts of individual prawns per pound weight.

Sorting includes separating the catch by species, and checking for quality by removing soft, broken and other defective product from whole prawn packs.

Standards for size grading and maximum defect levels in sorted prawns are written up in Part 1 of this Code. Part 1 also includes a description of defects together with photographs to aid in their identification. This section provides information on common problems with grading and ways to overcome difficulties.

Prawns should be rinsed to remove all mud and weed, sorted for defects and drained before size grading.

Grade Standards

The weight ranges for a number of commonly used grades are provided in Part 1 of this Code. Scales weigh in grams (gm) and kilograms (kg), but counts are numbers of prawns per pound weight (lb). One pound (lb) is approximately 454 gm, therefore grade limits can be calculated as follows:

The minimum weight for each grade is calculated by dividing 454 gm (one lb) by the maximum number of prawns allowed and the maximum weight per prawn is 454 gm divided by the minimum number of prawns allowed.

For example, with a 10/20 count the minimum weight is

454 g divided by the maximum number (20) = 22.7gm.

and the maximum weight is

454 g divided by the minimum number (10) = 45.4gm

It is impossible to weigh on board a trawler to this level of accuracy, with many scales only weighing at 2gm intervals. Therefore grade limits have been set by rounding the grades to the nearest 2gm, with some further adjustment to avoid overlapping grades.

In the above example the minimum weight has been set at 22gm and the maximum weight at 44gm. The maximum has been rounded down to avoid confusion with the U/10 grade where the minimum weight is 46gm.

A number of the weight limits in the standard differ from those currently used by some processors and buyers, but are recommended to introduce consistency across the industry.

The grades in the standard are examples of commonly used grades, but any grade is allowed if agreed between the supplier and buyer. For instance, the 21/30 grade may be split into 21/25 and 26/30

It is important that assessments are also carried out to the same tolerances. If a 1gm interval scale is used for assessments any odd number weights e.g. 21gm, 31gm must be rounded up to 22gm, 32gm etc. before calculating % out of grade. This allows for the fact that a prawn weighing 22gm on a 2gm interval scale may actually weigh between 21gm and 23gm.

A 30 count prawn will weigh 454/30 = 15.1gm, recorded as 16gm on a 2gm interval scale. A 31 count = 14.6gm, recorded as 14gm.

Note, however, the customer expectation is for an average count close to the centre of the allowed range. For this reason target and maximum counts have been included in the standard.

Finally, the standards for out of grade are <u>% by number</u>. This is calculated by counting all the prawns in a sample, counting the number of prawns out of grade and then calculating the percentage.

For example, 4 prawns are found to be out of grade in a sample of 50 prawns. The percent out of grade is then 4/50 * 100 = 8%.

In Part 1 tables have been provided to enable a quick calculation of percent out of grade for a known weight of prawns and are intended to particularly encourage on board assessments.

The numerical table assumes the largest count for each grade and is slightly more generous than a percentage calculation, rewarding vessels that pack to a target count. A 3 kg sample of 10/20 prawns with a 15 count (99 prawns) would be out of grade (5%) if 5 prawns were outside 22-44gm by % calculation whereas the table allows 7 prawns. The tolerance (7 prawns) is the same for the two methods with a 20 count for the 10/20 grade.

Grading Techniques

The Prawn Industry Quality Standard recognises the difficulties in accurate grading on many vessels by allowing a greater percentage out of grade for bulk packs, the option of selling prawns ungraded, or the setting of any agreed tolerance between supplier and buyer.

In general, the better the grading the higher the price, and therefore having a set of scales on board that can ideally weigh individual prawns to 2gm but at least give an accurate count per lb (454gm) is essential.

A). Hand Grading

Experienced crew or staff can grade by hand very accurately. For many people a visual guide is necessary. This is best achieved by using examples of prawns at the limits of each grade to visually check against.

If grading between two sizes use examples of the smallest and largest prawns acceptable, not just one in the middle of the grade. E.g. sorting to 15/25 grade is made easier if prawns weighing 18 gm (smallest) and 30 gm (largest) are used as examples. A 24 gm prawn may be the average weight, but it is difficult to visually decide how much smaller or larger is acceptable.

It is important that the weights are accurate and the scale checked before use. If the scale is inaccurate in a swell, keep some individual prawns of known weight frozen to use as a guide. Note, prawns of the same size are not always the same weight.

Check a one pound sample regularly for count per pound to confirm accuracy. A beam scale is good for this as it can be used in rough weather and if the prawns are all of a similar size the grading will be good.

If hand grading a large catch use simple grade limits, e.g. U/10, 10/20, 21/30, 31/50. Attempting tighter grades 10/15, 16/20, etc. often leads to inaccuracy.

B). Roller Grading

As the rollers determine grade based on the width of the prawn it will wrongly grade prawns where head parasites have been removed and may grade differently for different species.

Before bulk grading, one pound samples from each grade should be checked for count and the grader adjusted as necessary. Further checks should be made during grading and before grading a different species.

Roller graders must be fed a constant and even flow of prawns to work effectively. If product is fed too quickly prawns tend to bunch up at the feeder entrance and will end up 'piggy-backing' other prawns down the grader, thus producing out of grade product.

C). Haldane Graders

In the Haldane Grader, the rollers are replaced by vibrating channels down which the prawns are flumed with water. The channels are tapered to allow prawns of different width to pass through at different positions along the grader in the same way as a roller grader.

C). Electronic Scales

Electronic scales designed for the prawn industry have many advantages. Not only are they able to weigh accurately under at sea conditions but also can be programmed for specific pack weights and overpack.

The two most common brands of electronic scales are Marel and Pols.

Electronic scales have their limitations. Whilst they allow accurate grading of individual large prawns, those with a 2 gm limit are poorly suited to individual weighing of smaller prawns (21/30, 31+) where accuracy needs to be verified by counting a one pound sample of graded product.

Water on the scales can also lead to inaccuracies. Prawns should be washed and drained before grading.

A set of instructions for the use of the scales should be kept on board, together with a supply of spare fuses. Use of an incorrect fuse can seriously damage the electronic circuits.

Typical problems are:

Failure to calibrate the scales before and regularly during use.

Not allowing for tare weights when packing.

Damaging the load cells by putting excessive weight on the scales.

Hosing the units resulting in water damage and blown fuses.

Leaving the scales turned on at all times will assist in preventing condensation from affecting the electronic circuits.

2. Dipping

The prevention of black spot is vital to maintaining the quality image of prawns. The traditional preventative treatment is sodium metabisulphite and this is described in detail.

The export and domestic food regulations allow a number of chemicals to be used alone or in combination with sodium metabisulphite to prevent black spot.

A number of proprietary products use some of these other chemicals in combination with sodium metabisulphite (meta). The advantage of these products is the reduced level of 'meta' resulting in safer handling on board, and a claimed improved consistency in the prevention of black spot and levels of residual sulphur dioxide in the final product.

One treatment, Everfresh, does not use any 'meta', but a chemical labelled 4-hexylresorcinol.

Information on these other treatments, where available, is included later in this section.

What is Sodium Metabisulphite:

Sodium Metabisulphite is a preservative and an antioxidant. In this specific application it prevents black spot (Melanosis). Black spot is caused by Melanin formation owing to oxidative enzymatic reactions (polyphenol oxidase) followed by auto-oxidation and polymerisation.

In other words blackspot is the darkening of the shell pigmentation of prawns resulting from high temperatures and exposure of the product to oxygen.

Sodium Metabisulphite applied in a solution forms a barrier that excludes the oxygen necessary for the chemical reaction which forms Melanin, and thus prevents black spot developing.

All prawns will develop black spot eventually unless kept at 0°C or treated with Metabisulphite or other approved solutions.

Use of Metabisulphite:

Black spot is a problem that occurs needlessly, as prawns that are given an adequate dip in a correct metabisulphite solution prior to freezing on board should show no signs of this problem. All prawns must soak up enough metabisulphite to ensure black spot does not occur as a result of temperature fluctuations invariably involved in subsequent unloading, palletising, and trucking procedures.

Dipping solutions will gradually lose their metabisulphite concentrations as it is continuously used, therefore the solution must be changed at regular intervals.

If the metabisulphite you are using consists of rock hard lumps instead of a fine powder, it indicates that the metabisulphite is losing its potency and should not be used. Metabisulphite bought in small sealed packets may be more expensive than a bulk purchase, but may last longer. If the 'meta' gets wet in storage it will lose its effectiveness

Care should also be taken to ensure that metabisulphite is stored away from direct heat preferably in an open area on deck. Metabisulphite is explosive in certain situations particularly if stored in a confined space.

Metabisulphite gives off sulphur dioxide, a severe irritant to lungs. Care must be taken in its use. It should not be handled by anyone with asthma or chest complaints, nor breathed in confined spaces.

Applications:

There are many combinations of concentration and time that are effective for different species in different fisheries. If you have a system of use that is effective in preventing black spot, and results in residual sulphur dioxide levels below the legal limits, stick with that system.

In the absence of an effective treatment:

THE RECOMMENDED PROCEDURE FOR ALL SPECIES IS TO DIP PRAWNS IN A SOLUTION OF 1 KG METABISULPHITE PER 100 LITRES OF WATER FOR A PERIOD OF ONE MINUTE.

