

**Extending innovation in integrated and product
management: implementation of value chain
management and traceability in the Australian Southern
Rocklobster Industry**

Matthew Muggleton



Australian Government

**Fisheries Research and
Development Corporation**

Project No.2004/412

¹ Matthew Muggleton & ² Heather Haines & Brendan Larkin

¹ CORVEL Marketing & Management Level 1, 16 Unley Road, Unley SA 5061

² Department of Primary Industries, Symes Road, PO Box 264, Woori Yallock 3139

Publisher:

ISBN: 978-0-9803977-0-3

FRDC 2004/412

Copyright

© Fisheries Research and Development Corporation and Southern Rocklobster Limited. 2007

PROJECT TITLE:

**2004/412 - Extending innovation in integrated and product management:
implementation of value chain management and traceability in the Australian
Southern Rocklobster Industry**

Matthew Muggleton
Market Development Manager
Southern Rocklobster Limited
Level 1, 16 Unley Road
Unley SA 5061
Telephone 1300 853 880
Facsimile (08) 8272 7767
Email matthew@corvel.com.au

31 May 2007

Southern Rocklobster Limited

Copyright Fisheries Research and Development Corporation and SRL 2007.

This work is copyright. Except as permitted under the Copyright Act 1968 (Cth), no part of this publication may be reproduced by any process, electronic or otherwise, without the specific written permission of the copyright owners. Neither may information be stored electronically in any form whatsoever without such permission.

The Fisheries Research and Development Corporation plans, invests in and manages fisheries research and development throughout Australia. It is a statutory authority within the portfolio of the federal Minister for Agriculture, Fisheries and Forestry, jointly funded by the Australian Government and the fishing industry.

DISCLAIMER

The authors do not warrant that the information in this report is free from errors or omissions. The authors do not accept any form of liability, be it contractual, tortious or otherwise, for the contents of this book or for any consequences arising from its use or any reliance placed upon it. The information, opinions and advice contained in this book may not relate to, or be relevant to, a reader's particular circumstances. Opinions expressed by the authors are the individual opinions of those persons and are not necessarily those of the publisher or research provider.

PROJECT TITLE:	2
1. Non Technical Summary	5
2. Acknowledgements	8
3. Background	9
4. Need 11	
5. Objectives	12
6. Methods	13
I - TRACEABILITY SOLUTION FOR LIVE AUSTRALIAN SOUTHERN ROCKLOBSTER.....	13
<i>a. Product Development</i>	13
<i>b. Tag refinement</i>	15
<i>c. Benefit / cost analysis</i>	16
II - Trace back System Development	17
<i>a. Current value chain activity and implementation of trace back systems within the Australian Southern Rocklobster industry</i>	17
<i>b. Issues relating to traceability of product and affecting end customers</i>	17
<i>c. Integration and promotion of existing best practice (Clean Green Australian Southern Rocklobster Integrated 'pot to plate' environment and product standards)</i>	17
<i>d. Traceability tag / label solution for live Australian Southern Rocklobster</i>	18
<i>e. Data acquisition, analysis and feedback at different levels of the value chain</i>	19
III - Demonstration of trace back system to the value chain	19
<i>a. Simulation trials of the traceability system</i>	19
7. CONTACT WITH BENEFICIARIES	24
8. Results/Discussion	25
9. Benefits	27
10. Further Development.....	28
11. Planned outcomes.....	29
12. Conclusion	30
13. References.....	31
14. Appendices	32
<i>Appendix 1 Intellectual Property</i>	32

<i>Appendix 2 Staff</i>	33
<i>Appendix 3 Steering Committee Membership</i>	34
<i>Appendix 4 – Demonstration project: traceability of southern rocklobster</i>	35
<i>Appendix 5 – Tag specification</i>	36
<i>Appendix 6 - Cost Benefit Study: Development of a Traceability System for the Australian Southern Rocklobster Industry</i>	37
<i>Appendix 7 – DPI Victoria Value Chain Review</i>	38
<i>Appendix 8 – Traceability system structure</i>	39
<i>Appendix 9 – Data to be recorded along the chain</i>	Error! Bookmark not defined.
<i>Appendix 10 – Trial 2</i>	42
<i>Appendix 11 – Trial 3</i>	45
<i>Appendix 12 - Supply Chain graphs</i>	49

1. NON TECHNICAL SUMMARY

2004/412 - Extending innovation in integrated and product management: implementation of value chain management and traceability in the Australian Southern Rocklobster Industry

PRINCIPAL INVESTIGATOR: Matthew Muggleton
ADDRESS: Southern Rocklobster Limited
Level 1, 16 Unley Road
Unley SA 5061
Telephone 1300 853 880
Facsimile (08) 8272 7767
Email matthew@corvel.com.au

OBJECTIVES:

1. To evaluate and compare indestructible and tamperproof informative tags / labels to provide for traceability of Australian Southern Rocklobster from the point of capture (wild fishery) to the point of consumption
2. To integrate and promote existing best practice (Clean Green Australian Southern Rocklobster Integrated 'pot to plate' environment and product standards) by including relevant information on the informative tag/label.

NON TECHNICAL SUMMARY:

OUTCOMES ACHIEVED TO DATE:

This project has produced a robust individually branded and barcoded lobster tag and a functional traceability system to allow industry to offer a branded, traceable, and quality guaranteed product to new and existing markets. The development of these tools provides the opportunity to increase the value of the lobster resource through improving the "offer" to new niche markets willing to pay increased prices for the guaranteed quality. This represents an increase in economic activity at both the industry and community level. The initial response from industry has been positive. Fishers now have the ability to prove the quality standards they fish by through whole chain traceability.

KEYWORDS: Rocklobster, tagging, and traceability

Southern Rocklobster Limited's (SRL) global market research (FRDC 2004/251) indicated that substantially higher value markets exist in Europe, the Middle East and United States for live Australian Southern Rocklobster. In order to position product in the premium end of these markets the research identified several critical success factors namely:

1. Differentiation through establishing an Australian Southern Rocklobster 'brand'
2. Establishing and promoting brand values
3. Guaranteeing the 'offer' or 'brand' attributes and
4. Reliability of supply.

This project aimed to produce the tools which could allow industry to achieve the above points.

“Implementation of value chain management and traceability in the Southern Rocklobster Industry” was formed as a collaborative project between the Department of Primary Industries Victoria (DPIV) and Southern Rocklobster Ltd (SRL). SRL together with the DPIV developed and trialled a robust tag / label and traceability system (hardware, software and database).

A number of tags / labels were evaluated, these included:

- Horn rubber band
- Glue on tag (adhesive item that sticks to the carapace)
- Horn tag (barcode printed on the back of the tag)
- Electronic tag (RFID)

The horn tag, manufactured by Harcor Pty Ltd, had previously been developed by the New Zealand Rocklobster Industry as well as being used by Tasmanian Southern Rocklobster fishers for direct sales to the public.

The horn tag was chosen for the traceability system as this was found to be the best option available, but the tag required modifications to suit the needs of industry.

The modifications included:

- Changing from Nylon to Polypropylene
- Printing on the front and back of the tag (Clean Green trade mark on the front and barcode, readable number and website address on the back of the tag)
- Enhancement of the female and male locking components to increase the security of the tag.

It was identified that tag application onboard Southern Rocklobster vessels was difficult. SRL and Harcor Pty Ltd have completed some preliminary design work for an applicator to allow easy application of the tag on board Southern Rocklobster vessels. Due to the significant investment required to develop moulding equipment, the design work has not progressed any further than a prototype.

The project aimed to develop a traceability system to track individual lobsters from “pot to plate”. In collaboration with DPI Victoria, a demonstration project was implemented to trial tag technology, the scanning system, data collation and access.

SASTEK (the traceability specialist company) was appointed by DPI Victoria to modify their “*food chain*” database to capture information along the supply chain by scanning the barcoded tags “in” and “out” of facilities (factories) along the supply chain.

A demonstration database was established through the project, but wasn’t suitable for trade of lobsters. More research and development work will be required to develop a fully integrated traceability system to capture and analyse certified Clean Green Southern Rocklobster along the supply chain.

A track and trace website was developed to guarantee the Southern Rocklobster’s origin and Clean Green Brand integrity. The website can be viewed by entering the following URL - www.southernrocklobster.com. Please note that you need flash to operate the website, which can be downloaded from macromedia.

Throughout the trials the website functioned on manual data entry.

The demonstration project clearly identified that all aspects of an effective tag/label for live Southern Rocklobster had not been resolved. The advantages and disadvantages of the trial, and future traceability solutions for Southern Rocklobster were documented.

Further areas for investigation should include:

- The use of “intelligent scales” which have the capability to wirelessly transfer data to the handheld storage unit. This would effectively reduce the opportunity for human error due to manual entry.
- An investigation into the use of Radio Frequency Identification (RFID) technology. RFID technology would remove the need for the scanning of individual lobsters. Entire baskets could be scanned using RFID sensors.
- The design of an automatic tag applicator for both factory and on-boat use.

2. ACKNOWLEDGEMENTS

Southern Rocklobster Limited would like to acknowledge the support of the Victorian Department of Primary Industries for providing graphs and other information contained in this report and the Southern Rocklobster fishers and processors who have supported the trial work undertaken through this project.

The investigators also wish to acknowledge the contribution and direction provided by Southern Rocklobster Ltd Board, SASTEK, and Harcor Security Seals Pty Ltd

Photographs

Courtesy of Brendan Larkin (DPI, Victoria)

3. BACKGROUND

The Southern Rocklobster industry strategic plan, completed in 2003, identified a number of key challenges facing the industry. The plan identified opportunities in market development, including value chain development. The industry had experienced a significant price down turn which highlighted the need to spread the industry's risk by developing new high-end markets outside South East Asia.

Australian Business Limited completed global market research (FRDC 2004/251) in 2005 to allow the industry to make an informed decision on how best to position and structure the Australian Southern Rocklobster (ASR) industry for future growth. The research involved market trials undertaken in the Napa Valley and London which proved that ASR has the culinary capabilities to be positioned as the top 5% of protein within the Super-Premium-Fine-Dining (SPFD) sector and gain immediate improvements in export returns of up to thirty percent, if positioned well.

The market research clearly highlighted that Southern Rocklobster is of superior quality and can demand premiums in the SPFD sector. However, servicing this food service sector is highly sophisticated and expensive. To guarantee the quality offer industry needs to invest in the appropriate infrastructure and systems to effectively service the needs of this market sector. A market development approach was required that delivers an integrated supply chain to deliver:

1. Product that guarantees quality to market specifications;
2. Consistent supply through an organised distribution network; and
3. Communication and education to create relationships with the chefs and reinforce ASR position and the value proposition.

In developing SPFD markets it is critical to deliver product to satisfy the markets quality specifications. The industry is uniquely placed to guarantee quality by using the "Clean Green" product certification program¹ to brand product meeting quality specifications. However, the industry wishes to develop and maintain a brand image consistent with consumer needs (reflecting the attributes above). It also aims to guard against substitution and against product which does not demonstrably comply with the Clean Green standards. Accordingly, there is a need for traceability. In addition to protecting brand image, traceability can portray certain quality attributes to the restaurants i.e. time of harvest, temperature during transit among other quality attributes.

As part of DPI Victoria's "Our Rural Landscapes" (ORL) initiative the Southern Rocklobster industry was identified as a segment of the seafood industry ready to implement a full system of traceability. After initial discussion with Southern Rocklobster Limited (SRL) the ORL 3.2 project entitled "Implementation of value chain management and traceability in the Southern Rock Lobster Industry" was formed as a collaborative project between DPI Victoria and SRL.

Southern Rocklobster Limited aims to use traceability as potential marketing tool, by incorporating an electronic web based interface. This would have the facility for entry of unique lobster

¹ The Clean Green program is a fully integrated product management strategy presenting auditable standards of environmental and ecological sustainability, food safety, product quality, work place safety and animal welfare. The program embraces the entire supply chain from the point of capture to the point of consumption. The standard and protocol allows evaluation to be carried out by Conformity Assessment Bodies (CAB), who are accredited against the ISO/IEC Guide 65: 1996 and Joint Accreditation System of Australia and New Zealand (JAS-ANZ) procedure 15- General Requirements for Bodies Operating Product Certification Systems.

identification numbers, and thus give the consumer information on the lobster they are consuming via a website stationed at the restaurant and operated by the waitress/waiter using a hand held palm pilot, or accessed on the guest's mobile phone web. The unique opportunity exists for Southern Rocklobster to differentiate in the global market based on a range of independently certified product standards including full traceability of individual Clean Green branded lobsters.

4. NEED

SRL's global market research (FRDC 2004/251) indicated that alternative ultra-premium and substantially higher value markets exist in Europe, the Middle East and United States for live Australian Southern Rocklobster. To position product in the ultra-premium end of these markets the research has identified several critical success factors namely:

1. Differentiation through establishing an Australian Southern Rocklobster 'brand'
2. Establishing and promoting brand values
3. Guaranteeing the 'offer' or 'brand' attributes and
4. Reliability of supply.

The ability to identify products, with demonstrated credence attributes, and the value of this ability to value chains, will be key factors to the success of delivering products that meet market needs in new niche markets for Southern Rocklobster. As well trace back systems are emerging e.g. Europe as compulsory tools for collection and delivery of a range of information about products to both customers and regulators.

5. OBJECTIVES

1. To evaluate and compare indestructible and tamperproof informative tags / labels to provide for traceability of Australian Southern Rocklobster from the point of capture (wild fishery) to the point of consumption
2. To integrate and promote existing best practice (Clean Green Australian Southern Rocklobster Integrated 'pot to plate' environment and product standards) by including relevant information on the informative tag/label.

6. METHODS

The project was conducted in 3 parts as follows:

I - TRACEABILITY SOLUTION FOR LIVE AUSTRALIAN SOUTHERN ROCKLOBSTER

a. Product Development

DPI Victoria and Southern Rocklobster Limited (SRL) identified that three elements were required to allow traceability of live Australian Southern Rocklobster from “pot to plate”, these included:

- Tag / label for each individual Southern Rocklobster
- Scanning hardware and software and
- Database to capture information after the lobster has been scanned.

DPI Victoria, in conjunction with SRL, called for tenders from companies to provide a traceability solution for the scanning hardware / software and database. DPI Victoria assessed the tenders received and selected SASTEK Pty Ltd. The key reason why DPI Victoria chose SASTEK was SASTEK were offering modification to their database solution (*food chain*) for live Southern Rocklobster. The *food chain* database had been successfully used within the meat industry and they advised that this solution could be tailored to accommodate the capture, storage and reporting information for traceability of individual live Southern Rocklobster.

SASTEK's role in the project was to establish the hardware and software to capture data in the field (at the regional locations across southern Australia) and transfer the information electronically to a centralised point where *food chain* was stationed. The information / data were to be electronically presented to show the traceability of the lobster from “pot to plate” via a website.

SRL appointed JABA multimedia as part of the FRDC Project 2006 / 216 to establish and implement the front-end website for the track and trace system.

SRL and the DPI Victoria focused on identifying a tag / label suitable for applying onboard Southern Rocklobster vessels after lobster was removed from the pot and remain with the lobster through to the point of sale to the customer.

DPI Victoria identified a number of tag / label options, these initially included:

- Plastic tags – commonly used as wrist bands for conventions and concerts.
- Harcor Nylon tag – developed by the New Zealand Southern Rocklobster industry.

RFID tags were identified as an option, but it was identified that the tags were not suitable for holding in seawater and the cost of the tags were too high at the time of investigation through this project. It was the consensus of DPI Victoria, SASTEK and SRL that RFID tag should remain on the agenda into the future as improvements in the technology could reduce cost and increase durability (e.g. holding in wet storage conditions).

A Demonstration Project (DP) was completed on the initial trial of the tags and traceability system and is attached in Appendix 4.

The DP clearly identified that all aspects of an effective tag/label for live Southern Rocklobster (SR) had not been resolved. Further evaluation and trialling tag options for a traceability solution for live

southern rocklobster was required. Hence, preliminary trials² to assess the suitability of the following three tag options for traceability of live SR were implemented, these included;

1. Harcor tag (Figure 1.)
2. Rubber band and applicator (this is used to hold the claws of American lobster together) (Figure 2)
3. Glue-on tags (Mainly used on abalone and other shellfish) (Figure 3)

Figure 1. Harcor tag



Figure 2. Rubber band and applicator



Figure 3. Mollusc tag (commonly used on abalone)



Each of the three tags were evaluated (Table 1) by members in the supply chain (fishers and processors) and SRL with the results of the trials listed below;

² Trials have involved approximately 10 fishers using the different tags in the field and communicating to industry members who have used the tags.

Table 1 – Tag / Label evaluation

HARCOR (approximately \$0.15 per tag)	
POSITIVES	NEGATIVES
<ul style="list-style-type: none"> The tag attaches well to the animal and doesn't seem to cause any stress 	<ul style="list-style-type: none"> It is difficult to apply on the vessels in rough conditions
<ul style="list-style-type: none"> It provides room for a barcode, number and website address 	<ul style="list-style-type: none"> In applying the tag you receive cuts on your hands
<ul style="list-style-type: none"> It is Food safe material 	<ul style="list-style-type: none"> It is time consuming to apply
<ul style="list-style-type: none"> Can withstand the temperature extremes of cooking and cryogenic freezing. 	<ul style="list-style-type: none"> Potentially once the tag is heated the plastic softens, therefore providing opportunity to remove and reuse the tag on a smaller product
<ul style="list-style-type: none"> The tag was developed by the New Zealand Rocklobster industry for Southern Rocklobster. 	<ul style="list-style-type: none"> Some of tags break on the hinge and tag section
<ul style="list-style-type: none"> Once number has been entered into database can only be used once 	

RUBBER BAND (approximately \$0.01 - \$0.05 per band)	
POSITIVES	NEGATIVES
<ul style="list-style-type: none"> Is easily applied 	<ul style="list-style-type: none"> Requires an applicator
<ul style="list-style-type: none"> Remains on the product through the supply chain 	<ul style="list-style-type: none"> Doesn't provide adequate room for a barcode
<ul style="list-style-type: none"> Doesn't seem to cause any stress 	<ul style="list-style-type: none"> Would require more information for traceability purposes.
<ul style="list-style-type: none"> Relative cheap in comparison to other tags 	<ul style="list-style-type: none"> May be re-used
<ul style="list-style-type: none"> Can with-stand temperature extremes (i.e. cooking or freezing) 	

GLUE-ON TAGS (approximately \$0.15 plus glue cost per tag)	
POSITIVES	NEGATIVES
<ul style="list-style-type: none"> Potentially a good idea if an adhesive was developed to attached to a wet lobster 	<ul style="list-style-type: none"> No adhesive material exists
	<ul style="list-style-type: none"> A tag is very small, not really providing room to add a barcode. More applicable for RFID, which is more expensive.
	<ul style="list-style-type: none"> Very time consuming and difficult to apply, due to the size of the tag and application method (super glue)
	<ul style="list-style-type: none"> No knowledge whether the tag would remain attached through the supply chain

The initial trial confirmed that the Harcor tag (horn tag) was the most appropriate tag / label solution for live Southern Rocklobster at the time of this report.

b. Tag refinement

The Harcor tag was selected by the SRL Board to use in simulation trials. The trial (described below) confirmed that the tag is suitable for live Australian Southern Rocklobster, but the tag required the following alterations; these include:

- Re-moulding with different plastic and potentially adding metal teeth in the female section of the tag to ensure the tag can not be removed.
- Changing the shape and colour to provide a more aesthetically pleasing tag.

- Increasing the clarity of the barcode to guarantee 100% reading when scanned.

The changes were made to the tag prior to undertaking the simulation trials.

It was identified after the simulation trials that further work was required on the harcor tag / label and an application method was required to reduce the time taken to attach the tag.

The SRL Board directed that the project use the Harcor tag as a starting point to negotiate with tag manufacturers (i.e. Leader Products and Allflex) the development of an applicator for the existing tag or modified version of the tag. A tag specification (Appendix 5) was written and sent to three major plastic tag manufacturers seeking expression of interest to develop the tag and applicator for live Australian Southern Rocklobster.

c. Benefit / cost analysis

A benefit / cost analysis was completed by Kristy Henry as part of the DPI Victoria project. The report is attached as Appendix 6.

The benefit / cost analysis identified the cost per kg to implement the different forms of the traceability solutions for live Australian Southern Rocklobster. The least cost tag / label was the rubber band tag, but from a practical point of view this didn't meet SRL's requirements. The analysis showed that RFID tags were cost prohibitive at the time of the investigation.

Although, whilst the SRL Board was in China they identified an RFID tag costing under \$0.10 per unit for individually tagging Chinese Hairy crabs (Figure 4). The tag system has been investigated further, which identified that the company that manufactured the tags is under Chinese Government licence and the tags are not available for widespread distribution. To gain access to these tags it would require an official Government to Government communication and agreement.

Over time, as the cost of the RFID tag decreases in cost, the RFID tag presents as a great option for live Australian Southern Rocklobster. This technology could also allow the storage of information of the fisher, port of landing and fishery information, which could be utilised as a communication tool in the marketplace (food service sector).

Figure 4. Chinese Hairy Crab RFID tag



II - TRACE BACK SYSTEM DEVELOPMENT

a. Current value chain activity and implementation of trace back systems within the Australian Southern Rocklobster industry

DPI Victoria reviewed the current Southern Rocklobster value chain activity and implementation of trace back systems. A report containing the review, which also covers the demonstration trial to London is attached as Appendix 7.

Consultation with Southern Rocklobster fishers and processors allowed the documentation of the value chain for domestic and export markets. The consultation identified that the value chain for live southern rocklobster had no or limited ability to trace back the products origin and the value wasn't overly sophisticated. The chain basically encompassed moving the lobster from the vessel, to a holding facility and then packaged into a styro-foam box for delivery to the marketplace (large importer / Distributor).

A diagram of the value chain is contained in the Demonstration Project report – Appendix 4.

b. Issues relating to traceability of product and affecting end customers

Traceability originally was conceived for ownership traceability. Ownership traceability is the ability to track and trace forward ownership to determine the potential source of a problem, and eliminate potentially contaminated food from the supply chain. Ownership traceability is vitally important to identify the source of any potential issue.

The importance of traceability within the food industry is starting to emerge, with out-breaks such as the mad cow disease being the driver for the food industry, especially in Europe. The traceability requirements for different markets vary significantly e.g. China – traceability one step forward and one step back compared to Europe – full traceability back to the origin and all inputs in the value chain.

The British Retail Consortium (BRC) Global Standard – Food detail the traceability requirements for food products is one example of how the supermarket sector has made it mandatory that all its suppliers have full traceability.

The research conducted in FRDC Project 2004 / 251 – Identification of new market opportunities for Australian Southern Rocklobster Exports – identified that the position of live Australian Southern Rocklobster as a premium product required full traceability right through the chain to the end consumer.

The traceability solutions investigated included capacity for the customer to type in the number (found on the horn tag) to identify the origin and fisher who caught the lobster. This information flow, underpinned by traceability, could build brand values and help position Australian Southern Rocklobster.

c. Integration and promotion of existing best practice (Clean Green Australian Southern Rocklobster Integrated 'pot to plate' environment and product standards).

The current live lobster supply chain is price driven (buyers buy on price), making the implementation of traceability systems cost prohibitive, as the operators compete on the price at the beach on a daily basis to achieve volume turn-over through factories. Therefore, if the cost is \$1 per kg to implement a system, then that company would need to reduce its profit or pay less for

the product at the beach. If the company is offering less at the beach, then it is less likely to receive the product.

Until the current importing countries require full traceability of the product, the current industry members will not be able to afford to implement traceability systems in their organisations.

In the “what if” scenario that full traceability of individual live southern rocklobster was mandatory, then all current processors would need to absorb the implementation costs, with no competitive price edge being gained by any one processor, resulting in all processors competing on a level playing field.

Processors involved with the trial of the full traceability system have commented on the potential benefits in terms of efficiencies that could be established through traceability to manage their inventory.

The traceability system is being developed for Clean Green certified product, which allows information on Quality Assurance to be collected to demonstrate, through 3rd party audit, best operating practices are being maintained in the chain and product not meeting the documented quality specifications is to not carry the Clean Green trade mark.

The traceability requirements for Certified Clean Green Australian Southern Rocklobster are documented in “The Clean Green Australian Southern Rocklobster Product Standard”. The Auditing of the Standard is detailed in the “The Clean Green Australian Southern Rocklobster Audit Protocol”. Supply chain members operate to the standard, which allows the incorporation of industry best practice and product quality to underpin the Clean Green trade mark, which is on each Certified lobster sold to the market by the Certified fishers.

The FRDC project 2006/216 and “Integrated supply chain management as a strategy to niche market Development – Australian Southern Rocklobster” supported by the Department of Forestry’s, Fisheries and Agriculture (DAFF), has assisted industry partners (supply chain processors) to adopt the traceability technology that was developed through this project, as it is a mandatory part of branding and positioning the product in the marketplace.

As part of the DPI Victoria project, a Project Officer (Brendan Larkin) accompanied a trial shipment to London and while in London a number of Government departments were interviewed to identify if the SRL traceability program would meet their legislative requirements now and in the future.

DPI advised that SRL traceability system, tracking individual animals back to their origin and knowing who handled the product along the value chain, would satisfy the European Union traceability requirements.

d. Traceability tag / label solution for live Australian Southern Rocklobster

Research conducted by DPI Victoria identified that there were no off-the-shelf solutions for tagging live lobsters using a tamper-proof tag / label solution. The project identified that the Harcor tag, subject to modifications as outlined under tag analysis, was the most appropriate solution for live lobster. The trials of the modified tag have demonstrated that the tags will remain on each animal from boats (in seawater storage) until after cooking (by boiling).

There is still further refinement required of the tags, which will be addressed through a project that is currently underway with Ausindustry.

e. Data acquisition, analysis and feedback at different levels of the value chain

SASTEK Pty Ltd were appointed by DPI Victoria project to adapt their *food chain* database traceability solution for live Australian Southern Rocklobster. The data that was to be recorded in the value chain is detailed in Appendix 8.

The analysis of the data included;

1. Lobster quality reports to fishers on each lobster
2. Weight received (daily and total for a time period) at the regional receiver
3. Lobster down grades at locations along the supply chain
4. Water / temperature vs time reports
5. Transfers (IN and OUT) for each step of the value chain
6. Inventory history and real time snapshot at each step in the supply chain
7. Sales report
8. Account complaints – to be logged via the website
9. Damaged tags and re-tag report
10. Website reports – time vs location to show the transitions through the supply chain

The analysis and feed-back of the data were stressed by SRL as important requirements to allow the members of the value chain to better understand what was happening along the value chain. This project identified what was required, in term of reporting, to allow the supply chain to operate more effectively.

III - DEMONSTRATION OF TRACE BACK SYSTEM TO THE VALUE CHAIN

a. Simulation trials of the traceability system

Simulation trials were implemented to evaluate the effectiveness of the traceability system by sending products to markets, through one supply chain.

Three trials were completed to trial the hardware, Sastek/SRL software, application of tags, data collection points, website (information display and mechanism to receive feed-back from the Chefs or consumers). The traceability system was capable of tracing individual Southern Rocklobster from “pot to plate”, which was identified in FRDC Project 2004/251 as essential to differentiate the product in the marketplace to command higher price per kilogram for large (2kg+) speckled lobsters. The trials highlighted areas requiring refinement prior to full implementation of the traceability system (hardware, software and Harcor tag) for live Southern Rocklobster.

Prior to implementation of the traceability trials, the following elements of the traceability system were changed. These included:

- Re-development of the tag to include the tag specifications (Appendix 5);
- Purchasing hardware to implement the trial, this included:
 - PDA device containing a PSC Falcon 4420 scanner,
 - Scales system;
- Development of the Sastek “*food chain*” software specifically built to record data along the Southern Rocklobster value-chain (Appendix 8 - data recorded along the supply chain);
- Distribution of tags and training fishers in tag application;
- Development and distribution of a product specification to fishers to clearly specify the Rocklobster to which the tags need to be applied to (Refer to FRDC Project 2006/216 for further information on the product specification).

Project Participants:

Southern Rocklobster Industry (Matthew Muggleton and Southern Rocklobster Board Members)

Government Participants:

Victorian Department of Primary Industries (Brendan Larkin and Joanne Bobbit)

Technology Provider:

Sastek Pty Ltd (Neil Pitt and Gavin Hall)

Industry Participants:

The simulation trial partners were selected on the basis that they were Clean Green Certified fishers and processors willing to handle and pack to meet specifications, in-market partners that were happy to handle and pack to agreed specifications and chefs/restaurants that were selected on the basis that a future opportunity was present.

MEMBERS OF THE VALUE CHAIN	
FISHER (POT)	PROCESSOR (FACTORY)
<ul style="list-style-type: none">➤ Bryan Lawrie – Cape Jaffa➤ Mark Denton – Robe➤ David Johnston – Port MacDonnell➤ Rodney Smith – Kangaroo Island➤ Wayne Coombe – King Island➤ Greg Lewis – King Island➤ Peter Watson – King Island➤ Kevin Smith – King Island	<ul style="list-style-type: none">➤ Stanke Oceania Seafoods – Robe/Carpenters Rocks➤ Ferguson Australia – Kangaroo Island/Adelaide➤ King Island Seafoods – King Island➤ Southern Unite Seafoods – Melbourne
TRANSPORTATION	
FREIGHT FORWARDER	AIRLINE
Hellmann Perishable Logistics Melbourne	Qantas Airways (QF93)
IMPORTER	DISTRIBUTOR
Kingfisher Trading Inc.	Pacific Pride Seafood
RETAIL (PLATE) Details in project 2006/216	

Trial details:

TRIAL 1

- 23rd May, 2005. This trial involved 2 boxes of lobsters shipped to London. The details of the trial are documented in Appendix 7.

TRIAL 2

- 2nd May, 2006: This trial involved 25 animals source from 2 fishers from King Island and Southern Unite Seafood (Appendix 9 - details the traceability of each animal) tracked and traced through the chain to the market place (USA) to identify issues in the chain and test the hardware and software. This trial was supported by an in-market visit by the Southern Rocklobster Board and industry members.

Trial 2 review:

POSITIVES	NEGATIVES	IMPROVEMENTS
○ 100% of the tags remained intact.	○ The barcode on the tag was difficult to read.	○ The clarity of the barcode requires improvement.
○ The market confirmed the importance of the traceability and Clean Green brand.	○ The software still hadn't been finalised.	○ The software requires finalisation.
○ Traceability at each step can be used for continual improvement of supply chain standards.	○ Difficult to scan the lobsters at each point in the chain without hardware in each region where the lobster is handled.	○ Implementation of the system at each step in the chain.
	○ No system developed to deal with rejected animals.	○ Rejected animals need to have the tag removed and be recorded in the system.
	○ Animals not meeting the specifications still were delivered to the marketplace.	○ Staff training and more time required for pack-outs.
	○ No real-time data captured by system and reported live on website the website.	○ Develop a system to provide real-time electronic data transfer from the scanners to the database and website.

TRIAL 3

- 30th May, 2006: The second traceability trial was completed between 30th May and 4th June, 2006. This trial involved 50 animals being tagged and tracked through the Supply chain (Appendix 11 - details the traceability of each animal). The animals were sourced from 8 fishers across Southern Australia, handled by 3 receival points and the consolidation hub in Melbourne. The lobsters were then air freighted to Los Angeles and re-tanked and distributed to 4 different restaurants, 2 in Los Angeles and 2 in Las Vegas.
- This trial involved familiarisation and training of the receiver processors, consolidation hub and in-market importer/distributor. The familiarisation and training involved using the scanning hardware or a combination of the scanning hardware and digital scales at each point in the chain. Feed-back from the processors highlighted the significant change in practices and hardware, which will require training when implementing the system at each location.

Trial 3 review:

POSITIVES	NEGATIVES	IMPROVEMENTS
<ul style="list-style-type: none"> ○ 100% of the tags remained intact. 	<ul style="list-style-type: none"> ○ The barcode on the tag was still difficult to read. 	<ul style="list-style-type: none"> ○ The clarity of the barcode requires improvement or a new bar-coding system.
<ul style="list-style-type: none"> ○ The scanning software worked well. 	<ul style="list-style-type: none"> ○ Additional parameters need to be added to the scanning software (e.g. Water quality, arrival temperature, comments – See Appendix 11). 	<ul style="list-style-type: none"> ○ The software requires alterations.
<ul style="list-style-type: none"> ○ The scales and scanning hardware were integrated at the consolidation hub in Melbourne. 	<ul style="list-style-type: none"> ○ Without hardware in each region it is difficult to scan the lobsters at each point in the chain. 	<ul style="list-style-type: none"> ○ Implementation of the system at each step in the chain.
<ul style="list-style-type: none"> ○ The market re-confirmed the importance of the traceability and Clean Green brand and willingness to pay a premium for the product. 	<ul style="list-style-type: none"> ○ No system developed to deal with rejected animals. 	<ul style="list-style-type: none"> ○ Rejected animals need to have the tag removed and be tracked in the system.
	<ul style="list-style-type: none"> ○ Animals not meeting the specifications were still delivered to the marketplace. 	<ul style="list-style-type: none"> ○ Staff training and more time required for pack-outs.
	<ul style="list-style-type: none"> ○ No real-time data transferred to the database. 	<ul style="list-style-type: none"> ○ System still requires development.
	<ul style="list-style-type: none"> ○ No link with the Front-end website. 	<ul style="list-style-type: none"> ○ The system requires integration between the front-end and back-end data (data can flow both ways).
	<ul style="list-style-type: none"> ○ Each step in the chain requires real-time electronic data transfer from the hand scanners to the database and website so that members of the supply chain can view reports on rocklobster movement in their relevant sections in the chain. ○ Each element of the supply chain requires URL site on the website under password to view information on rocklobster movement in their relevant sections of the chain. The elements include: <ul style="list-style-type: none"> ● The fishers, ● Regional receivers, 	<ul style="list-style-type: none"> ● The database needs to provide real-time data directly to the front-end (website) and accommodate information transfer from the front-end to the database. This will provide the following: <ul style="list-style-type: none"> ○ Real time information on individual animals at each point in the supply chain ○ Feed-back from the restaurants ○ Feed-back from elements in the supply chain <p>The system needs to have the capacity to develop reports on:</p>

	<ul style="list-style-type: none"> • Consolidation hub, • Importer/distributor (USA). 	<ul style="list-style-type: none"> • Individual animals meeting specifications at each step of the supply chain, • Down grading to 2nd grade animals and reasons why • Mortalities (when and where).
--	---	--

Output: *Traceability system trialled*

Data gathering:

Data was collected through the supply chain continuum to confirm implementation of best practice at each section of the supply chain and to identify areas of improvement. The data collected included:

- Temperature, motion, humidity, dissolved oxygen, carbon dioxide for each export shipment sent to the USA.
- Temperature, motion, humidity at the point of unloading (King Island, Robe / Cape Jaffa) at the wharf to point of packing for export at the consolidation point (Melbourne).
- Water quality (temperature, salinity, dissolved oxygen, ph & ammonia) parameters between the consolidation holding tanks in Melbourne and the importers holding tanks in Los Angeles.