The solution should be changed at least every 400 kg of product dipped or if the solution becomes dirty or discoloured. Carefully wash prawns before dipping. If large quantities of prawns are expected prepare a second dip tank rather than trying to cut back dip time or top up the solution. Check the accuracy of the procedure by having prawns tested for residual sulphur dioxide in a laboratory.

The importance of the correct use of 'meta' to protect product cannot be over stressed.

Too little 'meta' and the prawns may go black during freezing or subsequent handling.

Too much 'meta' and the residual level in the prawns (measured as sulphur dioxide) may be higher than the regulations allow. Currently product sold in Australia may contain no more than 30 ppm residual sulphur dioxide and for general(*) export product no more than 100 ppm. A solution of 2kg meta per 100 litres could thus be used for export but not for local sale.

(*) Regulations vary country to country- make sure you know the limits!

Notes:
The active component is sulphur dioxide, and this is released when the metabisulphite powder is dissolved in water.

The regulatory limits on sulphur dioxide are to ensure that prawns when eaten cannot cause allergic reactions.

The recommended dip of 1kg meta per 100kg water for 1 minute is based on a number of trials with different species all of which, when tested, had residuals below 30 ppm. sulphur dioxide. Other combinations of concentration and time may be equally effective. If you have been using a different dip then there is no need to change unless your results are showing too high or too low residual levels in the final packed prawns.

Reprocessing of Meta Treated Product:

When reprocessing product treated with metabisulphite the product should be tested to find current residuals to determine correct solution strength required during the reprocessing stage.

If no additional 'meta' is used the prawns may lose the protection on defrosting and show signs of black spot. Too much additional meta, however, could result in excess levels in the final product

If incomplete cartons or tubs of prawns are frozen for re-packing the next night these should not be defrosted in a meta solution.

Metabisulphite Concentration Testing Procedure

The concentration of meta in the tank reduces as sulphur dioxide is given off and absorbed by the prawns. Change the water regularly.

Merck sulphite test strips when dipped in solutions or pressed against the flesh of prawns change colour with the final colour indicating the approximate concentration of sulphur dioxide in the solution or prawn.

A very pale pink colour on the test strip after applying to the flesh of prawns indicates correct level If the strips are dipped directly into the 'meta' solution the colour will be outside the range of the test and the solution needs to be diluted first

The following is a quick procedure that may be used.

Chemicals:

Merckoquant Sulphite test strips

Procedure:

1) Take a 100g sample of the Meta solution ($^1/_2$ cup but check actual weight).
2) Pour into a larger container (C) and fill to total weight 1kg with tap water.
3) Take 100g sample from (C); discard the remainder.
4) Pour the 100g back into the container and fill to 1kg.
5) Immerse a sulphite test strip into the diluted sample for 1-2 seconds.
6) Leave for 30 seconds, then compare the colour of the test strip with the standard on the pack.

Example:

If solution should be 1kg meta per 100kg water then this is the same as ;

1,000gm in 100,000gm

or 10,000 in 1,000,000

This is referred to as 10,000 parts per million (ppm)

As this is out of the measurable range of the test strips the method requires a dilution.

The dilutions above were the following:

1) & 2) 10,000 x 100/1000 = 1000;
3) & 4) 1,000 x 100/1000 = 100ppm

Hence if the solution was 1kg per 100kg then a reading of 100ppm on the colour comparison might be expected. However since the metabisulphite

powder is only 70% sulphur dioxide, the actual reading should be 70ppm. The closest standard on the pack is 80ppm thus a similar colour would indicate correct dilution.

If the closest colour is equivalent to only 40ppm it suggests the calculation is wrong or the solution needs changing, whilst a reading of 120ppm or more indicates too high concentration.

Note, The Centre For Food Technology in Brisbane is currently assessing rapid methods for sulphur dioxide testing. Results will be included in future editions of this Code.

Tips for the Use of Meta :-

1. Rinse prawns in basket first to remove mud and other matter that will reduce the life of the dip water.

2. Ensure meta is fully dissolved in the tank before adding prawns. Some operators open the bag of meta under water, therefore minimising the fumes given off.

3. Agitate basket in the dip solution to ensure good coverage.

4. Find a method that ensures the product receives its one minute dip.

   This may be an activity e.g. Collect basket, rinse, place in dip, collect second basket, rinse, place in dip, unload first basket. If the time taken to process each basket is one minute, then the routine can be used as a timer.

   Preferably set up a timer that can be operated by a knee or elbow, which sounds an alarm after one minute and then automatically resets.

5. When the solution needs replacing empty and refill, do not simply add extra meta. This is likely to result in initially excessive levels and then rapid loss as the meta is absorbed by the dirt in the water.

Other Treatments for Prawns

Everfresh

Everfresh is the trade name for the non sulphite treatment (4-hexylresorcinol) that prevents black spot by binding to the enzymes responsible.

Everfresh have produced a video in which the recommended treatment is one sachet (200gm) dissolved in 95 kg water and the prawns dipped with agitation for 2 minutes. The solution may treat up to 250 kg of prawns

HQ Bacterol F

HQ Bacterol F is a mixture of chemicals, including 'meta', where the combination of ingredients is claimed to be more effective than meta alone and without the health hazards to the handlers. Recommended treatment in their literature is 4kg of HQ Bacterol F dissolved in 100 litres of water in which the prawns are dipped for 5-10 minutes.

The solution will treat 100kg of prawns and should then be changed.

The literature indicates that this treatment will result in a residual sulphur dioxide below 100ppm. The treatment may therefore need adjusting if the prawns are to be sold on the domestic market under current regulations.

Information from prawn industry operators who use HQ Bacterol F indicates that a treatment of 2kg Bacterol dissolved in 200 litres of water is effective for treating 100 kg prawns.

Antidot

Antidot is another chemical mix that is being used successfully by some prawn fishermen. Recommended usage instructions were requested from the supplier.

Regulations

Domestic and export regulations require that all additives are declared on cartons of prawns. Thus metabisulphite, 4-hexylresorcinol and all the alternative chemicals in the mixtures above must be included in an ingredient declaration.

Operators should ensure that all chemicals are approved before use. Also the permission for a chemical use in Australia or for export does not imply that all countries accept it. For instance, 4-hexylresorcinol is yet to be approved in Japan, even though there are no concerns with its safety.

A revised Australian Food Standards Code planned for gazettal in late November 2000 raises the maximum residual sulphur dioxide in raw prawns to the export 100ppm and introduces a 30ppm allowance for cooked.

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3. Packing

A) Random Weight (Bulk Packs)

Once product is ready for packing, a final inspection should be made to cull any remaining foreign matter, weed, damaged prawns etc.

Ensure prawns are well drained before packing into lined cartons. Ice in packs is a common and unnecessary cause for complaint.

Do not overpack. Net weight should not exceed 12kg and it is false economy to pack more. Any savings on packaging are reduced by the extra cost of freezing bulging packs, the risk of damaged and broken prawns, and often the extra cost of transport as the cartons cannot be stacked efficiently.

B) Fixed Weight

As above, product should be rechecked for damage, foreign matter and allowed to drain for one minute prior to weighing. Ice in packs is a defect.

The scale should be tared, allowing for the weight of the packaging, before the prawns are weighed.

Prawns are then weighed to the required net weight plus a small overpack to ensure that if product is checked after freezing the average weight will be at least the declared pack weight.

If a standard allowance (e.g.1kg) is used a tare is not required, but the prawns must be packed to net weight plus 1kg.

Whilst underweight cartons are illegal, overweight cartons not only give product away, but also may result in damage and slow freezing.

Precise weight control requires care during weighing and an accurate scale.

Scales should be calibrated at regular intervals and should be checked with known weights before and after packing. Keep weights in a safe dry place.

Regulations

The Australian regulations for weight control are:

The average weight of a random 12 cartons must be equal to or greater than the declared weight, and

No individual pack must be less than 95% of the declared weight.

The AQIS export regulations are slightly different in that the number of samples to be taken depends upon the batch size and for packs of 5 kg or greater the minimum weight of an individual pack must be at least 98% of the declared weight. The average weight must again be equal to or greater than declared.

The differences between the regulations should not be important since no prawn cartons should be underweight, as they are all individually weighed.

Measurement of Net Weight

Gross weight is the weight of prawns plus packaging.

Net weight is the actual weight of prawns in a pack.

Gross weight is often used to determine such as costs for freight, whereas net weight is the legal term for the weight of prawns in the pack.

When measuring net weight of a frozen pack of prawns the following technique should be used :-

1. Check the accuracy of the scale with a known weight.

2. Weigh the total pack to obtain Gross Wt (GW).

3. Remove all packaging, dry any plastic liners and re-weigh **all** the packaging (P).

4. The net weight is then (GW) minus (P).

5. Re-pack the prawns without allowing to defrost.

Note :

Surface frost immediately surrounding the prawns is considered part of the prawns. Any lumps of ice, or other foreign matter, however, would need to be removed and weighed (O). Net weight in this case is now (GW) minus (P) minus (O)

For lightly glazed product it is fairly easy to defrost the glaze and re-weigh the prawns whilst still frozen.

For water filled packs, by the time the ice around the prawns has melted the prawns may also have partially defrosted, and an extra overpack may be necessary to allow for any prawn drip loss.