From data above has been graphed and is attached in Appendix 12.

Track and trace website:

- The track and trace website was developed to guarantee the Southern Rocklobster’s origin and Clean Green Brand integrity. The website can be viewed by entering the following URL - www.southernrocklobster.com (enter these tag numbers 0000807 & 0002036 to see the track and trace front-end display for the marketplace) – please note that you need flash to operate our website, which can be downloaded from macromedia.
- Throughout the trials the website has functioned on a manual data entry, which needs to be changed to a real time system that sources electronic data from the *food chain* database developed through the DPI Victoria project.

7. CONTACT WITH BENEFICIARIES

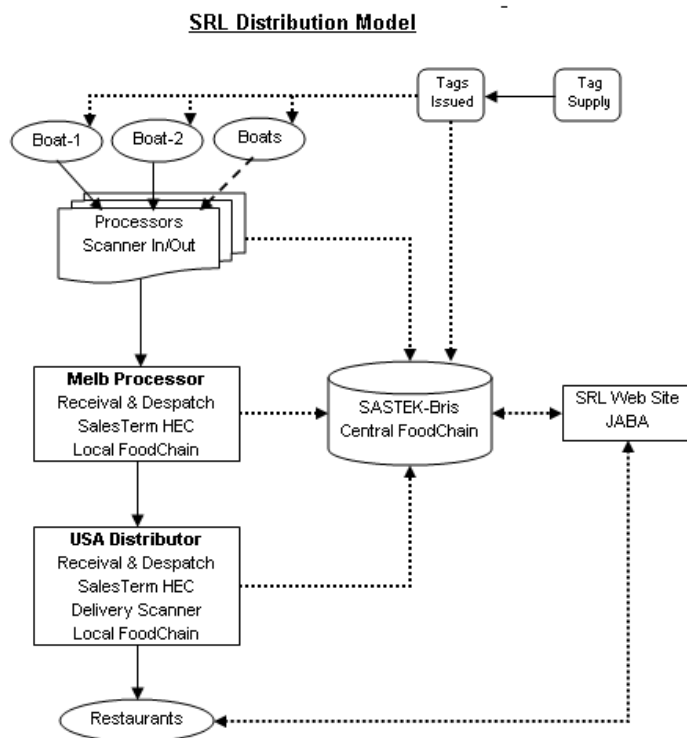
The outcomes of the project have been communicated to the industry through the Australian Southern Rocklobster Industry News (FRDC 2006/215) and a series of port meetings have been held to communicate the product specifications, market development activities and traceability system to industry, these include:

- Kingston (8th March, 2006)
- Southend (10th April, 2006)
- Beachport (10th April, 2006)
- Launceston (26th May, 2006) – approximately 45 fishers attended
- St Helens (29th May, 2006) – 30 fishers attended
- Adelaide (13th June, 2006)
- Warooka (19th June, 2006)
- Port Lincoln (20th June, 2006)
- Millicent – major industry workshop 100+ (30th June, 2006)
- King Island (27th June, 2006)
- Kangaroo Island (July 4th 2006)
- Robe (September, 2006)
- Carpenters Rocks (September, 2006)
- Pt MacDonnell (September, 2006)
- Portland (October 2006)

8. RESULTS/DISCUSSION

The development, establishment and implementation of the SASTEK traceability system (Figure 5) based on the Harcor tagging solution provides the potential vehicle for management of all distribution information required to facilitate the operation of the market development platform.

Figure 5: Diagrammatic representation of SASTEK traceability system.



At the point of entry into the system the following information was required to be recorded:

- date of entry
- fisher name, boat name and licence number
- port of landing
- tag number
- lobster weight
- size grade (H1, H2, or H3)
- whether the fish has been downgraded as not meeting Clean Green specifications (sick / damaged / missing limbs / lethargic / mortality)

As the lobster moves along the chain i.e. held in the tank or to the next 'category', the traceability system provides for the following functions:

- the downgrading of any lobster for reasons detailed above that may have deteriorated while being held in the tanks – including recording of any mortalities
- any downgraded or sick lobster that may have recovered - allowing their entry back into the system for sale
- the 'retagging' of any lobster which may have either lost their tag or the number and barcode on the tag has become unreadable.

- Recording the entry of the product at the next 'category' along the chain.

At any time the system is to provide the operator to check:

- the total stock on hand across the supply chain (any stock currently in transit is displayed as still residing at the previous 'category')
- the total stock on hand at any given category
- the total stock scanned out to any destination code (account)
- total downgraded stock
- total mortalities
- all of the above information is also attainable on the individual fisher level

The system has scope for payment to fishers through allowing the extraction of the following information:

- total volume of lobster delivered by an individual fisher
- total volume of lobster downgraded to receive the applicable beach price
- total volume of lobster downgraded to receive the applicable downgraded rate
- total volume of lobster downgraded as a mortality for which no payment is received
- the volume of lobster sold (scanned out) to any particular destination code – these are fish for which the fisher will be paid the agreed rate for fish meeting the clean green specifications.

The basic data is in the system, the system can facilitate the creation of accounts by allowing the extraction of the following information:

- the total volume of lobster scanned out to a specific location / account on a given date - this corresponds to the date on a specific invoice created by the Account Manager and ensures that fishers are only paid for lobster which have been sold and not for fish which remain in the system i.e. a cross check is required against individual fishers to determine which tag numbers were scanned out to that location on that date.

Data is captured via an electronic hand-held scanner (PSC Falcon 4420), at time of the trial all data was manually entered into the system i.e. fish weight and size and quality grade selection, is required to be made on the scanner interface for each animal by factory staff.

During the trial the scanner acted as simply a tool for data capture - it does not communicate with the traceability system. Files are transferred from the scanner to the SASTEK administration centre in Brisbane, via email, where the files are uploaded and the captured information is entered onto the actual system.

The research and development work within this project identified the functions required from a traceability system for live Southern Rocklobster. The project highlighted the deficiencies and further research and development required for the SRL traceability solution to underpin a branding and position strategy based on best practice.

9. BENEFITS

The benefit from the project is that the traceability system incorporating quality assurance, inventory control and branding, can be used through a fisher market development platform to increase price and manage quality through the chain.

A brand / trade mark support by a traceability system provides a platform to create and build new markets based on a differentiation and end-users (Food Service Sector or the customer) can distinguish between branded and non-branded products.

Creating new markets using unbranded products is risky and allows opportunist to undercut the market, which forces the trade to be commodity driven – demand and supply.

Once a robust traceability system combined with an efficient tagging of lobsters a platform may exist to address compliance issues for recreational / commercial catches of lobster and other high value wild catch fisher products.

10. FURTHER DEVELOPMENT

The traceability system developed to date still needs further refinement. This includes:

- Refinement of the tag to ensure the barcode remains intact throughout the whole supply chain
- Development of a tag applicator for onboard the Southern Rocklobster vessel
- Refinement and development of the traceability database to capture all the information along the chain via barcode scanning and input of data over the website
- Software development to provide accurate reporting for:
 - Quality Assurance reports
 - Fisher payments
 - Inventory
 - Financial accounting
 - Downgrades and mortalities
 - Transfer of stock
- Implementation of the traceability system at each step of the value-chain.

11. PLANNED OUTCOMES

The main outcome planned from the project was the identification of a tag / label and traceability system to incorporate best practice, underpinned by a brand. This has occurred.

12. CONCLUSION

The traceability system has proved that individual animals can be tracked and traced using a horn tag, which can differentiate Australian Southern Rocklobster in the marketplace.

Four different informative tags / labels to provide for traceability of Australian Southern Rocklobster from the point of capture to the point of consumption have been evaluated. The tag / label chosen by the Australian Southern Rocklobster industry was the Harcor tag, which required improvements to meet the requirements of the SRL value chain to position the lobster as the finest in the world.

The traceability system (hardware and software) can also be used to capture quality assurance, financial, inventory data along the value chain. The traceability data provides best practice information to underpin a brand (printed on the tag) and allows a linkage the customer to seek further information on each individual lobster via visiting the website printed on the tag and typing in the readable number.

The traceability system components and data that is to be captured have been identified and trialled, but further research and development is required on the tag / label, data capture mechanism (hardware and software), database, reports and development of an application method for use on board southern rocklobster vessels is still required.

The quality assurance data logging highlighted deficiencies in the cool chain, which require further investigation to guarantee product quality to the marketplace.

13. REFERENCES

Gittins, S (2006) FRDC Project No: 2006 / 216 - Development of supply chain, distribution and communication tools to support entry of Australian Southern Rocklobster into the Super-Premium-Fine-Dining sector in the USA. Corvel Marketing and Management & Australian Business Limited

Yap, G (2005) FRDC Project 2004 / 251 – Identification of new market opportunities for Australian Southern Rocklobster Exports, March 2005

Larkin, B and Channon, H (2005) *Implementation of value chain management and traceability in Southern Rocklobster Industry*. Department of Primary Industries, Victoria. Our Rural Landscapes 3.2 Stage 1, June 2005

McShane, P, Edwards, R & Muggleton, M (2007) – Integrated supply chain management as a strategy to niche market Development – Australian Southern Rocklobster. Department of Forestry's, Fisheries and Agriculture (DAFF)

14. APPENDICES

Appendix 1 Intellectual Property

Nil

Appendix 2 Staff

The only staff member involved in the project was Matthew Muggleton, Industry Development Officer.

Appendix 3 Steering Committee Membership

Southern Rocklobster Limited

Roger Cotton
Independent Chair

Roger Edwards
Executive Officer

Rodney Treloggen
Chief Executive Officer
TRLFA

David Lucas
Executive Officer
VRLA

Kim Skeer
Director

Simon Peters
Director

John Samson
Director

David Johnston
Director

Appendix 4 – Demonstration project: traceability of southern rocklobster

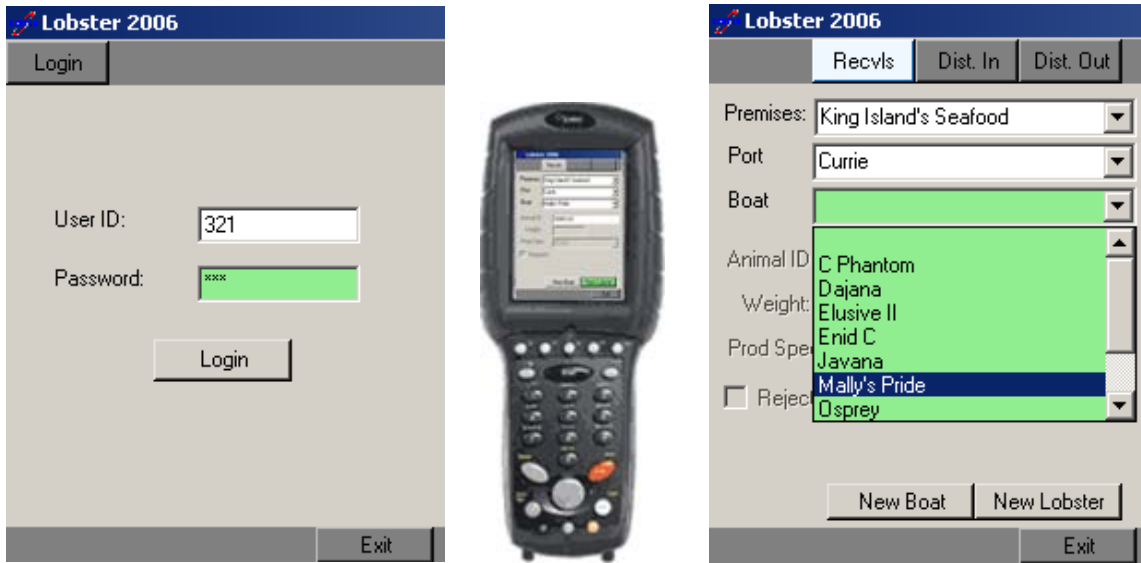
Appendix 5 – Tag specification

Appendix 6 - Cost Benefit Study: Development of a Traceability System for the Australian Southern Rocklobster Industry

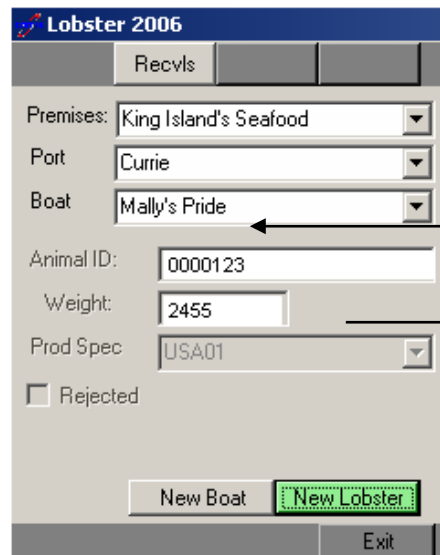
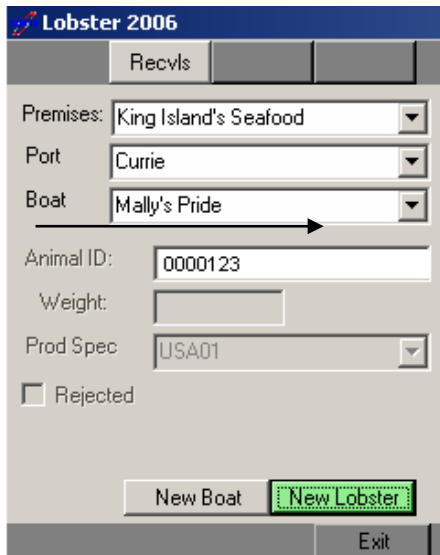
Appendix 7 – DPI Victoria Value Chain Review

Appendix 8 – Traceability system structure

Appendix 9 – Data to be recorded along the chain



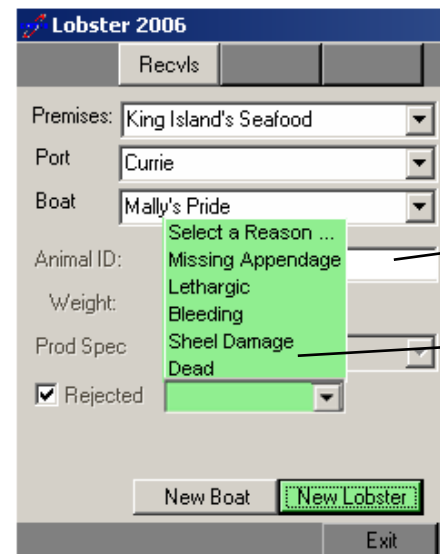
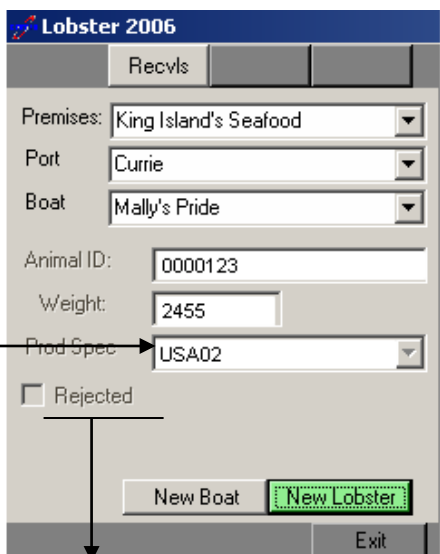
Add tabs for:-
 -Water Quality
 -DO%
 -Salinity
 -pH
 -NH₃
 -Temp °C/°F



Air Temp @
 receipt point

Weights need to
 be displayed in
 kg's & lb's or
 can be entered
 as either unit &
 converted

Need a link to
 show the
 specification



Leg(s)

"Shell" - spelling

A note is required advising that the tag needs to be removed & sent to SRL

Lobster 2006

Recvls

Premises: King Island's Seafood

Port: Currie

Boat: Mally's Pride

Animal ID: 0000123

Weight: 2455

Prod Spec: USA01

Rejected Missing Append 2

New Boat New Lobster

Exit

DISTRIBUTOR IN

Water Quality tab & Ambient Air Temp upon arrival tab needed

Lobster 2006

Recvls Dist. In

Premises: Kingfisher Trading Inc

Box ID

Gross Weight

Customs #

Animal ID:

Rejected

New Box New Lobster

Exit

Lobster 2006

Recvls Dist. In

Premises: Kingfisher Trading Inc

Box ID: 012342300001245

Gross Weight: 2455

Customs #: AUS7639J

Animal ID: 0000123

Rejected DEAD

New Box New Lobster

Exit

All weights (kg, lb, grams)

NOTE: Remove tag and send to SRL

Appendix 10 – Trial 2

Boat unload at KI Wharf, weigh/tag. Departed KI airport at 2:30pm

KillDate	Time	Boat Number	Port of Loading	Premises Location	Animal ID	Weight
28/04/2006	13:19 PM	Tainui III	Currie	King Island's Seafood	0000001	2850
28/04/2006	12:24 PM	Wayfarer	Currie	King Island's Seafood	0000002	2400
28/04/2006	12:04 PM	Wayfarer	Currie	King Island's Seafood	0000003	2950
28/04/2006	12:22 PM	Wayfarer	Currie	King Island's Seafood	0000004	2250
28/04/2006	13:17 PM	Tainui III	Currie	King Island's Seafood	0000006	2950
28/04/2006	12:19 PM	Wayfarer	Currie	King Island's Seafood	0000007	2950
28/04/2006	12:02 PM	Wayfarer	Currie	King Island's Seafood	0000008	2650
28/04/2006	12:03 PM	Wayfarer	Currie	King Island's Seafood	0000009	2250
28/04/2006	13:17 PM	Tainui III	Currie	King Island's Seafood	0000010	3150
28/04/2006	13:18 PM	Tainui III	Currie	King Island's Seafood	0000011	2100
28/04/2006	13:21 PM	Tainui III	Currie	King Island's Seafood	0000012	3000
28/04/2006	13:24 PM	Tainui III	Currie	King Island's Seafood	0000013	3400
28/04/2006	13:23 PM	Tainui III	Currie	King Island's Seafood	0000014	2900
28/04/2006	13:19 PM	Tainui III	Currie	King Island's Seafood	0000015	2850
28/04/2006	13:24 PM	Tainui III	Currie	King Island's Seafood	0000016	1900
28/04/2006	13:19 PM	Tainui III	Currie	King Island's Seafood	0000017	1700
28/04/2006	13:22 PM	Tainui III	Currie	King Island's Seafood	0000018	2200
28/04/2006	13:22 PM	Tainui III	Currie	King Island's Seafood	0000019	1750

Lobster records into Wensons					
KillDate	Time	Port of Loading	Premises Location	Animal ID	Weight
28/04/2006	4:42 PM	King Island's Seafood	Wenson	0000001	2740
28/04/2006	4:49 PM	King Island's Seafood	Wenson	0000002	2440
28/04/2006	4:49 PM	King Island's Seafood	Wenson	0000003	2900
28/04/2006	4:50 PM	King Island's Seafood	Wenson	0000004	2260
28/04/2006	4:43 PM	King Island's Seafood	Wenson	0000006	2820
28/04/2006	4:47 PM	King Island's Seafood	Wenson	0000007	2780
28/04/2006	4:48 PM	King Island's Seafood	Wenson	0000008	2620
28/04/2006	4:48 PM	King Island's Seafood	Wenson	0000009	2160
28/04/2006	4:43 PM	King Island's Seafood	Wenson	0000010	2980
28/04/2006	4:43 PM	King Island's Seafood	Wenson	0000011	1980
28/04/2006	4:41 PM	King Island's Seafood	Wenson	0000012	2860
28/04/2006	4:45 PM	King Island's Seafood	Wenson	0000013	3340
28/04/2006	4:44 PM	King Island's Seafood	Wenson	0000014	2620
28/04/2006	4:41 PM	King Island's Seafood	Wenson	0000015	2720
28/04/2006	4:45 PM	King Island's Seafood	Wenson	0000016	1800
28/04/2006	4:42 PM	King Island's Seafood	Wenson	0000017	1580
28/04/2006	4:45 PM	King Island's Seafood	Wenson	0000018	2040
28/04/2006	4:46 PM	King Island's Seafood	Wenson	0000019	1700

Water Quality Parameters
Southern Unite Seafood
date: 28/05/2006 / 5:20pm

Salinity 38 ‰
Temperature 11.8 °C
DO 98 %
PH 8.42
NH3 0.5 mg/l

Wenson loadout for USA

KillDate	Time	Port of Loading	Premises Location	Animal ID	Weight
2/05/2006	5:42:00 AM	Wenson	Kingfisher Trading	0000001	2780
2/05/2006	5:48:00 AM	Wenson	Kingfisher Trading	0000002	2460
2/05/2006	5:40:00 AM	Wenson	Kingfisher Trading	0000003	2920
2/05/2006	5:41:00 AM	Wenson	Kingfisher Trading	0000004	2280
2/05/2006	5:41:00 AM	Wenson	Kingfisher Trading	0000006	2820
2/05/2006	5:44:00 AM	Wenson	Kingfisher Trading	0000007	2820
2/05/2006	5:47:00 AM	Wenson	Kingfisher Trading	0000008	2660
2/05/2006	5:45:00 AM	Wenson	Kingfisher Trading	0000009	2200
2/05/2006	5:44:00 AM	Wenson	Kingfisher Trading	0000010	3020
2/05/2006	5:49:00 AM	Wenson	UNKOWN	0000011	
2/05/2006	5:43:00 AM	Wenson	Kingfisher Trading	0000012	2840
2/05/2006	5:45:00 AM	Wenson	Kingfisher Trading	0000013	3380
2/05/2006	5:41:00 AM	Wenson	Kingfisher Trading	0000014	2640
2/05/2006	5:44:00 AM	Wenson	Kingfisher Trading	0000015	2760
2/05/2006	5:49:00 AM	Wenson	UNKOWN	0000016	
2/05/2006	5:49:00 AM	Wenson	UNKOWN	0000017	
2/05/2006	5:42:00 AM	Wenson	Kingfisher Trading	0000018	2060
2/05/2006	5:49:00 AM	Wenson	UNKOWN	0000019	
WENSON SUPPLIED FOLLOWING, SOURCE UNKNOWN					
2/05/2006	5:05:00 AM	Unkown	Kingfisher Trading	0000043	3040
2/05/2006	5:55:00 AM	Unkown	Kingfisher Trading	0000040	2940
2/05/2006	5:56:00 AM	Unkown	Kingfisher Trading	0000046	2320
2/05/2006	5:56:00 AM	Unkown	Kingfisher Trading	0000045	2540
2/05/2006	5:57:00 AM	Unkown	Kingfisher Trading	0000048	3180
2/05/2006	5:57:00 AM	Unkown	Kingfisher Trading	0000049	2300
2/05/2006	5:57:00 AM	Unkown	Kingfisher Trading	0000042	2860
2/05/2006	5:58:00 AM	Unkown	Kingfisher Trading	0000041	2020
2/05/2006	5:58:00 AM	Unkown	Kingfisher Trading	0000044	2060
2/05/2006	5:58:00 AM	Unkown	Kingfisher Trading	0000026	2220

Arrival to the USA

Product delivered to the Mondrian @ 4:00pm

KillDate	Time	Premises Location	Time	ProDelivered to	Animal ID	Shipping box (foam)	Quality Inspected @ 8:30am 3rd May, 2006
2/05/2006	1:00:00 PM	Kingfisher Trading	4:00:00 PM	MONDRIAN	0000001	1	Minor tail damage
2/05/2006	1:00:00 PM	Kingfisher Trading					
2/05/2006	1:00:00 PM	Kingfisher Trading					
2/05/2006	1:00:00 PM	Kingfisher Trading					
2/05/2006	1:00:00 PM	Kingfisher Trading					
2/05/2006	1:00:00 PM	Kingfisher Trading	4:00:00 PM	MONDRIAN	0000007	1	
2/05/2006	1:00:00 PM	Kingfisher Trading					
2/05/2006	1:00:00 PM	Kingfisher Trading					
2/05/2006	1:00:00 PM	Kingfisher Trading	4:00:00 PM	MONDRIAN	0000010	1	
2/05/2006	1:00:00 PM	UNKOWN					
2/05/2006	1:00:00 PM	Kingfisher Trading	4:00:00 PM	MONDRIAN	0000012	1	
2/05/2006	1:00:00 PM	Kingfisher Trading					
2/05/2006	1:00:00 PM	Kingfisher Trading					
2/05/2006	1:00:00 PM	Kingfisher Trading					
2/05/2006	1:00:00 PM	UNKOWN					
2/05/2006	1:00:00 PM	UNKOWN					
2/05/2006	1:00:00 PM	Kingfisher Trading	4:00:00 PM	MONDRIAN	0000018	1	
2/05/2006	1:00:00 PM	UNKOWN					
WENSON SUPPLIED FOLLOWING, SOURCE UNKNOWN							
2/05/2006	1:00:00 PM	Kingfisher Trading	4:00:00 PM	MONDRIAN	0000043	3	
2/05/2006	1:00:00 PM	Kingfisher Trading	4:00:00 PM	MONDRIAN	0000040	2	
2/05/2006	1:00:00 PM	Kingfisher Trading	4:00:00 PM	MONDRIAN	0000046	2	
2/05/2006	1:00:00 PM	Kingfisher Trading	4:00:00 PM	MONDRIAN	0000045	2	
2/05/2006	1:00:00 PM	Kingfisher Trading	4:00:00 PM	MONDRIAN	0000048	2	
2/05/2006	1:00:00 PM	Kingfisher Trading	4:00:00 PM	MONDRIAN	0000049	2	
2/05/2006	1:00:00 PM	Kingfisher Trading	4:00:00 PM	MONDRIAN	0000042	3	
2/05/2006	1:00:00 PM	Kingfisher Trading	4:00:00 PM	MONDRIAN	0000041	3	
2/05/2006	1:00:00 PM	Kingfisher Trading	4:00:00 PM	MONDRIAN	0000044	3	
2/05/2006	1:00:00 PM	Kingfisher Trading	4:00:00 PM	MONDRIAN	0000026	3	missing horn

Water Quality Parameters
 Kingfisher Trading Inc
 Date: 4/05/2006 / 4:00pm
 Salinity 35 ‰
 Temperatur 13.5 °C
 DO 92.6 %
 PH 8.54
 NH3 0.5 mg/l

Lobsters carried as Hand luggage to Las Vegas

KillDate	Time	ProDelivered to	Animal ID
4/05/2006	4:30:00 PM	LAS VEGAS	0000002
4/05/2006	4:30:00 PM	LAS VEGAS	0000003
4/05/2006	4:30:00 PM	LAS VEGAS	0000004
4/05/2006	4:30:00 PM	LAS VEGAS	0000006
4/05/2006	4:30:00 PM	LAS VEGAS	0000008
4/05/2006	4:30:00 PM	LAS VEGAS	0000009
4/05/2006	4:30:00 PM	LAS VEGAS	0000013
4/05/2006	4:30:00 PM	LAS VEGAS	0000014

Product delivered to Bastide and Josie Restaurant @ 4:00pm

KillDate	Time	ProDelivered to	Animal ID
6/05/2006	2:30:00 PM	BASTIDE	0000011
6/05/2006	2:30:00 PM	JOSIE RESTAURANT	0000015
		Missing product	0000016
		Missing product	0000017
		Missing product	0000019

Appendix 11 – Trial 3

Recorded In 27/5/06					Loaded Out 30/5/06		
Premises Location	Boat Number	Port of Loading	Animal ID	Weight	Carton	Weight	Ctn Total
Southern Unite Seafood Aust	C Phantom	Vivonne Bay	0000203	3700	1	3860	
King Island's Seafood	Wayfarer	Currie	0000183	2780	1	2870	
Stanke Oceania - Carpenters Rock	Mally's Pride	Robe	0000107	2520	1	2500	
Stanke Oceania - Carpenters Rock	Dajana	Robe	0000062	2480	1	2520	
Southern Unite Seafood Aust	C Phantom	Vivonne Bay	0000204	2460	1	2550	14300
Stanke Oceania - Carpenters Rock	Dajana	Robe	0000058	2640	2	2640	
King Island's Seafood	Tainui III	Currie	0000103	2580	2	2650	
King Island's Seafood	Tainui III	Currie	0000194	2520	2	2610	
Southern Unite Seafood Aust	Enid C	Grassy	0000206	2420	2	2520	
King Island's Seafood	Javana	Currie	0000097	2380	2	2450	12870
Stanke Oceania - Carpenters Rock	Mally's Pride	Robe	0000095	2740	3	2760	
King Island's Seafood	Javana	Currie	0000098	2580	3	2690	
Southern Unite Seafood Aust	Enid C	Grassy	0000055	2500	3	2580	
Stanke Oceania - Carpenters Rock	Mally's Pride	Robe	0000104	2500	3	2560	
Stanke Oceania - Carpenters Rock	Elusive II	Port MacDonell	0000490	2500	3	2520	13110
King Island's Seafood	Tainui III	Currie	0000193	2580	4	2670	
Southern Unite Seafood Aust	C Phantom	Vivonne Bay	0000202	2560	4	2670	
Stanke Oceania - Carpenters Rock	Dajana	Robe	0000118	2420	4	2480	
Southern Unite Seafood Aust	Enid C	Grassy	0000057	2360	4	2430	
Stanke Oceania - Carpenters Rock	Mally's Pride	Robe	0000148	2340	4	2390	12640
King Island's Seafood	Tainui III	Currie	0000105	2760	5	2860	
Stanke Oceania - Carpenters Rock	Elusive II	Port MacDonell	0000494	2740	5	2760	
Stanke Oceania - Carpenters Rock	Mally's Pride	Robe	0000056	2660	5	2690	
Stanke Oceania - Carpenters Rock	Dajana	Robe	0000130	2480	5	2550	
King Island's Seafood	Javana	Currie	0000108	2300	5	2410	13270
Stanke Oceania - Carpenters Rock	Mally's Pride	Robe	0000052	2460	6	2530	
Southern Unite Seafood Aust	Enid C	Grassy	0000027	2440	6	2510	
Southern Unite Seafood Aust	Enid C	Grassy	0000207	2380	6	2480	12970
Stanke Oceania - Carpenters Rock	Mally's Pride	Robe	0000088	2620	7	2550	
Stanke Oceania - Carpenters Rock	Mally's Pride	Robe	0000078	2520	7	2550	
Stanke Oceania - Carpenters Rock	Dajana	Robe	0000067	2360	7	2420	
Southern Unite Seafood Aust	Enid C	Grassy	0000028	2340	7	2400	
King Island's Seafood	Javana	Currie	0000101	2340	7	2460	12380
Southern Unite Seafood Aust	Enid C	Grassy	0000050	2680	8	2790	
Southern Unite Seafood Aust	Enid C	Grassy	0000051	2540	8	2680	
Southern Unite Seafood Aust	Enid C	Grassy	0000053	2520	8	2610	
King Island's Seafood	Javana	Currie	0000096	2360	8	2480	
Southern Unite Seafood Aust	Enid C	Grassy	0000210	2320	8	2440	13000
Stanke Oceania - Carpenters Rock	Dajana	Robe	0000068	3260	9	3380	
Stanke Oceania - Carpenters Rock	Dajana	Robe	0000063	2840	9	2890	
Southern Unite Seafood Aust	C Phantom	Vivonne Bay	0000205	2640	9	2800	
Stanke Oceania - Carpenters Rock	Mally's Pride	Robe	0000069	2400	9	2500	
Southern Unite Seafood Aust	Enid C	Grassy	0000209	2400	9	2550	14120
Stanke Oceania - Carpenters Rock	Mally's Pride	Robe	0000029	2540	10	2580	
King Island's Seafood	Tainui III	Currie	0000188	2480	10	2610	
Southern Unite Seafood Aust	Enid C	Grassy	0000031	2420	10	2540	
King Island's Seafood	Javana	Currie	0000102	2380	10	2480	
Stanke Oceania - Carpenters Rock	Mally's Pride	Robe	0000059	2360	10	2440	12650
				Total Weight (grams)	127400	131310	
				Total Weight (kilograms)	127.4	131.31	
				Lobster Coun	50	50	
				Number of box	10.6167	10	

Water Quality Parameters
Southern Unite Seafood
date: 27/05/2006 / 2:00pm

Salinity	38 ‰
Temperature	11.2 °C
DO	124.5 %
PH	8.08
NH3	0.25 mg/l

Loaded Out 30/05/06 - Southern Unite Seafood			
Carton	Weight	Ctn Total	Comments
1	3860		
1	2870		
1	2500		
1	2520		
1	2550	14300	
2	2640		
2	2650		
2	2610		
2	2520		
2	2450	12870	
3	2760		
3	2690		
3	2580		
3	2560		
3	2520	13110	
4	2670		
4	2670		
4	2480		
4	2430		
4	2390	12640	
5	2860		
5	2760		
5	2690		
5	2550		
5	2410	13270	
6	2530		
6	2510		
6	2480	12970	
7	2550		
7	2550		
7	2420		
7	2400		
7	2460	12380	
8	2790		
8	2680		
8	2610		
8	2480		
8	2440	13000	
9	3380		
9	2890		
9	2800		
9	2500		
9	2550	14120	
10	2580		
10	2610		
10	2540		
10	2480		
10	2440	12650	
	131310	13.131	
	131.31		
	50		
	10		