C) Carton Markings

1. Bulk Prawns for Further Processing

Bulk prawns packed for further processing on land can be frozen in unbranded cartons and transferred to a processing factory. A transfer certificate (E51) will be required if the prawns are to be exported.

Cartons should be marked with date of freezing, species, vessel, any additives used, grade and approximate weight and this should be included on the transfer documentation. Product from the same date of production should be kept together for ease of sorting. Company specific codes may be used for grades etc.

2. Customer Pack Product

Prawns which may be exported or sold without further processing must be packed in cartons which have as a minimum the following markings :-

- Establishment number of vessel
- Catch or freezing date
- Description of contents e.g. "Frozen Whole Shrimp"
- Species and grade
- Any additives (e.g metabisulphite)
- Name and address of exporter
- Product of Australia
- Keep frozen at or below -18^{0}C
- Net weight
- Brand name
- Batch numbers or serial numbers

Note :
Export registered vessels transferring product for ultimate export must complete a transfer certificate.

Only in the case of unregistered "catcher boats" can product enter the export chain at a registered export establishment.

Catcher boats may only catch, chill, bleed, head and gut on board. If it is proposed to cook or freeze product for export the boat must be registered and transfer certificates must be used.

4. Freezing

Once packed product must be snap frozen to below -18^0C as soon as possible in a snap freezer operating at the warmest -30^0C. Once below -18^0C product can be transferred to the storage freezer and held at the warmest -20^0C. Do not try to freeze in the storage freezer.

There are three golden rules for freezing at sea:

I) Freeze it fast
ii) Freeze it cold
iii) Keep it frozen

It is always worth remembering that freezing is not about putting cold into a product, but about removing heat from a product. Similarly, frozen storage is not about losing 'cold' but about preventing heat from entering your product. If you approach freezing and storage in this frame of mind, you can't go wrong!

i) Freeze it fast:

It is vital for the maintenance of quality, and good shelf life that the heat is removed from the prawns as soon as possible after capture. Prawns start to go off as soon as they die, in many cases even before they land on deck. It is vital that they are washed, sorted graded and antioxidant treated without delay. Once packed they should be immediately placed in a snap freezer.

A good snap will have the capacity to bring a full load of prawns down to temperature within 6-12 hours. The best snap freezers operate to below -40^OC. This is not to freeze prawns to that temperature but so that it has the thermal capacity (the 'grunt') to take the heat out of the product quickly.

As prawns are about 70% water, they freeze in much the same way as water. The critical phase is during the change of water to ice without a fall in temperature. It is during this phase (called the latent heat phase) that most of the problems associated with freezing happen, and usually because the time taken to go through the phase is too long. That is why a snap must have plenty of grunt.

However, there is no point in having all the grunt in the world, if the heat from the prawns is not carried away. This is why prawn cartons should always be spread out as much as possible in a snap, so that the air blast is continuously

sweeping over them. It is also why crew should always try to put cartons where they are in the full force of the air-draught as the air will always take the line of least resistance if not confronted by a carton.

Finally, it is why the passage of air should never be blocked off by stacking cartons tightly, especially in front of the fans. This is the best method known to man of slowing the freezing process, and encouraging Blackspot.

ii) Freeze it cold:

Bacterial action, causing spoilage in prawns will tail off once the temperature drops through the latent heat phase (about -5^0C). Biological (enzyme) action usually stops below -18^0C (which is why this is the figure set by AQIS for export prawns).

Enzymes speed up deterioration e.g. Blackspot. Chemical action (such as oxidation) stops below -30^0C, which is why sashimi grade tuna is often frozen to -55^0 C and held at very low temperatures.

iii) Keep it frozen:

Keep the product at **constant** low temperature. If the temperature varies even when the prawns stay frozen, chemical and enzyme action can start, and this will reduce the shelf life of the product and can be the cause of dramatic loss of quality.

It is worse because often there are no visible signs of quality loss, and it is only noticed when the customer tries the product

It is vital that this point is remembered when prawns are transferred from snap to holding room, and from boat to shore freezer. Once the damage is done it is irreversible. No amount of re-freezing will return the prawns to their previous condition.

Note:

Frozen prawns can be very brittle, particularly when frozen to -25^0C or below.

Care in handling cartons is vital to prevent broken prawns in otherwise perfect packs.

Do not throw or drop prawn cartons, especially when unloading a snap freezer.

5. Cooking on Board

When cooking product on board, particular care must be taken to ensure the prawns are handled hygienically and adequately cooked.

Prawns should be graded and must be washed immediately prior to cooking.

Prawns for cooking should not need to be dipped if cooked immediately. Delays beyond 30 minutes may, however, result in blackspot. If delays are expected store product on ice or dip for only 30 seconds in a 1 kg per 100 litre solution of 'meta'.

The following information is provided as a guide, but as equipment and conditions vary boat to boat, operators will need to determine their own procedures.

- The water to prawn ratio is 6:1 (6 litres of water to 1 kg of prawns). Therefore the cooker should be filled with 100 litres of water to cook approximately 15 kg of prawns.

Note: For safety, make sure the volume of water is well below the top of the cooker to prevent spillage when filled with prawns in rough seas.

- Water must be at boiling point (100^0C) prior to product being placed in cooker.

If salt is added use a constant amount after first checking the flavour of a test batch. Do not oversalt.

- Whilst cooking, product should be stirred to ensure even cooking

- As cooking is usually reserved for smaller product the total time prawns are cooked is critical, 10-15 seconds can mean the difference between an overcooked prawn and an ideally cooked prawn.

As an example, for product graded between 20-40 count per pound a total cooking time of 5 to 6 minutes is typical. However this time not only depends upon the size of prawns, but also the volume of water to prawns and the

power of the cooker. Gas will differ from diesel etc, the more rapidly the water returns to the boil the easier it is to control the cook.

A timer could be used as a guide, but each cook is likely to be slightly different. Remember even cooking depends upon tight grading.

Visual assessment is often the best method and prawns are starting to cook when they begin to float. This is caused by the formation of an air bubble under the shell as the flesh cooks and shrinks. Typically prawns will be cooked after a further minute when floating.

- Once product is cooked it should be placed into a tank of iced salt water for at least two (2) minutes. This is to ensure the cooking process is halted immediately. If ice is not available or in limited supply, the prawns may be first cooled in running **clean** seawater to reduce the temperature and stop the cook.

Product should then be drained for one (1) minute, packed, and frozen immediately.

A probe that can be used to measure exactly the degree of cooking in prawns is being developed by the Centre For Food Technology.

Notes:

Cooked prawns are ready to eat products and have strict bacteria standards.

It is, therefore, vital that the tank used for cooking is completely clean and only fresh clean sea water is used for ice and cooling.

Thoroughly wash hands and wear clean gloves to handle cooked prawns

Never handle cooked and raw prawns at the same time. If possible, have one person responsible for handling, cooling and packing the cooked prawns, and another person in charge of loading raw prawns. Always use new clean packaging.

The cooking process will kill off any harmful bacteria, but the cooked prawns are easily re-contaminated with bacteria from handling, or dirty tanks.

Have samples tested on land for bacteria (microbiology) to check the process.

6. Product Unload

Whilst the trawler crew may have little control over the shipment of product to distant markets, they are responsible for ensuring the quality of product packed on board is maintained when transferred to a mother ship, container or truck.

Product unload often happens at the end of a long voyage when the crew are tired and ready to go home. Lack of attention at unload, however, can result in irreparable damage to product.

The two main problem areas are temperature and damage.

Temperature

The temperature of the product must be maintained at the most -18^{0}C during unload and transport.

Whilst the cartons will hold their cold for some time they should be kept out of the sun at all times and loaded into the transport as quickly as possible.

Doors should be shut and refrigeration turned on whenever there is a break in loading and the skipper or mate should ensure that the temperature of the transport is down to -18^{0}C or lower before releasing the goods.

Damage

Dropped cartons often result in broken prawns. The colder the carton the more risk of breakage. Even sliding cartons can result in breakage when the carton stops suddenly.

Dropping cartons also results in carton damage. Torn cartons can expose prawns leading to freezer burn.

Ruptured liners within a carton can also result in freezer burn.

Temperature has a very big impact on damage.

Cartons in a warm atmosphere will attract condensation from the air. This can result in ice on the cartons, cartons sticking together and further damage to prawns when cartons are prized apart.

Transport

Transport containers and trucks should be fitted with continuous temperature monitoring devices to ensure your product is kept frozen at constant temperature throughout the journey.

A formal agreement with the transport company that specifies transport and storage conditions, temperatures etc is recommended.

Never risk leaving an unload to others. If casuals are employed to help ensure they are supervised and told what to do, what not to do and why.

Australian Sea Caught Prawns

CODE OF PRACTICE

Part 3 - Fresh Prawn Catching & Landing

	Fresh Prawn Catching & Landing **CONTENTS**

Fresh Prawn Catching & Landing

INTRODUCTION

Quality Policy

On behalf of the industry, the policy of the Australian Prawn Promotion Association (APPA) is to promote Australian sea caught prawns harvested in ecologically sustainable fisheries that are of excellent quality and highly marketable. It is the industry's job to work with transporters, shippers, wholesalers and retailers to maintain the quality of the product so that customers know they are buying the world's best prawns.