Loaded In 30/5/06 (4:00pm) - Kingfisher Trading			
Weight (kg)	Weight (lb)	Temperature in box Degrees Celcius)	Comments
3864	8.5	11	
2727	6	11	
2273	5	11	
2455	5.4	11	
2364	5.2	11	
2545	5.6	13.6	Hole in box, no loggers
2545	5.6	13.6	
2545	5.6	13.6	
2455	5.4	13.6	
2455	5.4	13.6	
2455	5.4	12.8	broken leg
2545	5.6	12.8	
2455	5.4	12.8	
2182	4.8	12.8	Dead due to a badly damaged tail
2455	5.4	12.8	
2545	5.6	14	C02 logger, temp and humidity
2545	5.6	14	
2364	5.2	14	
2273	5	14	
2273	5	14	
2727	6		
2545	5.6		
2545	5.6		
2455	5.4		
2273	5		
2500	5.5		
2500	5.5		
2500	5.5		
2545	5.6	17.4	C02 logger, temp and humidity - Card Board box
2455	5.4	17.4	
2273	5	17.4	
2273	5	17.4	
2455	5.4	17.4	
2636	5.8		C02 logger, temp and humidity
2545	5.6		
2545	5.6		
2364	5.2		
2364	5.2		
3182	7		data logger for temperature
2727	6		
2545	5.6		
2273	5		
2455	5.4		
2500	5.5		
2500	5.5		
2500	5.5		
2500	5.5		
2500	5.5		
	276.1		
	125.5		
	50		
	10		

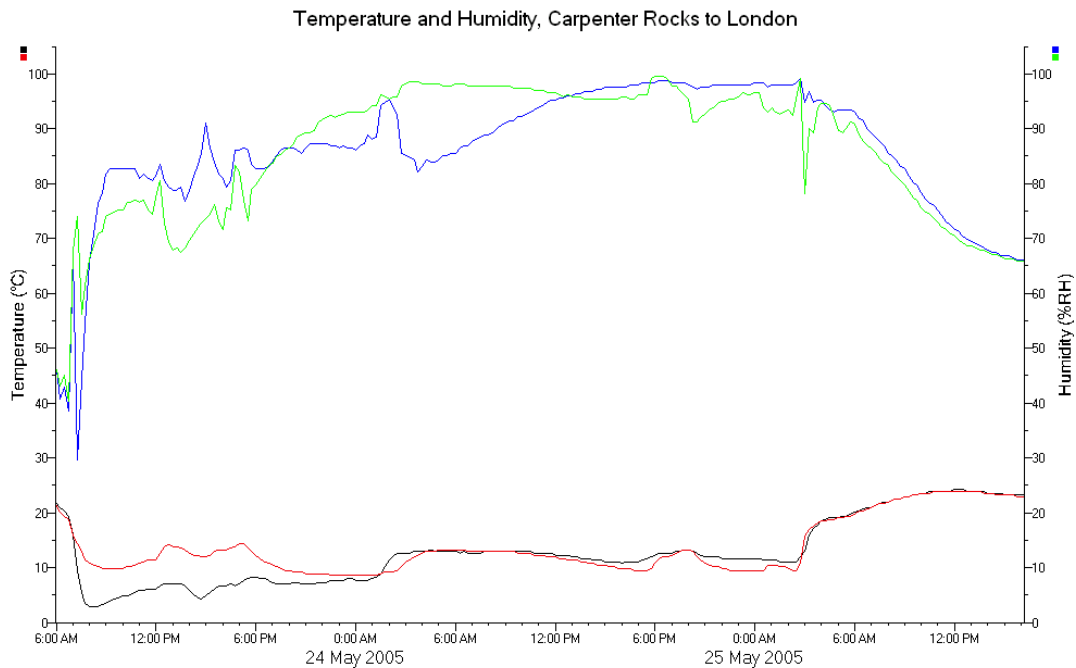
Water Quality Parameters
Kingfisher's tanks
date: 30/05/2006 / 3:30pm

Salinity 35 ‰
Temperature 13.2 °C
DO 65 %
PH 7.36
NH3 0.5 mg/l

Loaded Out 31/5/06 (12:00pm) - Kingfisher				
Lobster weight (kg)	Lobster weight (lb)	Restaurant	Date Packed	Time Packed
3818	8.4		31/05/2006	12:00pm
2500	5.5		3/05/2006	11:00am
2273	5		31/05/2006	12:00pm
2455	5.4			
2364	5.2		3/06/2006	11:00am
2545	5.6		31/05/2006	12:00pm
2409	5.3		31/05/2006	12:00pm
2500	5.5		3/05/2006	11:00am
2500	5.5		1/06/2006	5:00pm
2500	5.5		3/05/2006	11:00am
2455	5.4			
2545	5.6		1/06/2006	11:00am
2455	5.4		1/06/2006	11:00am
2182	4.8			
2409	5.3		31/05/2006	12:00pm
2545	5.6		3/06/2006	11:00am
2545	5.6		2/06/2006	2:00pm
2318	5.1		31/05/2006	12:00pm
2227	4.9		31/05/2006	12:00pm
2273	5		31/05/2006	12:00pm
2727	6			
2545	5.6			
2500	5.5		31/05/2006	12:00pm
2500	5.5		1/06/2006	5:00pm
2273	5		2/06/2006	2:00pm
2500	5.5			
2500	5.5		1/06/2006	5:00pm
2500	5.5		2/06/2006	2:00pm
2545	5.6		2/06/2006	3:00pm
2455	5.4		3/06/2006	11:00am
2273	5			
2500	5.5		1/06/2006	5:00pm
2318	5.1		31/05/2006	12:00pm
2500	5.5		3/05/2006	11:00am
2500	5.5		3/05/2006	11:00am
2500	5.5		3/05/2006	11:00am
2364	5.2		2/06/2006	3:00pm
2364	5.2		1/06/2006	2:00pm
3182	7		1/06/2006	2:00pm
2727	6			
2500	5.5		1/06/2006	5:00pm
2273	5		2/06/2006	2:00pm
2500	5.5		1/06/2006	5:00pm
2500	5.5		2/06/2006	2:00pm
2455	5.4		31/05/2006	12:00pm
2500	5.5		1/06/2006	5:00pm
2500	5.5		3/05/2006	11:00am
2500	5.5		1/05/2006	5:00pm
Trial	77.5			
extras	38.5			
	116			

Appendix 12 Supply Chain graphs

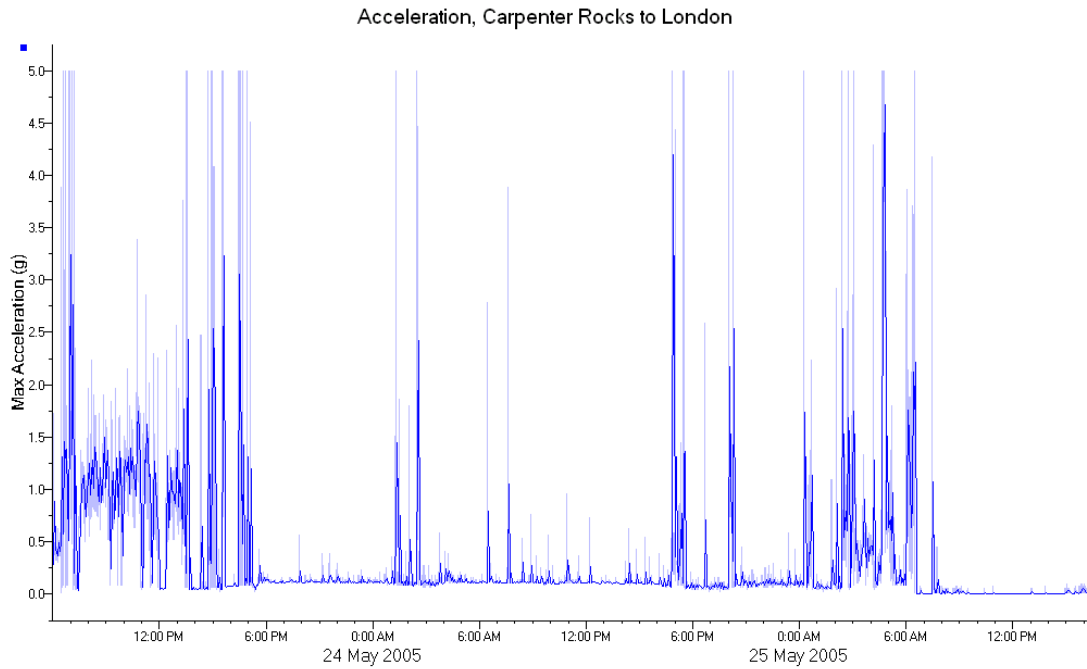
Graph 1. Carpenter Rocks to London Temperature and Humidity



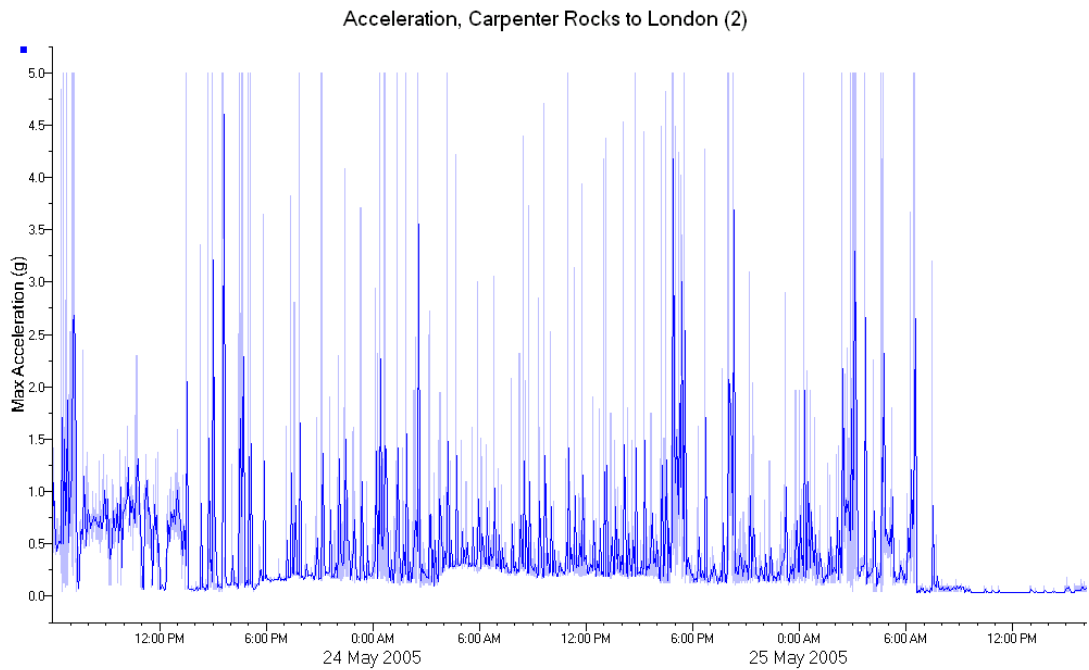
Key:

- 6:00 am – 12:30 pm -Transit in car to Melbourne Airport from Carpenter Rocks
- 12:30 pm – 1:00 pm – held at Freight Forwarders, Melbourne Airport
- 1:00 pm – 3:30 pm – held at Cargo Terminal Operators, Melbourne
- 3:30 pm – 12:00 am (24 May 2005) – Flight from Melbourne to Singapore
- 12:00 am – ~2:00 am (24 May 2005)- Singapore Changi Airport
- 2:00 am – 2:30 pm (25 May 2005) - Flight from Singapore to Heathrow Airport
- 2:30 pm – 2:00 am – Customs, Heathrow Airport
- 2:00 am – 2:30 am – Heathrow Airport to Freight Forwarders, Colnbrook, London
- 2:30 am – 4:00 pm – Colnbrook to London city central

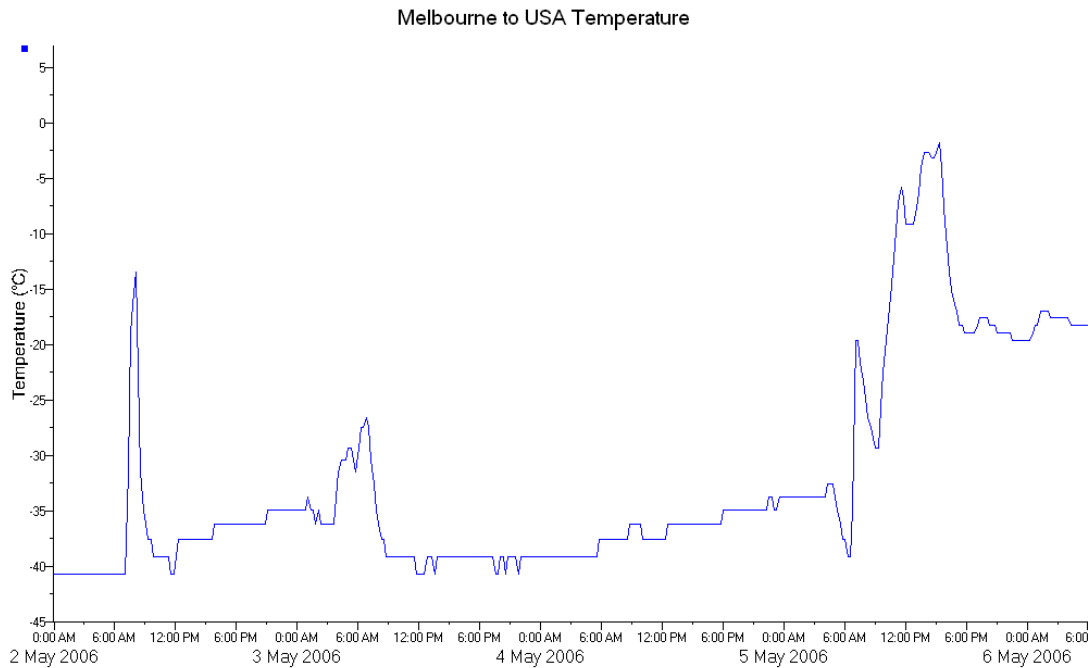
Graph 2. Carpenter Rocks to London Acceleration



Graph 3. Carpenter Rocks to London Acceleration, second logger.

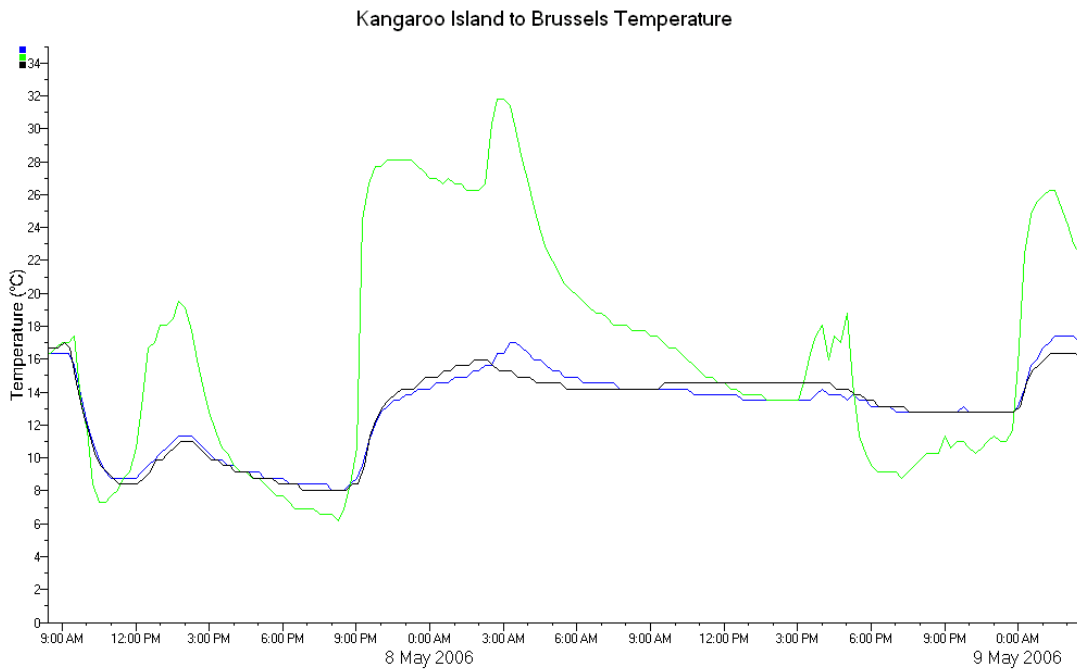


Graph 4. Melbourne to USA temperature, frozen Southern Rock Lobster

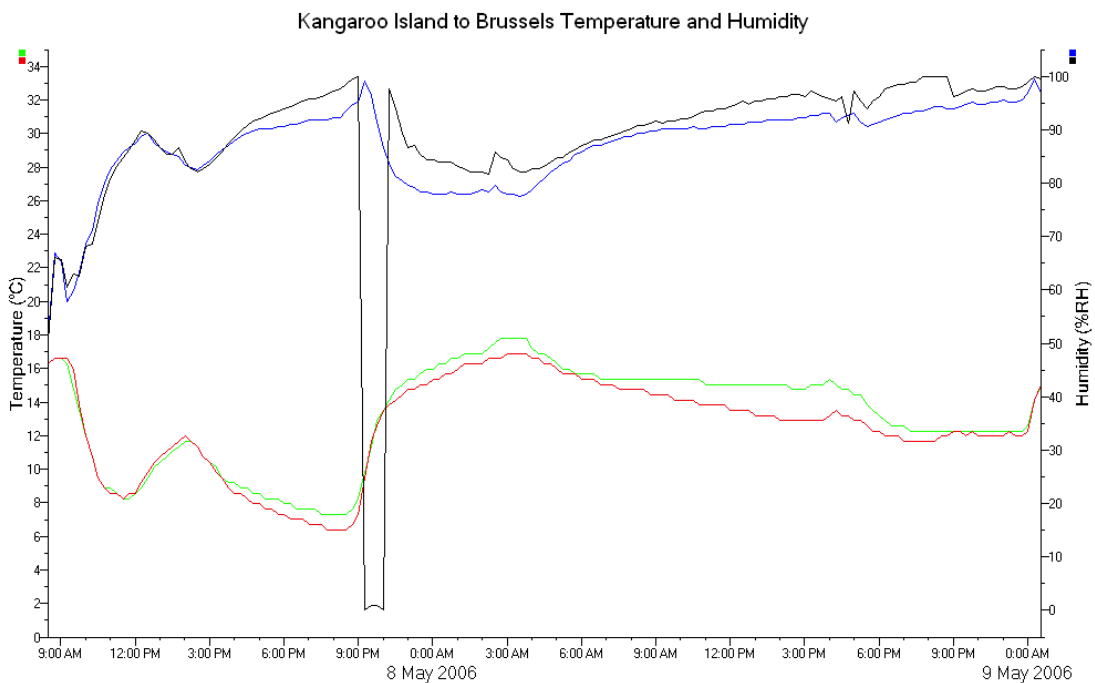


Date	Time	Place	Comments
2 May 2006	12:00AM-6:20AM	Melbourne	Stored in freezer (Southern Unite Seafood)
2 May 2006	6:20AM-6:30AM	Melbourne	Dry ice added
2 May 2006	6:60AM-7:30AM	Melbourne	Transport to airport
2 May 2006	7:30AM-10:50AM	Melbourne	Stored at freight forwarder
2-3 May 2006	10:50AM(2 May)-1:00AM(3 May)	Melbourne – Los Angeles	Flight to USA (Melbourne to Los Angeles)
3 May 2006	1:00AM-6:00AM	Los Angeles	Customs clearance, transport to distributor
3-5 May 2006	6:00AM(3 May)-6:30PM (5 May)	Los Angeles	Storage at distributor (King Fisher Trading – LA)
5 May 2006	6:30PM-10:40PM	Los Angeles	Transport to airport
5 May 2006	10:40PM-11:45PM	Las Vegas	Flight (LAX to Las Vegas)
5 May 2006	11:45PM-2:00PM	Las Vegas	Transport to restaurant (Luxor)
5-6 May 2006	2:00PM(5 May)-4:30AM(6 May)	Las Vegas	Storage in restaurant freezer
5 May 2006	4:30AM	Las Vegas	Removal from freezer

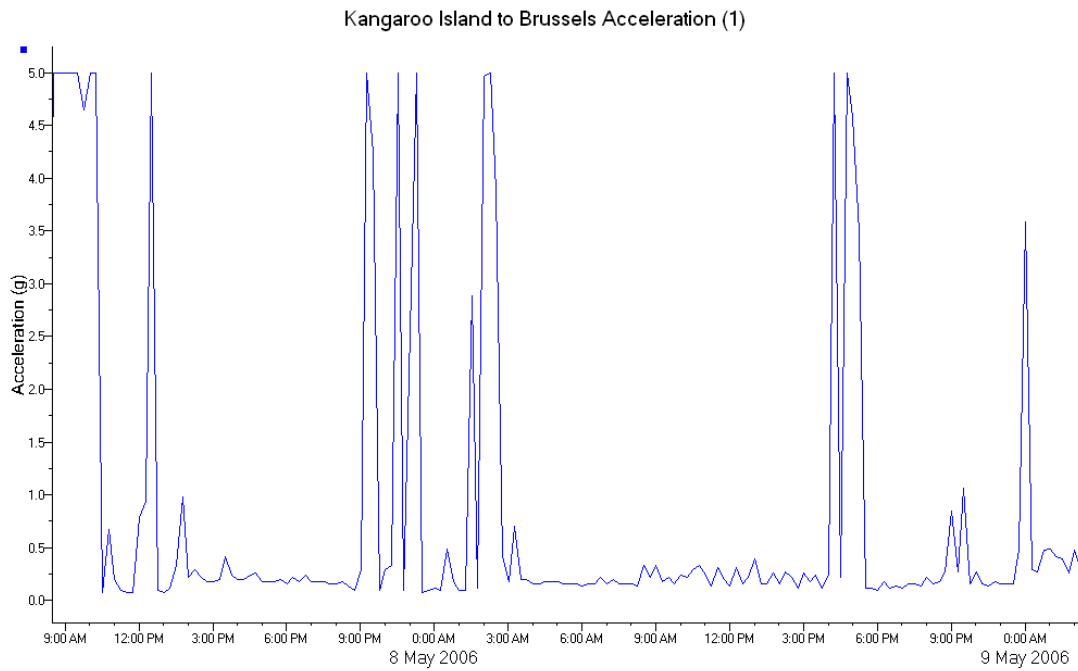
Graph 5. Live Southern Rocklobster Temperature - Kangaroo Island to Brussels



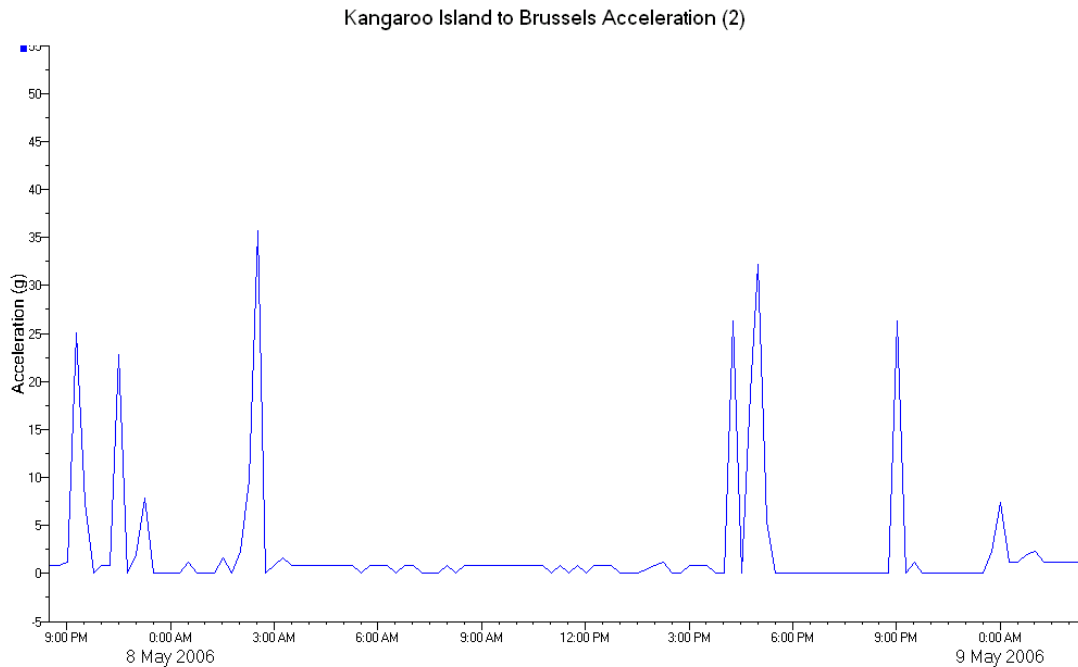
Graph 6. Live Southern Rocklobster Temperature & Humidity - Kangaroo Island to Brussels



Graph 7. Live Southern Rocklobster Acceleration (1) - Kangaroo Island to Brussels



Graph 8. Live Southern Rocklobster Acceleration (2) - Kangaroo Island to Brussels
(note different scale to previous acceleration graph)

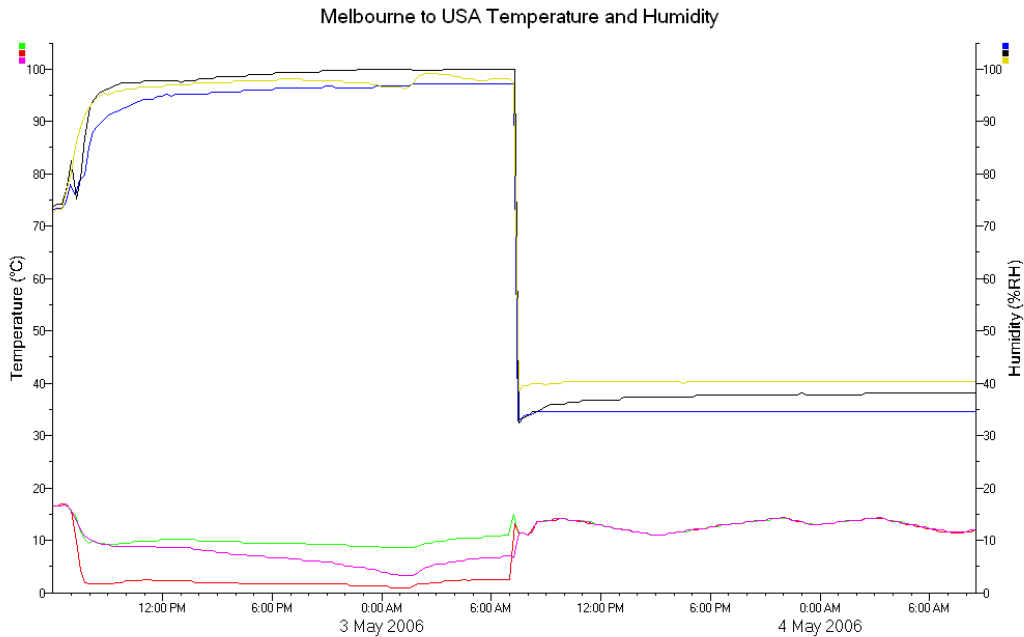


(note different scale to previous acceleration graph)

Date	Time	Place	Comments
7 May 2006	8:30AM-9:30AM	Adelaide	Load packed, transport to Adelaide Airport
7 May 2006	9:30AM-1:30PM	Adelaide	Stored in Airport chiller
7 May 2006	1:30PM-8:30Pm	Singapore	Flight to Singapore
7-8 May 2006	8:30PM (7 May)-3:00AM (8 May)	Singapore	Flight transition at Singapore
8 May 2006	3:00AM-3:00PM	Amsterdam	Flight to Amsterdam
8 May 2006	3:00PM-8:00PM	Amsterdam	Amsterdam custom clearance
8 May 2006	8:00PM (8 May)-12:30AM (9 May)	Brussels	Brussels
9 May 2006	12:30AM	Brussels	European Seafood Exposition – re-tanked

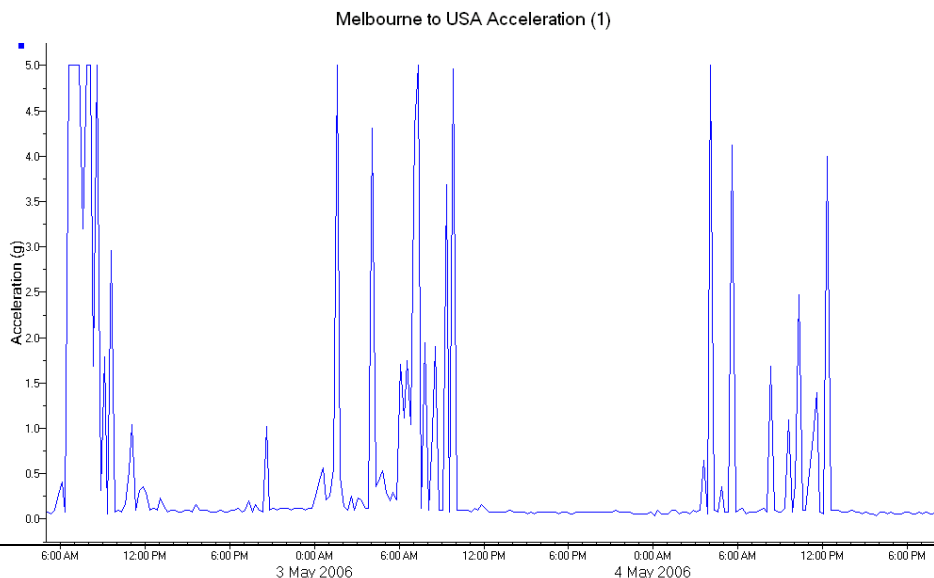
Graph 9. Melbourne to USA temperature and humidity

Note effects (or lack of fluctuations in temperature and humidity) of direct flight



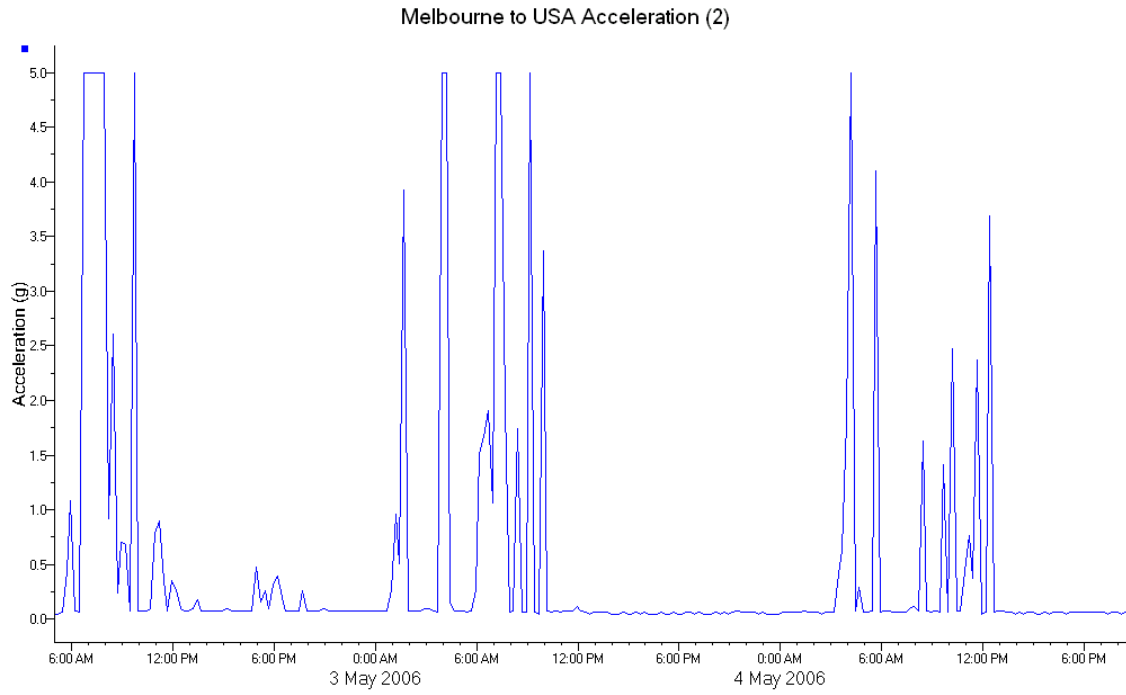
Date	Time (hours)	Place	Time/T emp	Humidit y	Motion	Comments
2/05/2006	0600	Richmond	y	y	y	Shipment packed for flight
2/05/2006	1000	Tullamarine	y	y	y	Flight to Los Angeles
3/05/2006	1230	Los Angeles	y	y	y	Arrive Los Angeles
3/05/2006	0400	Los Angeles	y	y	y	Arrived at distributor
3/05/2006	0600	Los Angeles	y	y	y	Loggers left at ambient temp
3/05/2006	0900	Los Angeles	y	y	y	Arrive at distributor
4/05/2006	0130	Los Angeles	y	y	y	Inspect for quality

Graph 10. Melbourne to USA acceleration (1)

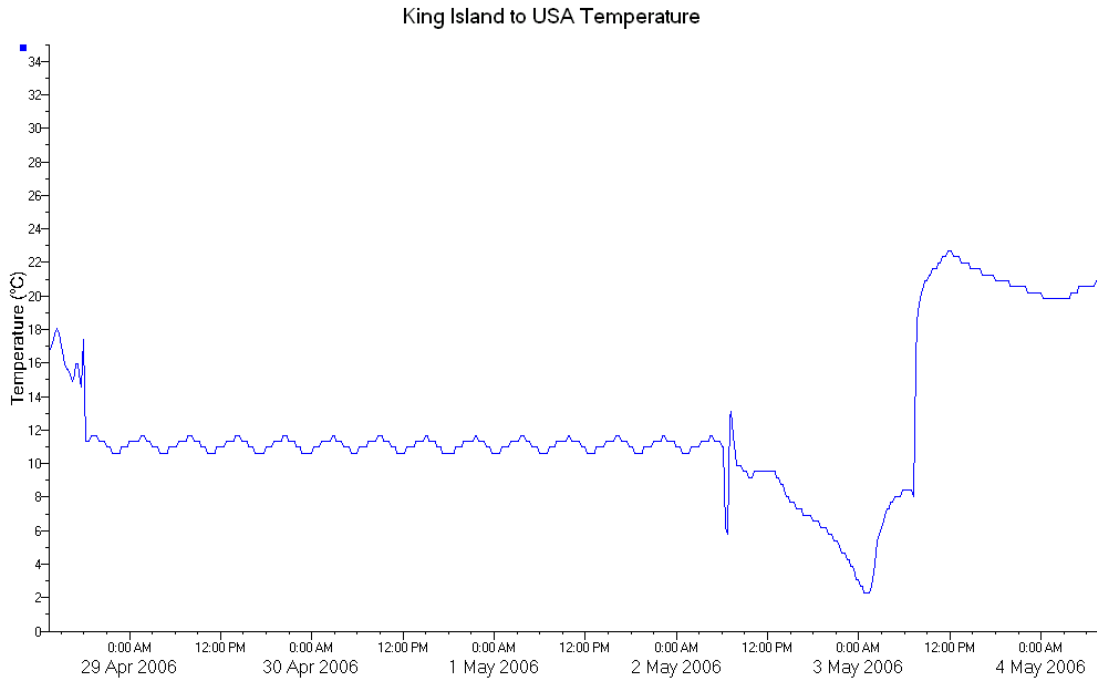


Extending innovation in Integrated Environment & Product Management: Implementation of value chain management & traceability in the Australian Rocklobster Industry.