This Code of Practice has been developed by APPA in conjunction with prawn fishers, prawn processors and their Associations to set a uniform national standard for prawn quality whilst ensuring food safety.

Our goal is to improve quality in every part of our industry. To survive we need it. Our customers demand it and our jobs depend upon it.

About this Code of Practice

The Code of Practice is in four parts:

Part 1 details the quality and food safety standards for freezer vessels and on-shore operations. Adherence to these standards will maintain and enhance the reputation of Australian sea caught prawns in both the international and domestic markets. The Australian Sea Caught Prawn logo may only be used by operators complying with the standard.

Part 2 provides Best Practice information and advice for vessels packing and freezing at sea. Much of the information is also relevant for land based processing.

Part 3 (this part) details the quality and food safety requirements together with Best Practice information for vessels catching and landing fresh prawns, often referred to as 'wet boats'.

Part 4 consists of a guideline for the implementation of a quality and food safety program to ensure compliance with the standard. A floppy disc is included containing templates that may be modified to suit individual operations.

The guideline is consistent with the requirements of export Food Processing Accreditation (FPA) issued by the Australian Quarantine and Inspection Service.

Further Parts may be added to this Code and existing sections amended in a continuing effort to improve standards.

Amendments will be issued by APPA to all registered holders of the Code. To ensure you have the latest issue, any amendments will be issued together with a new contents page showing the date of issue of each section. Check the date of the contents page against the date on the bottom of each section.

Comments and suggestions are welcome and should be sent to:

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Deakin West ACT 2600

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Fax: (02) 6281 0438
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This Code of Practice was initially prepared by The Australian Prawn Promotion Association with funding provided by the Commonwealth Department of Industry Science and Tourism. Modifications and extensions to the Code were completed with financial assistance from The Fisheries Research and Development Corporation

A) Sorting

Sorting involves two separate tasks:

1. Sorting prawns from incidental by catch and returning the by catch to sea.

2. Separating out soft, broken and other defective prawns, together with non-target prawn species.

During initial landing and sorting, every effort must be made to ensure that all incidental by-catch is rapidly returned to sea. The use of by-catch reduction devices and/or a mesh grid over the sorting table to catch and easily sort the larger by-catch is recommended.

Retention of some by-catch species may be permitted depending upon local fisheries regulations. Any retained by-catch must be handled and stored to minimise deterioration.

If prawns are sold 'sorted for defects' then the following must be removed and the damaged prawns stored separately as *soft and broken prawns.*

Soft shell – soft to the touch; shell insufficiently hardened after moult.

Loose head – membrane attaching the head broken; head drops 45^0 or more.

Broken/Damaged prawns – e.g. damaged flesh; cuts through abdomen into flesh; missing telson and tail fins; rostrum and both eyes missing; broken shell.

Note: prawns with part of the rostrum or part of the tail fins or one eye missing or small cuts in the shell not extending into the flesh are not defective.

If different species of prawns are caught and sold as separate species, then sorting by species must also be carried out. Where a number of different species may be caught, laminated photographs of the species and names kept close to the sorting deck may be useful for crew training.

Where fresh prawns are sold as "sorted for defects and species" then the maximum total defects/wrong species is 5% by number

B) Grading

Fresh prawns sold 'ungraded' or 'run of catch' are immediately transferred to storage tanks after sorting.

Some customers require prawns to be graded into large, medium, and small. Since the definition of 'large' may vary for each fishery it is recommended that standard prawn size limits be used. For instance, large may be under 10 per lb weight, each prawn weighing 46gm or more.

The standard should be agreed between the fishermen and the buyers.

Experienced crew may grade by hand very rapidly and accurately. A set of balance scales should be used to check accuracy during sorting. Actual size photographs, models of prawns and other devices can also be used to visually guide the sorting process.

C) Storage

Prawns deteriorate rapidly after catch. Sorting must be rapid and the prawns chilled as fast as possible.

Prawns are stored in refrigerated brine prepared from potable water and food grade salt or refrigerated seawater in tanks.

Tanks must be clean before use and only used for storing prawns. Where seawater is used this must be collected at sea a minimum of 5 km from coast or estuary.

Tanks must be pre-chilled to a maximum 2^0C (target –1.5°C) before trawling and of sufficient capacity to ensure temperature does not rise above 5^0C when loaded. Temperatures of tanks are recorded on the "Catch Record".

Small quantities of defect prawns may be kept in separate baskets in the refrigerated brine/sea water.

Tanks must be protected from birds and contamination at all times.

Brine/seawater tanks are not recommended for metabisulphite treating prawns. Provided product is loaded quickly into chilled tanks and the tanks not overloaded, cooling of prawns should be rapid enough to prevent black spot.

If metabisulphite is used the method should be written down and product checked for residual sulphur dioxide. For information on 'meta' use see Part 2 of this Code.

D) Unload

The aim of fresh prawn catching and landing is to unload prawns in peak condition either for further processing and packing or immediate sale.

The skipper and crew are responsible for ensuring that transfer of product from boat to land occurs without any risk of contamination or deterioration.

Unload must, therefore, be quick into clean bins that are transported in refrigerated trucks ensuring the product is protected from contamination.

Remember, the trawler crew's reputation is transferred to the buyer with the prawns. Make sure you know the controls on quality and product safety applied by the buyer.

Quantities of prawns unloaded should be recorded on the 'Catch Record'.

A) Food Additives

Food Additives may only be used on prawns if allowed by legislation and must be declared.

Generally food additives are not used during handling of fresh prawns. Occasionally it may be necessary to protect prawns against the formation of black spot.

The chemical most commonly used to prevent black spot is sodium metabisulphite, either alone or in combination with other chemicals. The use of sodium metabisulphite is permitted in both the domestic and export food regulations

Limits on residual 'meta' measured as sulphur dioxide (SO_2) are imposed as it can cause allergic reactions in some people particularly anyone suffering from asthma.

The following standards apply:

		Raw Prawns	Cooked Prawns
Australia	Maximum residual SO_2	30 ppm	NIL
Export	Maximum residual SO_2	100 ppm	30 ppm

Residual sulphur dioxide testing must be carried out on the flesh of the prawn only.

The use of the non-sulphite treatment 4-hexylresorcinol (the chemical in Everfresh) is permitted for uncooked prawns in both domestic and export sale. 4-hexylresorcinol is an additive and must be declared on the cartons

Note the general permission for a food additive in the export regulations does not imply that the additive is permitted by all importing countries.

Note also that the Australian maximum SO_2 residual may be raised to the Export level in legislation planned for gazettal in late November 2000.

B) Microbiological Limits

Raw prawns are usually cooked before consumption. However raw prawns must be handled at all times to prevent contamination by bacteria, chemicals or foreign matter.

A specific microbiological standard for raw prawns is proposed in Australian regulations planned for gazettal in late November 2000, and will be adopted by this Code when introduced.

Cooked prawns are ready to eat and therefore have strict microbiological limits. The standards are:

	Cooked/Frozen	Cooked Chilled
Standard Plate Count (max)	1 x 10^5 per gm	1 x 10^6 per gm
Salmonella	NIL	NIL
E. coli (max)	9 per gm	10 per gm
Coagulase Positive Staphylococci (max)	500 per gm	500 per gm

Note, a nil tolerance for *Listeria monocytogenes* in cooked prawns is also proposed in the revised Australian regulations.

If the addition of metabisulphite to prawns or cooking of prawns on board is carried out, further information and advice is provided in Part 2 of this Code Of Practice.

Construction

Appropriate construction of vessels, the use of suitable equipment and the provision of adequate services – water, refrigeration, etc., is essential for the hygienic handling of prawns.

Construction equivalent to or meeting the AQIS requirements is assumed in this standard. For non-registered vessels some of the issues to consider are given below, extracted from the International Codex Code of Practice for Fish and Fishery Products (1997).

To prevent contamination:

- bilge, oil, grease, drainage, etc. cannot contaminate prawns
- surfaces in prawn handling areas are smooth, impervious, non-toxic
- adequate hand washing and toilet facilities
- plumbing and waste lines can cope with peak demand
- clean sea water intake away from waste outlet
- prevent entry of birds, vermin, pests

For ease of cleaning:

- all prawn contact surfaces are corrosion resistant, smooth, easy to clean
- vessel construction avoids sharp corners to eliminate dirt traps
- construction allows ample drainage
- good supply of clean sea water or potable water at adequate pressure

To minimise damage to prawns:

- surfaces have no sharp corners or projections
- basket storage avoids excessive pressure on prawns
- if kept in r.s.w. prawn density controlled to prevent damage
- chutes and conveyors prevent physical damage from long drops

To minimise spoilage:

- design minimises exposure of prawns to elements
- design permits quick and efficient handling of prawns
- facilities for storage of ice
- if chilled sea water used, adequate cooling capacity

Note also spoilage and damage can be affected by operational considerations such as trawl times.

Cleaning

Without clean surfaces and equipment there will always be a chance of contamination. An effective and monitored cleaning program is essential.

Cleaning programs often fail because:

- the cleaning methods are not effective
- the crew are not trained how to clean
- the cleaning tools or chemicals are unsuitable

Cleaning programs are best decided between the skipper and the chemical supplier. Typically there are four steps in cleaning.