Graph 11. Melbourne to USA acceleration (2)

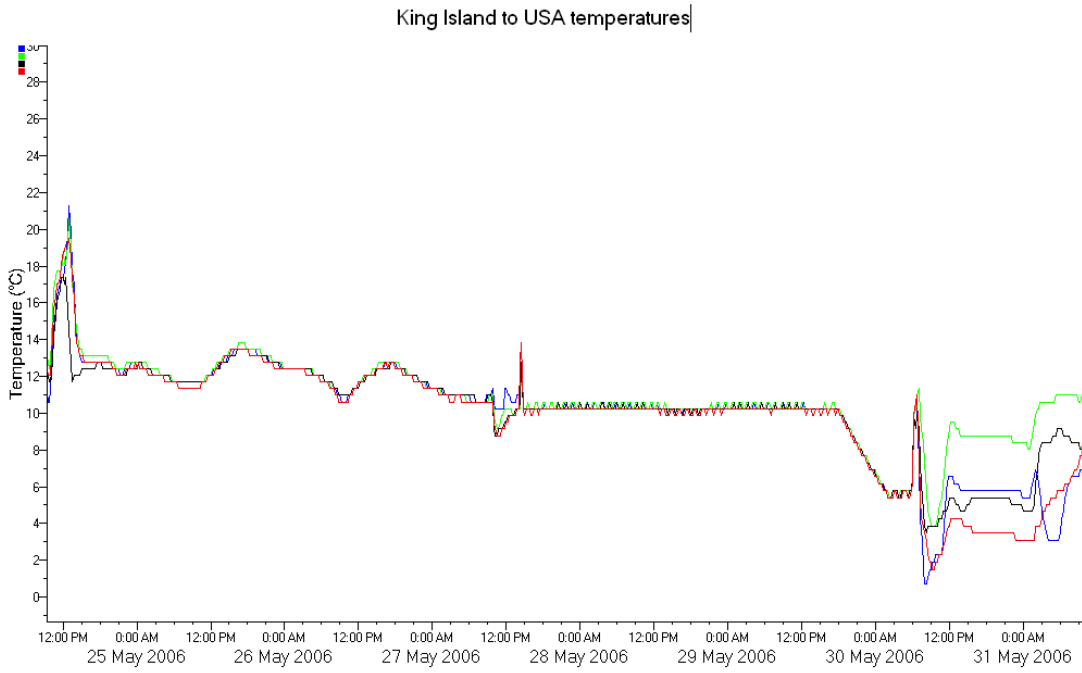


Graph 12. King Island to USA temperature

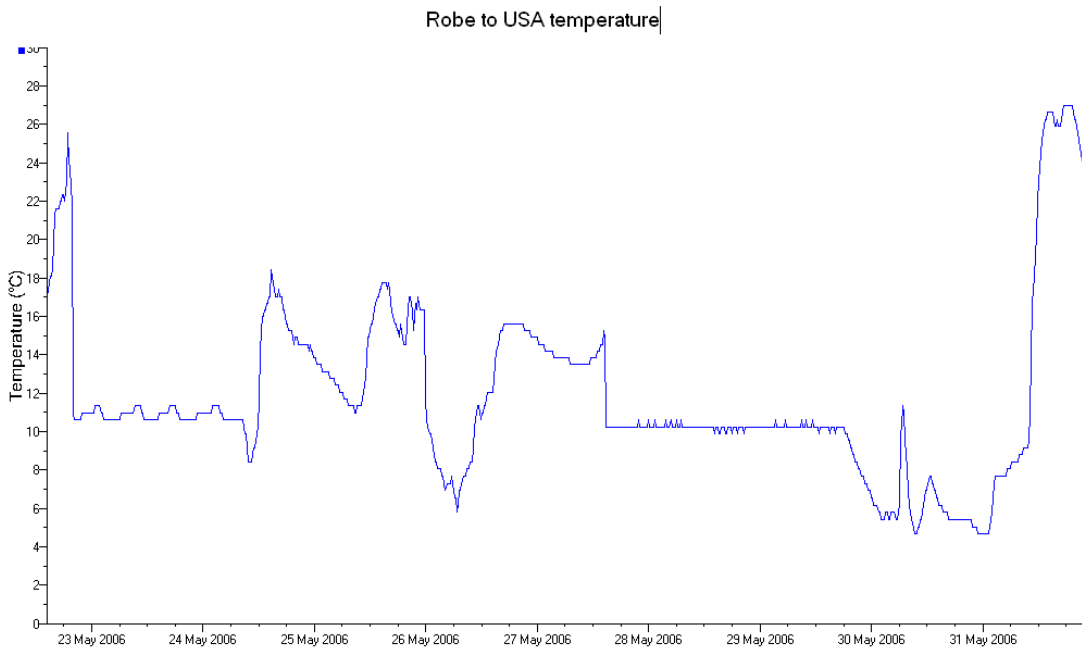


Date	Time (hours)	Time in LA	Place	Time/Temp	Humidity	Motion	Comments
28/04/2006	1330		King Island	y	y	y	Placed with shipment
28/04/2006	1430		King Island	y	y	y	Leave King Island
28/04/2006	1530		Moorabbin	y	y	y	Arrive Moorabbin
28/04/2006	1630		Richmond	y	n	n	Arrive at processors, remove humidity and motion loggers on arrival
28/04/2006	1700		Richmond	y	n	n	Place time/temp loggers in tanks
2/05/2006	0600		Richmond	y	y	y	Shipment packed for flight
2/05/2006	1000		Tullamarine	y	y	y	Flight to Los Angeles
3/05/2006	1230	0730, 2/5/06	Los Angeles	y	y	y	Arrive Los Angeles
3/05/2006	0400	1000, 2/5/06	Los Angeles	y	y	y	Arrive at distributor
3/05/2006	0600	1300, 2/5/06	Los Angeles	y	y	y	Loggers left at ambient temp
3/05/2006	0900	1600, 2/5/06	Los Angeles	y	y	y	Arrive at distributor
4/05/2006	0130	0830, 3/5/06	Los Angeles	y	y	y	Inspect for quality

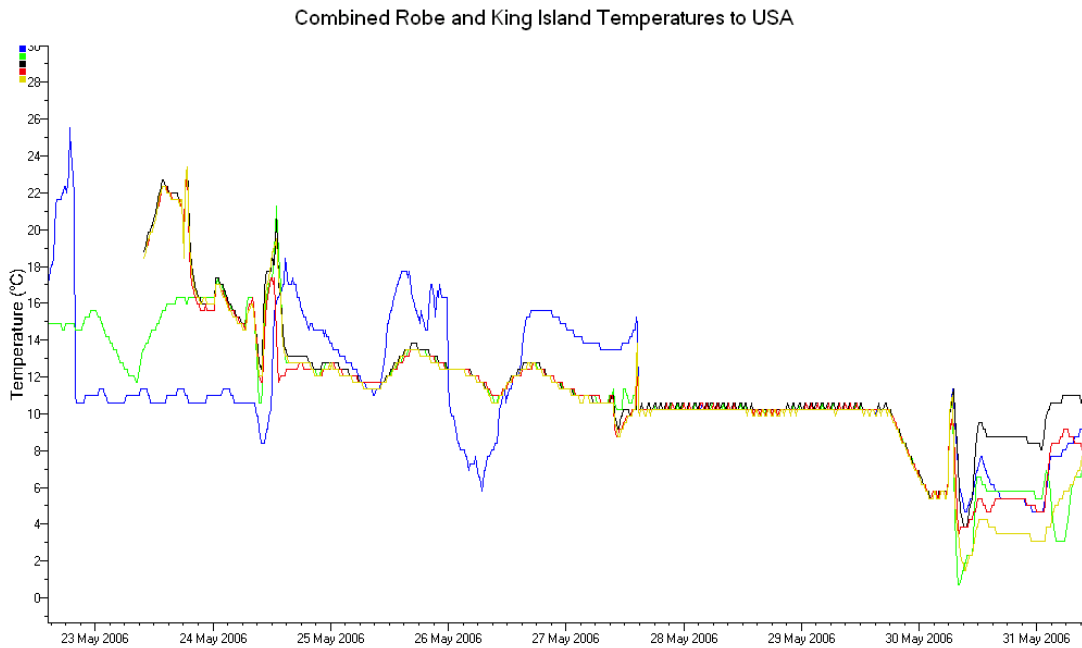
Graph 13. King Island to USA Temperatures



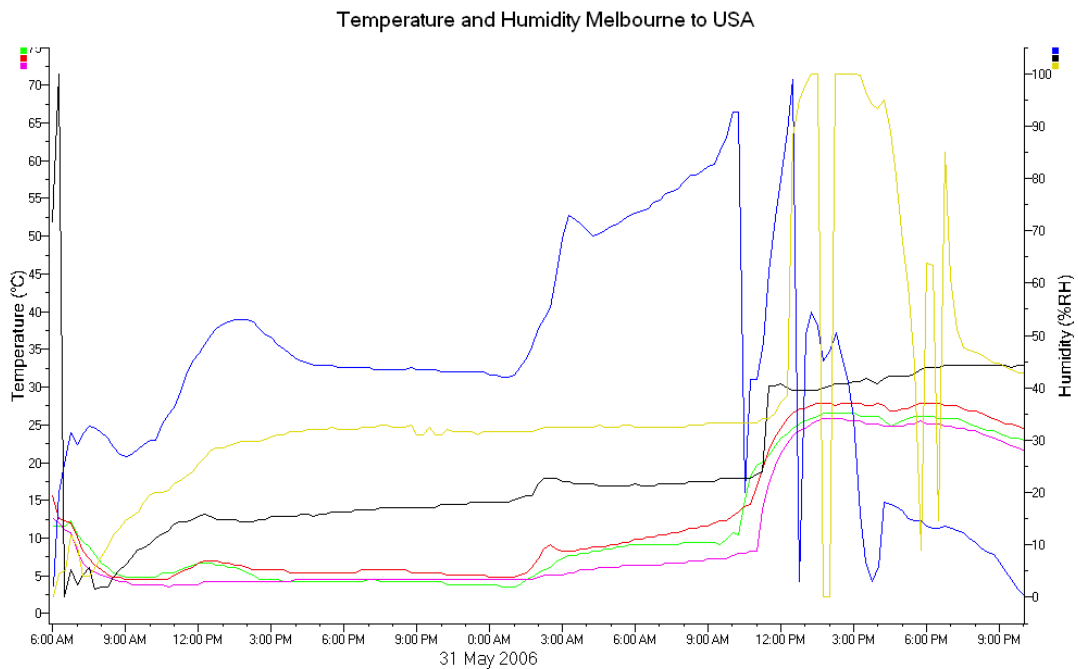
Graph 14. Robe to USA temperature (note irregularities in temp while at Carpenter Rocks)



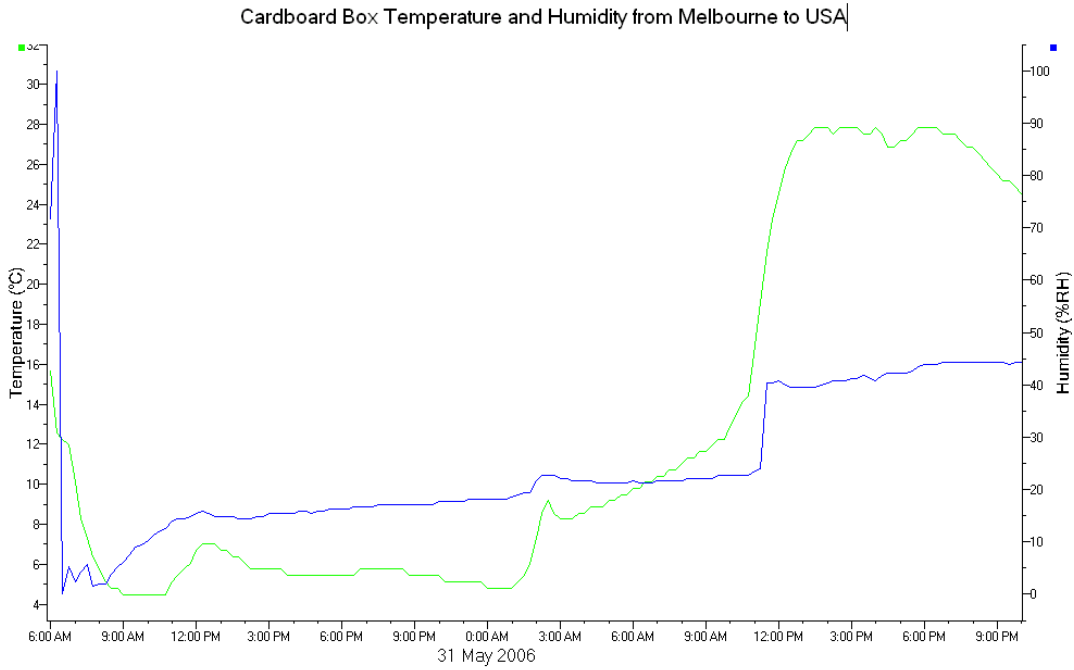
Graph 15. Combined Robe and King Island temperatures to USA
(note Blue line is Robe shipment)



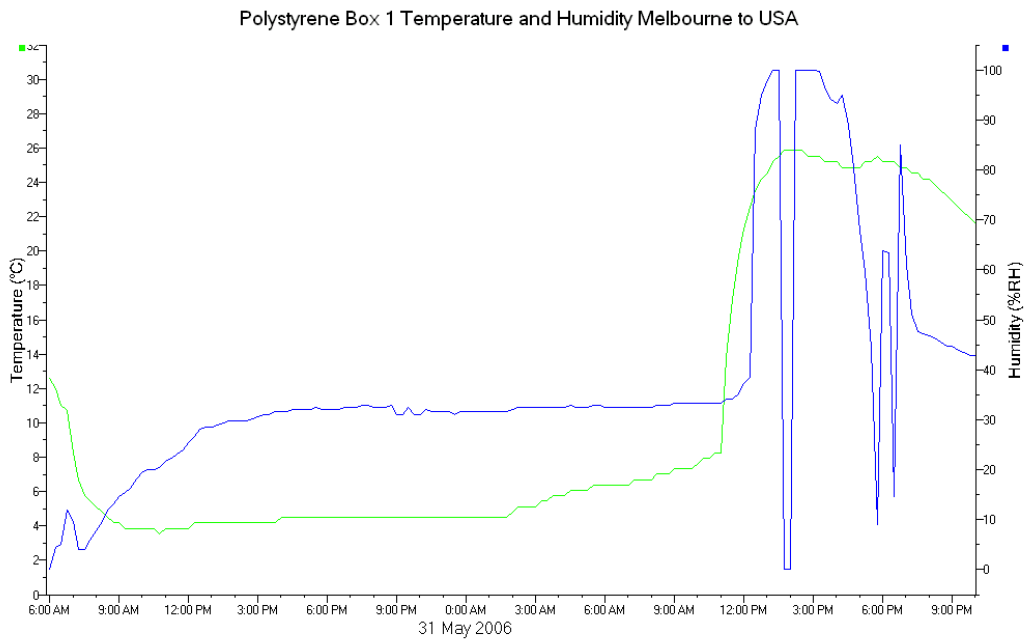
Graph 16. Combined Temperatures and Humidity from Melbourne to USA



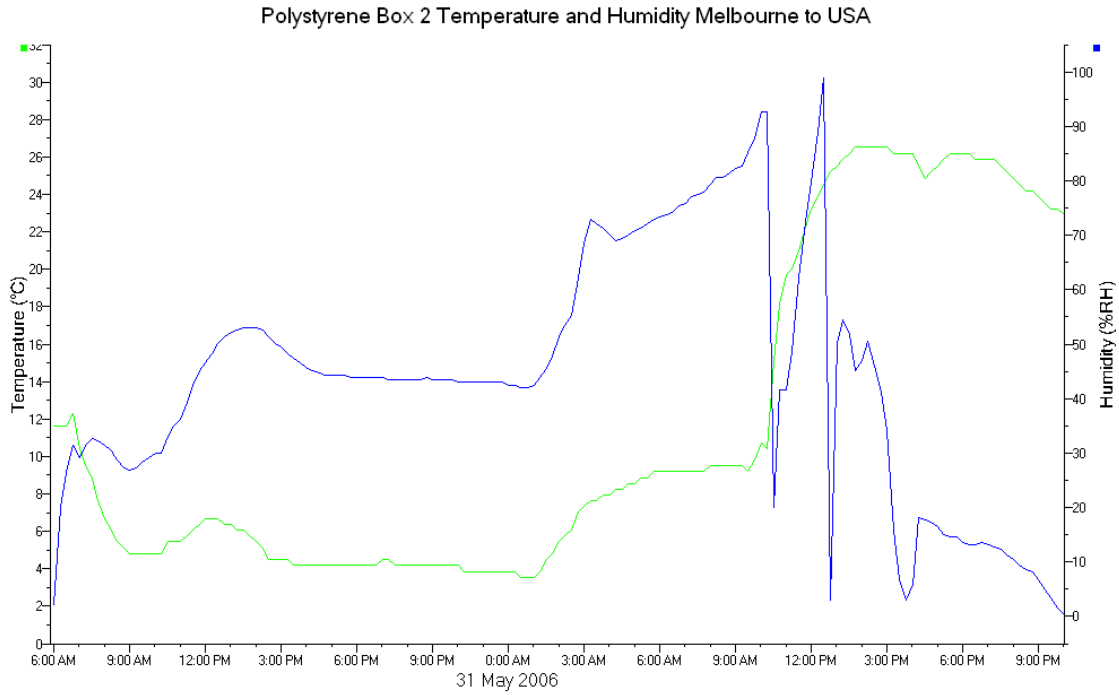
Graph 17. Cardboard Box (Amcors) Temperature and Humidity to USA