1. Remove loose dirt – brushing or hosing surfaces, bins, etc. removes much dirt and reduces chemical use.

2. Wash – using detergents that help break down fats and grease. Washing does not necessarily remove all bacteria.

3. Sanitise – reduce bacteria to low levels using sanitising chemicals or very hot water (70-80^{0}C). Follow sanitiser instructions as there may be a minimum contact time for effectiveness and the sanitiser may need to be rinsed off afterwards.

4. Dry – bacteria love water, so drying prevents them growing or being transferred on wet surfaces.

Crew/staff should be trained in the cleaning program, observed carrying it out and occasionally re-tested to ensure no mistakes are being made.

Ensure that the tools are adequate for the job, e.g. hose has sufficient pressure to remove dirt/rinse, brushes are clean and complete, and chemicals are used in sufficient quantities.

A Typical cleaning schedule may be:

Before Trawling

- Ensure all sorting tables, tanks, baskets and buckets are cleaned, sanitised and rinsed with clean water before use.

- Always follow the manufacturers' instructions for the use of cleaning chemicals. Material Safety Data Sheets should be kept on board.

After each Trawl

- After each shot has been processed the deck area should be hosed down and free of any foreign matter – dead fish/weed, etc.

- All sorting tables to be rinsed clean of prawn juice and foreign matter.

After each Unload

- Ensure all equipment is cleaned and sanitised in readiness for the next day's trawling.

- Ensure toilets, hand basins and other crew amenities are cleaned and soap, towels, nailbrushes etc. replaced as required.

N.B. Tanks/buckets used for storing prawns must never be used for any other purpose

Personal Hygiene

Prawns are food and all crew should be aware of and practice good personal hygiene. In principle there should be no difference between hygiene practices on board boat and shore based processing.

It is suggested that notices detailing the hygiene standards are laminated and fixed in prominent locations. Minimum standards are:

- Hands must be washed after going to the toilet or returning to the process area after a break

- Cuts and sores must be kept covered when handling prawns

- Smoking must not be allowed anywhere near product

- No food/eating in the process area during processing

If cooking on board there should be a specific cleaning schedule for cooking equipment, plus extra personal hygiene controls. For example, crew handling cooked prawns should not also handle raw prawns unless precautions are taken, e.g. hand washing/change of gloves before handling cooked.

Crew should be taught why hygiene is important as well as trained in how to wash and dry hands thoroughly, etc. Crew should be observed regularly to check compliance.

Sickness

Any person suffering from diarrhoea or an infectious disease must not handle prawns. An accident/sickness record book is useful to record all incidents.

Fresh Prawn Catching & Landing

3 B) Training

Training of crew in safety on board trawlers is a necessity.

Training of crew in hygienic handling of prawns, cleaning methods, prawn defect identification, grading etc. is also important in order to produce safe quality products.

Every member of the crew must know their own responsibilities and the responsibilities of others. Typical responsibilities are listed below.

Skipper

- must ensure the safety of crew and vessels at all times
- must ensure all crew are trained in the use of all equipment
- must ensure all crew are trained in quality and hygiene procedures
- is responsible for trawling only in defined locations for the optimum time with regard to quality and efficiency
- must ensure the sea water storage tanks are filled with clean sea water and chilled prior to trawling for prawns

Crew

- must work within safety requirements at all times
- must comply with all hygiene requirements before handling prawns
- are responsible for sorting, grading and chilling of prawns in accordance with this Code
- must inform the skipper of any circumstances that may affect the ability of the crew to maintain quality and safety standards

Certificates in Fishing Operations and Seafood Processing are now providing recognition of competence in jobs in the seafood industry. This may involve formal training but in many cases will acknowledge existing skills through *"recognition of prior learning"*.

Even with the development of training courses, most on board training in prawn processing will still be provided by other crewmembers.

Training on board usually involves three stages:

- Demonstration of how to carry out the task by the trainer
- Observation of the trainee carrying out the task
- Testing of the trainee by asking questions to verify that the crewmember understands the task and the reasons for doing it.

Training should be formally recorded and the trainee may require his or her training record when moving to another job to demonstrate their competence.

Training records are also important for occupational health and safety compliance and these can be added to the example training record below.

F.V. Freshness

Staff Training Check List

Date of issue 01.08.00

Crew ⇒ ***Task*** ⇓	*John. M*		*Mary .T*		*Tony. W*	
Induction	*jm 10/8*	*BJ 10/8 BJ5/9**	*mt 5/9*	*BJ 5/9*		
Safety on Board	*jm 10/8*	*BJ 10/8*	*mt 5/9*	*BJ 5/9*		
Personal Hygiene	*jm 11/8*	*BJ 11/8*	*mt 5/9*	*BJ 5/9*		
Net handling and repair	*jm 10/8*	*BJ 10/8*	*mt 5/9*	*BJ 5/9*		
Prawn sorting	*jm 10/8*	*BJ 10/8*	*mt 5/9*	*BJ 5/9*		
Prawn grading/storage	*jm 11/8*	*BJ 11/8*				
Cleaning Methods	*jm 12/8*	*BJ 12/8*				
Prawn Unload	*jm 12/8*	*BJ 12/8*				

Trainer and crew to sign and date when each task completed. Trainer to carry out refresher training as required and update check list(*)

Records

Records are essential for a number of reasons.

The Skipper's Log is used to record location of trawl. This is important not only to demonstrate compliance with any fisheries legislation, but also to ensure the safety of the prawns (not close to known areas of pollution) and environmental considerations (e.g. away from sensitive mangrove and seagrass areas).

As a guide average trawl times should not exceed one hour thereby ensuring the highest quality prawns and the highest possible survival rate of any incidental by-catch species. Recording trawl times in the skippers log allows comparison of quality after sorting with trawl time.

Total catch estimates may also be recorded in the skipper's log for compliance and fisheries management purposes.

A **Catch Record** provides information on species, quantities by size, quantities by quality (soft and broken), and prawn temperatures. The catch record will also allow product trace should the need arise. A dummy catch record form is included below.

Training Records provide evidence for occupational health and safety. They are also a useful checklist for training of new crew and allow recognition of prior learning for existing crew.

Other useful documents include cleaning methods, personal hygiene standards, descriptions or photographs of prawn defects, photographs of prawn species etc.

Vessel_____

Catch Record

Catch Date	RSW Temps (°C)		Prawn Temps	Weights recorded at unload (kg)						Signed
	tank 1	tank 2	Unload (°C)	Species	Large	Medium	Small	Soft/Broken	Total Catch	
8 June 2000	2°C	-1°C	3°C	King	135kg	106kg	54kg	31kg(#)	326kg	tp
9 June 2000	1°C	0°C	2°C	King	148kg	89kg	48kg	19kg	304kg	tp

Comments
8 June large quantity soft & broken mainly soft shell

(#) Record problems in comment section and advise crew of any recurring problems

Food Safety Plan

Increasingly regulatory authorities are requiring Food Safety Plans to be prepared by any business handling food.

Prawns may be at risk of contamination through unclean sorting tables, baskets and tanks; the use of contaminated seawater or from unhygienic handling of prawns.

Following the suggestions in this Code of Practice should ensure that prawns are safe to eat. Temperatures of prawns, training records, cleaning programs, etc. provide evidence of compliance with food safety and hygiene principles.

The addition of **sodium metabisulphite** to prawns may result in a food safety risk if the concentrations of 'meta' solutions are not carefully controlled. The sulphur dioxide given off by 'meta' is a lung irritant and can cause health problems.

Cooking of prawns is considered a 'high risk' process for food safety. This is because cooked prawns are ready-to-eat and if they contain any harmful bacteria, the person eating the prawns is automatically affected. High standards of hygiene for handling prawns from cook to consumption are essential.

Wet boats using chemicals containing sodium metabisulphite to prevent black spot or wet boats cooking prawns on board should request Part 2 and Part 4 of this Australian Sea Caught Prawn Code of Practice.

Part 2 provides further information on the use of metabisulphite and suggestions for safe handling of cooked prawns.

Part 4 contains guidelines for the preparation of food safety plans for 'meta' usage and prawn cooking.

Fresh Prawn Catching & Landing

3 D) Customer Service; Quality Commitment

Although wet boats are not preparing product for direct sale to the customer, they are the first link in the chain responsible for ensuring the highest quality product is available for ultimate sale.

The key factors in maintaining high quality from the moment of catch to unload are detailed in this Code.

Commitment to quality and customer service may be formalised by a statement from individual boat owners or their Associations along the lines of:

"We, the undersigned members of the XYZ Prawn Fishermen's Association, are committed to maintaining and enhancing the quality of prawns harvested in our fishery. We agree to abide by the principles and practices in this Code.

Signed

_____ *Owner/Skipper Vessel X*

_____ *Owner/Skipper Vessel Y*

etc."

This statement could be kept in a file with the completed records, master copies of cleaning programs etc.

Any comments from buyers/customers regarding quality or service should be recorded together with any action taken. This could simply be a note on the back of the relevant 'Catch Record' or a more formal 'Customer Comment Log" recording the date; customer comment; and response.

Australian Sea Caught Prawns

CODE OF PRACTICE

Part 4 - Guidelines for Complying with the Prawn Industry Quality Standard

	Prawn Quality Standard Guidelines
	CONTENTS

Prawn Quality Standard Guidelines

INTRODUCTION

Quality Policy
On behalf of the industry, the policy of the Australian Prawn Promotion Association (APPA) is to promote Australian sea caught prawns harvested in ecologically sustainable fisheries that are of excellent quality and highly marketable. It is the industry's job to work with transporters, shippers, wholesalers and retailers to maintain the quality of the product so that customers know they are buying the world's best prawns.

This Code of Practice has been developed by APPA in conjunction with prawn fishers, prawn processors and their Associations to set a uniform national standard for prawn quality whilst ensuring food safety.

Our goal is to improve quality in every part of our industry. To survive we need it. Our customers demand it and our jobs depend upon it.

About this Code of Practice

The Code of Practice is in four parts:

Part 1 details the quality and food safety standards for vessel and on-shore operations. Adherence to these standards will maintain and enhance the reputation of Australian sea caught prawns in both the international and domestic markets. The Australian Sea Caught Prawn logo may only be used by operators complying with the standard.

Part 2 provides Best Practice information and advice for vessels packing and freezing at sea. Much of the information is also relevant for land based processing.

Part 3 details the quality and food safety requirements together with Best Practice information for vessels catching and landing fresh prawns, often referred to as 'wet boats'.

Part 4 (this part) consists of a guideline for the implementation of a quality and food safety program to ensure compliance with the standard. A floppy disc is included containing templates that may be modified to suit individual operations. The guideline is consistent with the requirements for export Food

Processing Accreditation issued by the Australian Quarantine and Inspection Service.

Further Parts may be added to this Code and existing sections amended in a continuing effort to improve standards.

Amendments will be issued by APPA to all registered holders of the Code. To ensure you have the latest issue, any amendments will be issued together with a new contents page showing the date of issue of each section. Check the date of the contents page against the date on the bottom of each section.

Comments and suggestions are welcome and should be sent to:

The Australian Prawn Promotion Association Ltd
PO Box 97
Deakin West ACT 2600

Phone: (02) 6281 7220
Fax: (02) 6281 0438
Email appa@appa.org.au

This Code of Practice was initially prepared by The Australian Prawn Promotion Association with funding provided by the Commonwealth Department of Industry Science and Tourism. Modifications and extensions to the Code were completed with financial assistance from The Fisheries Research and Development Corporation

Prawn Quality Standard Guidelines

1 Commitment and Authorisation

Commitment

The Prawn Industry Quality Standard could be adopted by a single prawn trawler owner or processing factory, a fleet of trawlers or an integrated operation of trawlers and processors. The Standard could apply on its own or be part of a more comprehensive company or fleet operations manual.

The Prawn Industry Quality Standard is intended to enhance the reputation and value of Australian sea caught prawns in the export and domestic markets by providing consistent quality whilst ensuring food safety.

Commitment to the supply of quality safe prawns through the setting up and maintenance of a Food Quality and Safety Program by the owner/skipper/managing director is an essential starting point. This may be included in a company policy covering a range of issues or a simple statement such as:

"ABC Prawn Trawlers and Processors aim to provide customers with prawns of a consistent high quality. To help us achieve this we have adopted the Australian Sea Caught Prawn Industry Quality Standard. My fellow directors/managers and I are committed to maintaining this Standard in all our operations.

(signed) ----------

Managing Director"

If all operations of the company or vessel are covered under the Standard no further explanation is necessary. However, if only certain vessels or factory operations are included it may be necessary to define the scope, for instance:

"This standard applies to the catching, handling and storage of prawns on the vessels –

ABC Premium
ABC First
ABC Excellence

together with all prawn processing operations at the ABC Processors Pty Ltd factory."

Authorisation

The Export Control Processed Food Orders include the provision for "Authorised Signatories" who may sign export clearance documentation. This ensures that someone who understands the systems and the products is satisfied that all the checks have been carried out and the prawns are suitable to be shipped.

Similarly, it is important that one person is responsible for updating and checking the effectiveness of the quality system, whilst a limited number of other people are authorised to approve product being shipped direct to customers.

For example:

"The Prawn Industry Quality Standard documentation is updated and (at least) annually reviewed by the ABC Quality Supervisor (name). Changes require approval by the Managing Director.

In addition to the Quality Supervisor, the following staff are authorised to approve product for shipment:

Skipper ABC Premium
etc."

Note – if this standard is adopted by a single vessel this may simply be:

"Changes to this document may only be made by the skipper, whilst the mate is authorised to approve product for shipment."

2. Staff Responsibilities and Training

Responsibilities

Consistently meeting customer standards for quality and food safety requires staff and crew to have clearly defined responsibilities and be thoroughly trained to carry out their tasks.

The Authorised Signatory system of AQIS is a good example of assigning responsibility. The person signing the export documentation must be certain that all the tasks have been carried out and the product is suitable for shipment. This may involve a physical check of product or a review of documentation.

Some examples of responsibilities for prawn trawler crews are included on the floppy disc. The extent to which companies formalise responsibilities with written documents is a matter of individual choice. Usually the larger the company or the more diverse their operations the greater the need for formality.

It is no use having a number of staff trained to carry out a particular task, but nobody actually doing it as everyone thought it was somebody else's responsibility.

Training

Recognition of competence in jobs in the seafood industry is now being provided by Certificates in Fishing Operations and Seafood Processing. This may involve formal training but in many cases will acknowledge existing skills through *"recognition of prior learning"*.

Even with the development of training courses, most on board training in prawn processing will still be provided by other crewmembers.

Training on board usually involves three stages:

- Demonstration of how to carry out the task by the trainer
- Observation of the trainee carrying out the task
- Testing of the trainee by asking questions to verify that the crewmember understands the task and the reasons for doing it.

Training should be formally recorded and the trainee may require his or her training record to demonstrate their competence when moving to another job.

Training records are also important for occupational health and safety issues and these can be added to the example training record below.

Vessel	Training Record		Date of Issue	
Crew Member		Title		
Activity	Training Reqd	Date of Training/ Trainer	Due Date Refresher	Actual Refresher/ Trainer
Safety on board	√	6.3.2000 – TW	6.4.00	
Personal hygiene & prawn handling	√	7.3.2000 – JS	7.6.00	
Cleaning-processing	√	7.3.2000 – JS	7.6.00	
Cleaning – other	√	8.3.2000 – JS	8.6.00	
Sorting/grading	√	9.3.2000 – JS	9.6.00	
Defect Identification	√	9.3.2000 – JS	9.4.00	
Weighing/ctn marking	√			
Freezer loading/ operation	√			
Prawn cooking	√			
Net handling & repair				
etc				
For training required tick each activity to be trained; record and sign when training complete and set a refresher date				

For a small operation, e.g. a prawn trawler, a single training record covering all crew may be sufficient. An example is provided with the floppy disc.

3 Cleaning and Personal Hygiene

Construction

In the majority of cases vessels and factories are already registered with AQIS for export, notable exceptions being wet boats.

Appropriate construction of vessels and factories, the use of suitable equipment and the provision of adequate services – water, refrigeration, etc., is essential for the hygienic handling of prawns.

Construction equivalent to or meeting the AQIS requirements is assumed in this standard. For non-registered vessels some of the issues to consider are given below, extracted from the International Codex Code of Practice for Fish and Fishery Products (1997).

To prevent contamination:

- bilge, oil, grease, drainage, etc. cannot contaminate prawns
- surfaces in prawn handling areas are smooth, impervious, non-toxic
- adequate hand washing and toilet facilities
- plumbing and waste lines can cope with peak demand
- clean sea water intake away from waste outlet
- prevent entry of birds, vermin, pests

For ease of cleaning:

- all prawn contact surfaces are corrosion resistant, smooth, easy to clean
- vessel construction avoids sharp corners to eliminate dirt traps
- construction allows ample drainage
- good supply of clean sea water or potable water at adequate pressure

To minimise damage to prawns:

- surfaces have no sharp corners or projections
- basket storage avoids excessive pressure on prawns
- if kept in r.s.w. prawn density controlled to prevent damage
- chutes and conveyors prevent physical damage from long drops

To minimise spoilage:

- design minimises exposure of prawns to elements
- design permits quick and efficient handling of prawns
- facilities for storage of ice
- if chilled sea water used, adequate cooling capacity

Note also spoilage and damage can be affected by operational considerations such as trawl times.

Cleaning

Without clean surfaces and equipment there will always be a chance of contamination and therefore a potential food safety risk. Whilst this is obviously true for cooked prawns, raw prawns will deteriorate faster and spoil earlier if contaminated.

An effective and monitored cleaning program is an essential part of the Prawn Industry Quality Standard. Cleaning programs often fail because:

- the cleaning methods are not effective
- the crew are not trained how to clean
- the cleaning tools or chemicals are unsuitable

Cleaning programs are best set up between the person responsible for cleaning (e.g. mate) and the chemical supplier. Typically there are four steps to cleaning.

1. Remove loose dirt – brushing or hosing surfaces, baskets, etc. removes much dirt and reduces chemical use.

2. Wash – using detergents that help break down fats and grease. Washing does not necessarily remove all bacteria.

3. Sanitise – reduce bacteria to low levels using sanitising chemicals or very hot water (70-80^{0}C). Follow sanitiser instructions as there may be a minimum contact time for effectiveness and the sanitiser may need to be rinsed off afterwards.

4. Dry – bacteria love water, so drying prevents them growing or being transferred on wet surfaces.

Crew/staff should be trained in the cleaning program, observed carrying it out and occasionally re-tested to ensure no mistakes are being made.

Ensure that the tools are adequate for the job, e.g. hose has sufficient pressure to remove dirt/rinse, brushes are clean and complete, and chemicals are used in sufficient quantities.

Make sure dry storage areas are kept clean, dry and free of pests/vermin. There should be a specific location for chemical storage with laminated safety precautions and usage instructions kept nearby.

The Prawn Industry Quality Standard requires a written program and monitoring of cleaning. One method of achieving this is to draw up a schedule detailing the tasks, methods, frequency of cleaning and the crew or staff member responsible. For example:

F.V. ABC Excellence - Cleaning Schedule		
Task/Method	Frequency	Responsibility
Amenities - Toilets/Shower/Hand basins, etc. Check soap, brushes, paper and general cleanliness, rinse if necessary	Daily	Joe
Spray and wipe all surfaces with 'Chemical X' solution, scrub toilets with neat 'toilet aid', mop floors with 'toilet aid' diluted 1 cap per bucket hot water	Weekly	Joe
Operational Areas Deck/Sorting Hose down deck and tables prior to unloading catch; rinse again between shots; hose at end of day.	Daily	Fred
Spray tables with detergent/sanitiser solution 'Chemical Y' diluted 1 cap per bucket. Leave 10 minutes, rinse off	2x per week	Fred
Baskets	-	-
Carton Store	-	-
Blast Freezer	-	-
etc. etc.		

Personal Hygiene

Prawns are food and all staff handling prawns should be aware of and practice good personal hygiene. In principle there should be no differences

in hygiene practices on board boat compared with shore based processing, particularly if product is packed on board for direct shipment to customers.

It is suggested that notices detailing the hygiene standards are laminated and fixed in prominent locations. Minimum standards are:

- Hands must be washed after going to the toilet or returning to the process area after a break
- Cuts and sores must be kept covered when handling prawns
- Smoking must not be allowed anywhere near product
- No food/eating in the process area during processing

If cooking on board there should be a specific cleaning schedule for cooking equipment and area, plus extra personal hygiene controls. For example, crew/staff handling cooked prawns should not also handle raw prawns unless precautions are taken, e.g. hand washing/change of gloves before handling cooked.

It should be explained to staff why hygiene is important as well as training in how to wash and dry hands thoroughly, etc. Staff/crew should be observed regularly to check compliance.

Sickness

Any person suffering from diarrhoea or an infectious disease must not handle prawns. An accident/sickness record book is useful to record all incidents and reports.

4. Food Quality & Safety Plan

Ensuring that prawns are safe to eat is an automatic requirement of the Prawn Industry Quality Standard. AQIS and most regulatory agencies use the Hazard Analysis and Critical Control Point (HACCP) technique to identify food safety hazards and any necessary controls. The technique can also be used to identify the points where quality controls are applied and a combined safety and quality approach may be useful, particularly on board boat.

For the examples below prawn trawlers are considered, but the principles apply equally to factories.

Process Flow

Despite the difficult name, the HACCP technique is quite logical and fairly easy to apply. Firstly, all the steps in the process need to be identified. For a prawn trawler the steps might be:

- trawling
- landing
- sorting
- grading
- dipping
- packing & weighing
- freezing
- frozen storage
- unload

The steps may differ for different vessels and operations, for instance dipping may occur before grading, wet boats do not freeze and cooking has a different flow. The steps should be written down as they actually happen on board.

Hazard Analysis

For each step ask the following questions:

- Is there any potential food safety or wholesomeness hazard or risk?
- What could go wrong?
- If combining quality and safety, what could go wrong that affects quality?

Sometimes it is difficult to distinguish between quality and safety. For instance, excessive trawl times may result in long dead, deteriorating prawns.

This may or may not be a food safety hazard, but the chances are the prawns are also damaged and would be rejected on quality.

Possible hazards for each of the steps might be:

Process Step	Potential Hazard
Trawling	Fishing in contaminated waters; impact of trawl time and emptying nets on prawns - damaged, deteriorating
Landing	Contaminated sorting tray, contamination from other fish, or left over prawns on tray
Sorting	Spoilage/black spot from sorting in hot/sun. Damaged prawns; contamination from other fish
Grading	No safety hazard, but quality hazards – wrong grade, wrong species, prawn defects, long time resulting in black spot
Dipping	Too much metabisulphite is a safety hazard, too little leads to black spot. Contaminated dip water
Packing & Weighing	Wrong weights, packaging, labelling, excess water (all quality or trade description hazards)
Freezing	Spoilage from too slow or insufficient freezing
Frozen Storage	Deterioration, black spot formation if temperature fluctuates
Unload	Deterioration from too long out of the freezer, damage from poor handling

Critical Control Point

Having identified potential hazards, what controls are in place to prevent potential hazards from becoming real ones? Strictly, critical control points only apply to food safety hazards, e.g. meta concentration or cooking time/temperature for cooked prawns. In practice, the distinction between critical food safety controls and quality controls may not matter provided there is particular attention to critical control points and these are controlled tightly.

For each control point there must be a "*target and tolerance*" (limits). For example, frozen storage may have a *target –20^{0}C, tolerance + or - 2^{0}C.*

Setting limits is fine, but who checks them, how often and where are the results recorded? These are the "*monitoring procedures*". In the hazard analysis table the person or job function of the person responsible for checking must be identified.

Finally, if temperatures are outside limits, product out of grade, what "*corrective action*" is taken? This is most important.

An example of a complete hazard analysis table for raw whole prawns is provided below. Each vessel/fleet should carefully check their own processes before preparing their own table.

In the example, critical control points have been identified in ***bold and italics*** to highlight their importance.

Name of Vessel	Hazard Analysis Table – Raw Prawns			Date of Issue	
Process Step	**Potential Hazard**	**(Critical) Control Point**	**Monitoring Procedure & Recording**	**Target & Tolerance**	**Corrective Action**
Trawling	Contaminated prawns Damage/deterioration	Location Time	Trawling in approved location; Visual check of product on landing. Recorded in skippers log	No tolerance wrong location. Trawl time dependent on conditions, monitored but not fixed	Reject catch from wrong location; adjust trawl time to maximise prawn quality
Landing	Contamination on tray	Visual Clean tray	Mate ensures sorting tray empty & cleaned between shots as cleaning schedule – not recorded	No left over prawns Clean tray No tolerance	If prawns unloaded onto previous catch, check product after freezing for quality & black spot
Sorting	***Spoilage, damaged prawns, contamination***	***Visual Time***	***Crew sort & separate other fish, all defective & diseased prawns. Prawns protected from sun (if day catch);***	***No defective or diseased prawns retained No black spot (no delay)***	***If delays, prawns checked after freezing for eating quality & black spot***
Grading	Incorrect grades, species, defects contamination	Visual Product standards	Crew rinse prawns with clean water then grade according to procedures; Random check by mate, recorded in production log.	As product specifications	Product re-graded or cartons re-labelled to alternative specification
Dipping	***Insufficient/excess (unsafe) meta***	***Solution make up Quantity Time***	***Mate prepares dip; crew dip to set time/quantity before replacing – dip procedure & production log, external testing***	***Max 30 ppm residual domestic Max 100 ppm residual export***	***Product held for testing by laboratory & re-packing/processing as appropriate***
Packing & Weighing	***Incorrect weight/ Package (trade description) Excess water***	***Visual Weights***	***Mate ensures packaging marked, scales tared. Crew pack after draining prawns, marking grades & weight. Totals recorded in packing log***	***All weighed = or > net weight Correctly marked cartons***	***Re-pack underweight or wrongly marked cartons***

Name of Vessel	Hazard Analysis Table – Raw Prawns			Date of Issue	
Process Step	**Potential Hazard**	**(Critical) Control Point**	**Monitoring Procedure & Recording**	**Target & Tolerance**	**Corrective Action**
Freezing	***Microbiological Spoilage***	***Temperature Time***	***Mate loads freezer to ensure good air flow, checks freezer operating temperature – packing log`***	***Freezer max –30⁰C Product –18⁰C or colder after 12 hrs***	***Continue freezing if not cold enough; repair refrigeration. Check frozen product for quality & black spot***
Frozen Storage	Spoilage	Temperature	Storage temperatures checked by engineer & recorded in packing log	Target –25⁰C Max –18⁰C Min –30⁰C	Transfer to blast freezer if temp warms above –18⁰C. If above –12⁰C hold – do not export
Unload	Deterioration Damage	Visual Time Temperature	Mate checks temperature before unload. Product unloaded rapidly & carefully direct to freezer storage/truck. Transfer certificate prepared	Max –18⁰C at unload. No delays	Do not unload if product warm, transport unsuitable. Separate for assessment any dropped/damaged cartons

Although the table may look complicated, it concisely describes the process from trawl to unload, identifying the tasks, responsibilities, controls and limits together with the action to be taken if the limits are exceeded.

The example table refers to three documents – skippers log, production log and packing log. Some documentation is already required for legal and operational reasons. Where possible the same form should be used to record the quality information (e.g. checks on grading) and safety information (e.g. freezer temperatures). The documentation provides assurance to the customers and also provides a trace back to time of packing if a problem is encountered later on.

It is recommended that a random carton of product from each shot is assessed by the mate or senior member of the crew, either during production or after defrost the next day. This ensures that any grading or packing problems can be rectified before the product is shipped and any systematic errors, e.g. wrong tare on the scales, picked up before the next catch. This is part of the verification process. Regular checking of sulphur dioxide residuals in a laboratory against expected levels is also part of verification.

Examples of typical production and packing logs are given in Section 5 Production Records.

Cooking on Board – Hazard Analysis

Cooked prawns are ready-to-eat, therefore the hygiene and cooking process must be strictly controlled to ensure the prawns are safe to eat. Cooking procedures also need to be strictly controlled to ensure the safety of crew boiling prawns on a moving vessel.

A Process Flow needs to be prepared identifying the steps in the process. For example:

- Prepare boiling water
- Add pre-graded prawns
- Cook
- Cooling in sea water
- Packing
- Freezing

The Potential Hazards should be identified, e.g.

Process Step	Potential Hazard
Prepare boiling water	Contaminated cooker & water Too much water (safety of crew)
Add pre-graded prawns	Undercooking if size varies greatly Splashing (safety of crew)
Cooking	Undercooking (food safety) Overcooking (quality)
Cooling in clean sea water	Contaminated water Insufficient cooling(spoilage)
Packing	Contamination at packing
(Freezing	Same as raw prawns)

As previously, each identified hazard requires a Control Point. Each control point should have a target and limits set. There needs to be a monitoring procedure and corrective action.

By identifying all potential hazards and introducing controls problems can be avoided. For instance, the cooking process does not kill all bacteria, but provided the prawns are rapidly chilled those that remain cannot grow. If, however, the prawns are only slightly chilled and subsequently packed for freezing, the prawns may remain at ideal bacteria growth temperatures (30-50^{0}C) for long enough to spoil before freezing.

An example of a complete hazard analysis table is provided. If other steps are carried out, e.g salt addition to the cook water, this should be included (note: ensure the use of food grade salt). If clean seawater cannot be guaranteed cooling must be in potable water with ice. Again critical control points have been identified in ***bold and italics.***

The table refers to 'crew'. When preparing the table for a specific cooking operation, the crew or staff member responsible for each step must be clearly identified.

Steps common to both raw and cooked processes need not be repeated for cooked if the hazards and controls do not vary. This is the case for freezing, but the packing step has been included in both tables because of the need for srict hygiene precautions with cooked product

Verification of the cooking procedure will require microbiological testing of the product. Details of the number of batches cooked will be recorded on the production log. The cooking procedure should be written and available to the crew, who must be trained before being allowed to cook without supervision.

Name of Vessel	Hazard Analysis Table – Prawn Cooking		Date of Issue		
Process Step	**Potential Hazard**	**(Critical) Control Point**	**Monitoring Procedure & Recording**	**Target & Tolerance**	**Corrective Action**
Prepare boiling water	Contamination Scalding	Cleaning checks Visual	Crew checks cooker clean, uses clean sea water – fills only to half level, burners full on Ref cooking procedure	No tolerance hygiene	Re-clean cooker, rinse & replace water
Add pre-graded prawns	***Undercooking (microbiological)***	***Visual***	***Crew adds specified quantity of graded prawns- visually checking size. Ref cooking procedure***	***Visually to target grade. Max qty prawns predetermined***	***Re-grade prawns before cooking***
Cooking	***Undercooking (microbiological)***	***Visual Time***	***Crew cooks for at least min specified time & visually checks prawns at end of cook. Ref cooking procedure.***	***No tolerance for undercooking***	***Re-cook if undercooked Overcooked keep chilled for taste test before packing***
Cooling in sea water	***Contamination***	***Visual***	***Crew removes cooker basket, places in tank with running sea water***	***Clean sea water for min 3 minutes***	***Reject if contamination Re-cool if time short***
Packing	***Contamination Underweight***	***Visual Wt check***	***Crew drains prawns & packs into clean lined cartons wearing clean gloves. Cartons check weighed before sealing***	***No tolerance hygiene Min net wt as declared***	***Reject any prawns at risk of contamination Hold for re-checking if underweight suspected***

Procedures

It is not always possible to include detailed process information in the hazard analysis tables. The raw prawn table referred to a prawn dipping procedure and the cooked table to a prawn cooking procedure.

Prawn dipping and prawn cooking are important processes where failure to carry out the instructions correctly could have major financial or food safety consequences. Detailed written instructions or 'procedures' are recommended to ensure that crew do not have to rely on memory.

An example of a prawn dipping procedure and a prawn cooking procedure is provided on the accompanying disc.

5. Production Records

The Prawn Industry Quality Standard requires records to be kept.

A production record is important not only to identify what product has been produced but also for product trace.

Should there be a concern with wholesomeness or safety of prawns in the market, then the ability to trace prawns back through the distribution chain to the producer can be very beneficial. The records may help to define the limits of the problem and reduce the quantity of prawns held under suspicion. Hopefully they may also identify that prawns from the particular vessel or factory are not implicated in the problem.

Records of quality assessments, residual sulphur dioxide levels, microbiological results on cooked prawns, etc. also provide assurance of the ongoing maintenance of quality and meeting customer requirements.

Examples of a production log and packing log for vessels are provided. It is assumed that the skippers log contains statutory information for fisheries compliance together with catch location, trawl conditions and time.

It is also assumed that transfer certificates are generated at unload, otherwise a sales record is also required to identify what product was sold, when, and to whom.

Vessel			Production Log					Date of Issue						
Catch Date	Shot No	Prawn Baskets	Qty Prawns approx	Qty S&B approx	Meta bags used / baskets cooked	Weight and Grade Check (random checks by mate during or after packing)								Signed
						Species	Decl. wt	Act. Net	Decl. grade	Count/lb (2)	wts small / large	% in grade	% defects-#	
8 May 00	1	12	240 kg	20 kg		T	10.0 kg	10.1 kg	u/10	8, 9	44g,46g, 84g	95	Nil	BJ
	2	5	100 kg	10 kg		E	10.0 kg	10.2 kg	u/15	14, 14	30g, 30g 34g 64g	94*	Nil	BJ
	3	10	200 kg	5 kg	2 total	T	10.0 kg	9.9 kg	10/20	16, 15	24g, 22g 40g, 38g	100	1	BJ
					2 cooks	T	10.0 kg	10.1kg						jm
Comments * Prawns tending small, sorting crew informed.														

(#) Record types of defects in comments section and advise crew of any recurring problems

Vessel			Packing Log											Date of Issue				
Catch Date	Carton Marks	Serial Nos	Spec.	Ctn wts	Cartons per Grade										Total Ctns	Total wt	Blast/ storage freezer	Product temp	Sign
					U/10	U/15	10/20	15/25	20/30	31/50			cook	S&B					
8.5.00	√	2360-2396	Tig	10kg	10	18		5					2	2	37	370kg	-30°C	-19°C	*LD*
8.5.00	√	2397-2414	End	10kg		2	7	6	1					2	18	180kg	-28°C	-18°C	*LD*
Comments:																			

Prawn Quality Standard Guidelines

6. Feedback

Approval to market product under the Prawn Industry Quality Standard requires a commitment to supply consistent quality prawns.

Errors may occur resulting in, for example, out of grade or underweight prawns reaching the customer. It is important that action is taken to fix any problems and prevent recurrence.

Audits of product or the process may be required to demonstrate compliance with the standard. Results may be satisfactory, or some corrective action may be necessary.

In all cases records should be kept. This may be simply achieved with a logbook such as:

Vessel	Customer/Audit Feedback Log	Date of Issue
Date	Details	Action Taken Date & Signature
17.5.2000	10 ctns u/15 Tiger reported with slight black spot by B.B. Prawn Processors. Packed 10.3.2000	Records checked, 500 kg dipped without changing meta, solution probably too weak. Procedure tightened. 20.5.200 – *LD*
28/6/2000	AQIS audit – no problems found	N/A
11.7.2000	100 ctns Kings reported by CC Wholesalers contained up to 5% soft shell prawns. Date code 10.5.2000	No obvious reason, records indicate 10% soft & broken rejects on that day. Reported to crew for extra vigilance. 18.7.2000 – *LD*

Note also that records may need to be kept for other purposes. For example packing logs recording volumes and dates of production may be required for product trace and recall.

7. System Check List

Putting together a program to meet the Prawn Industry Quality Standard might at first seem difficult. It takes time and commitment to ensure that the food safety program is complete and effective. Training requires careful planning. It is recommended that a timetable be drawn up identifying the tasks, who is responsible and when completion is expected. The following check list is a suggested approach.

1. Crew/staff receive verbal instructions on personal hygiene and cleaning
2. Crew/staff trained in sorting, grading and defect identification
3. Dipping methods, times, etc. determined and written down
4. Cooking procedures, times, etc. determined and written down (if appropriate)
5. On board checks for grade/defects recorded
6. Training records prepared
7. Personal Hygiene and Cleaning Program written
8. Dipping methods checked by laboratory tests; micro. check on cooking
9. Production and Packing Logs prepared and completed
10. Food Safety Plan prepared – ensures that all necessary checks are in place
11. Customer Feedback/Problem recording form prepared
12. Authorisations formalised, Manual completed and signed