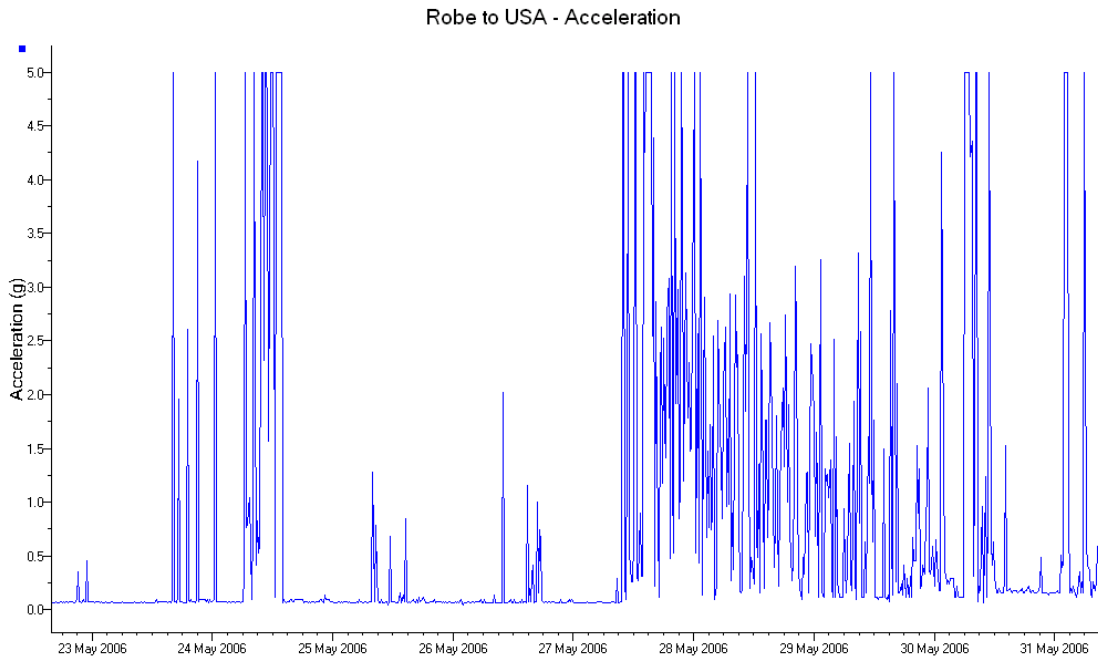
Graph 18. Polystyrene Box 1 Temperature and Humidity to USA



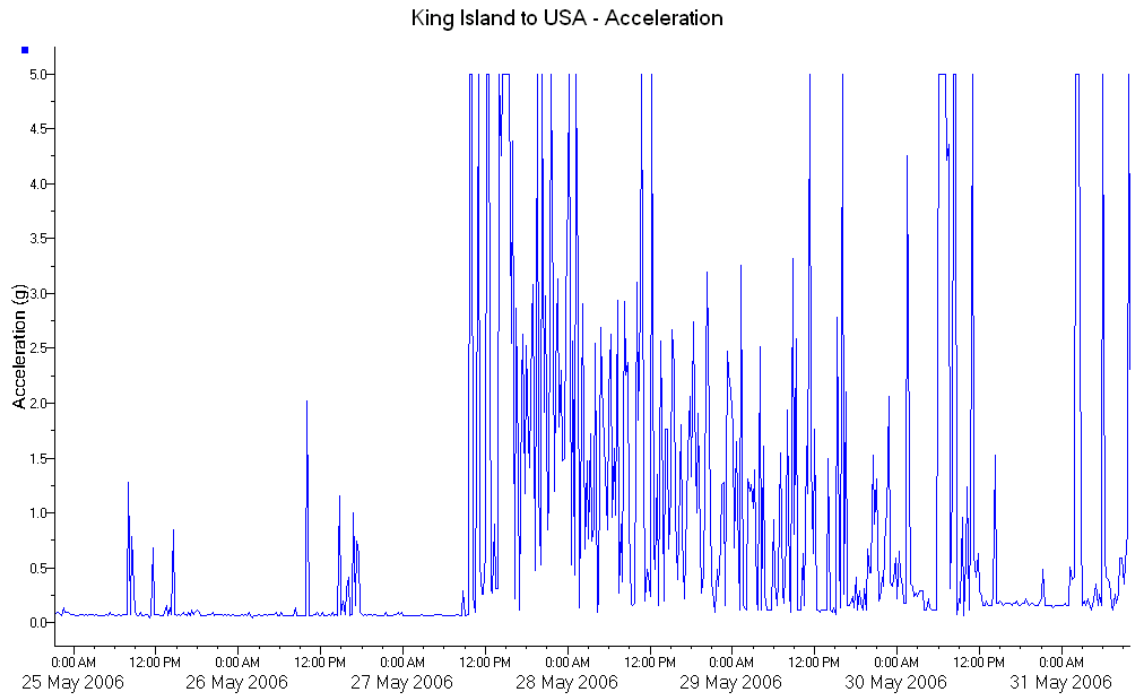
Graph 19. Polystyrene Box 2 Temperature and Humidity to USA



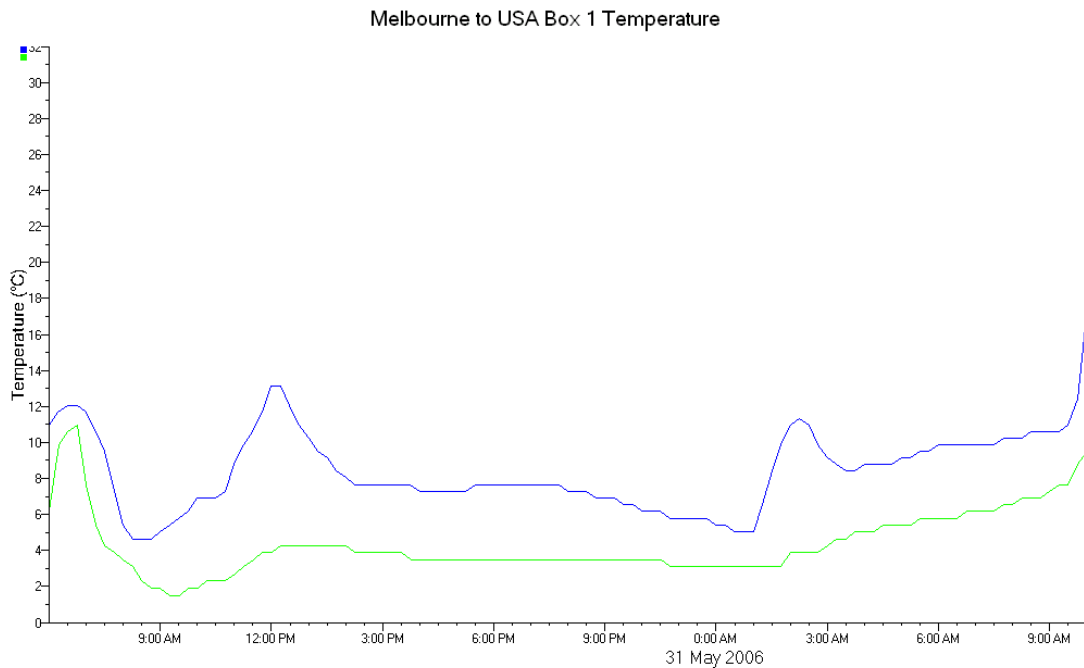
Graph 20. Acceleration from Robe to USA



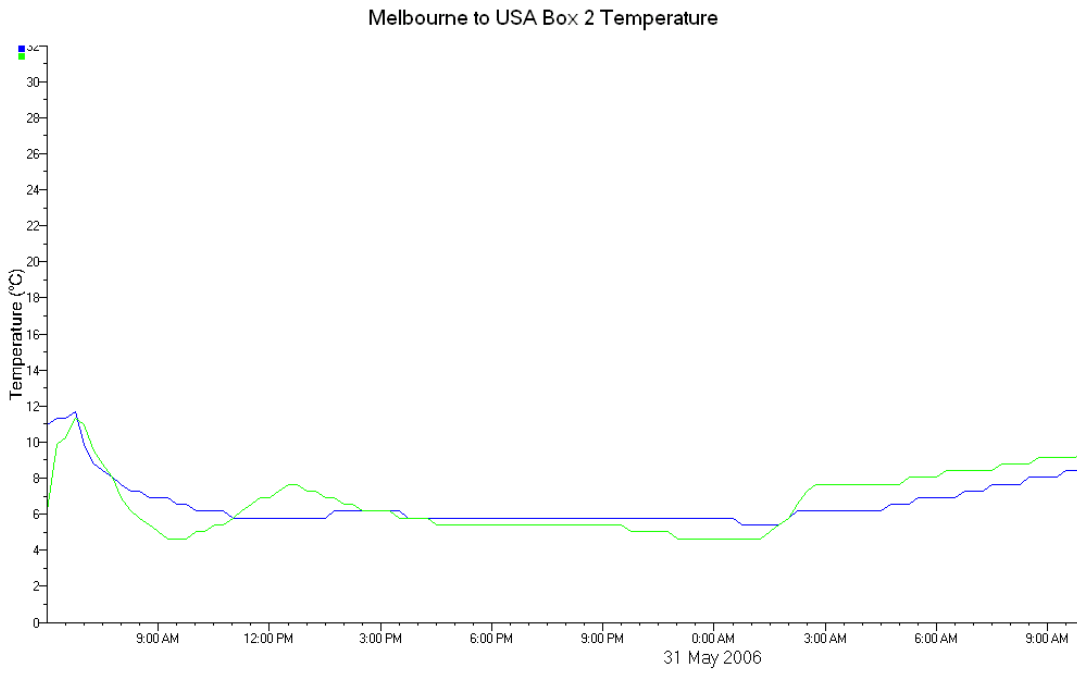
Graph 21. Acceleration from Robe to USA



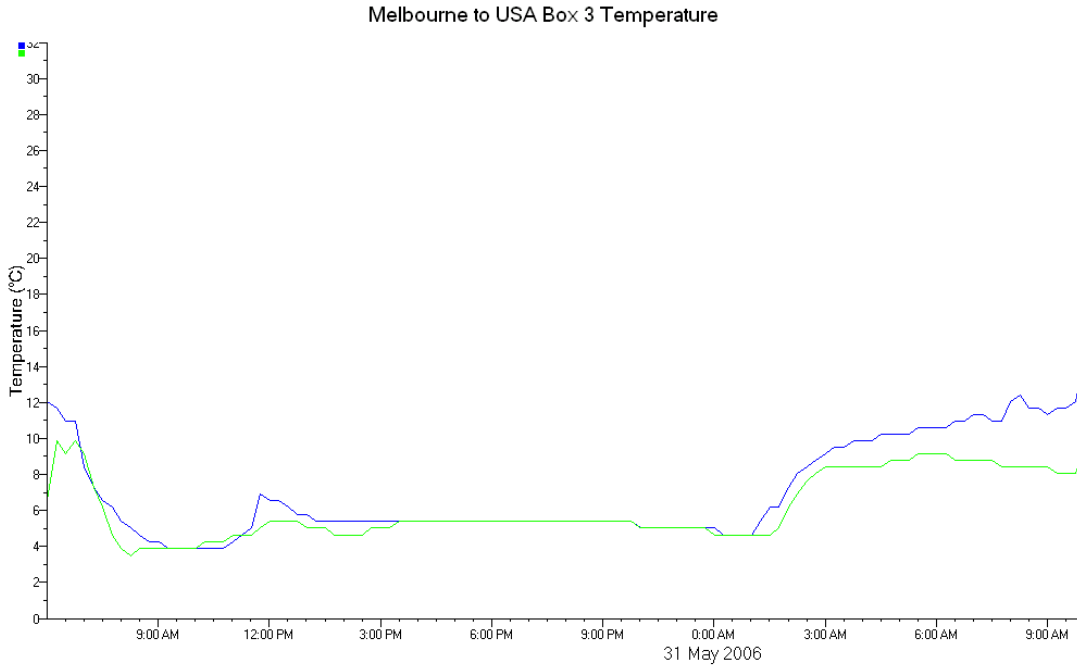
Graph 22 Melbourne to USA Box 1 temperature



Graph 23 Melbourne to USA Box 2 temperature

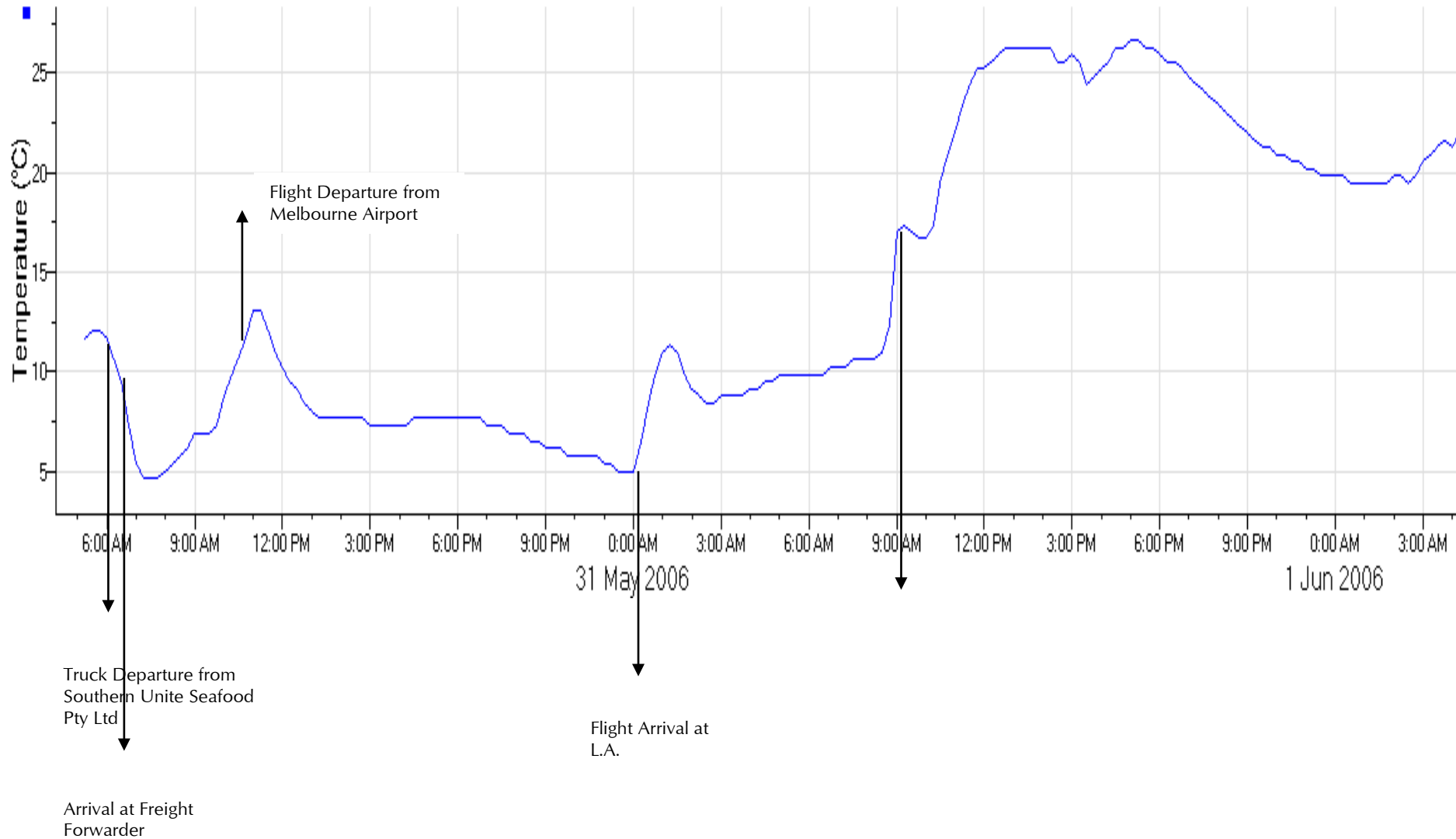


Graph 24 Melbourne to USA Box 3 temperature

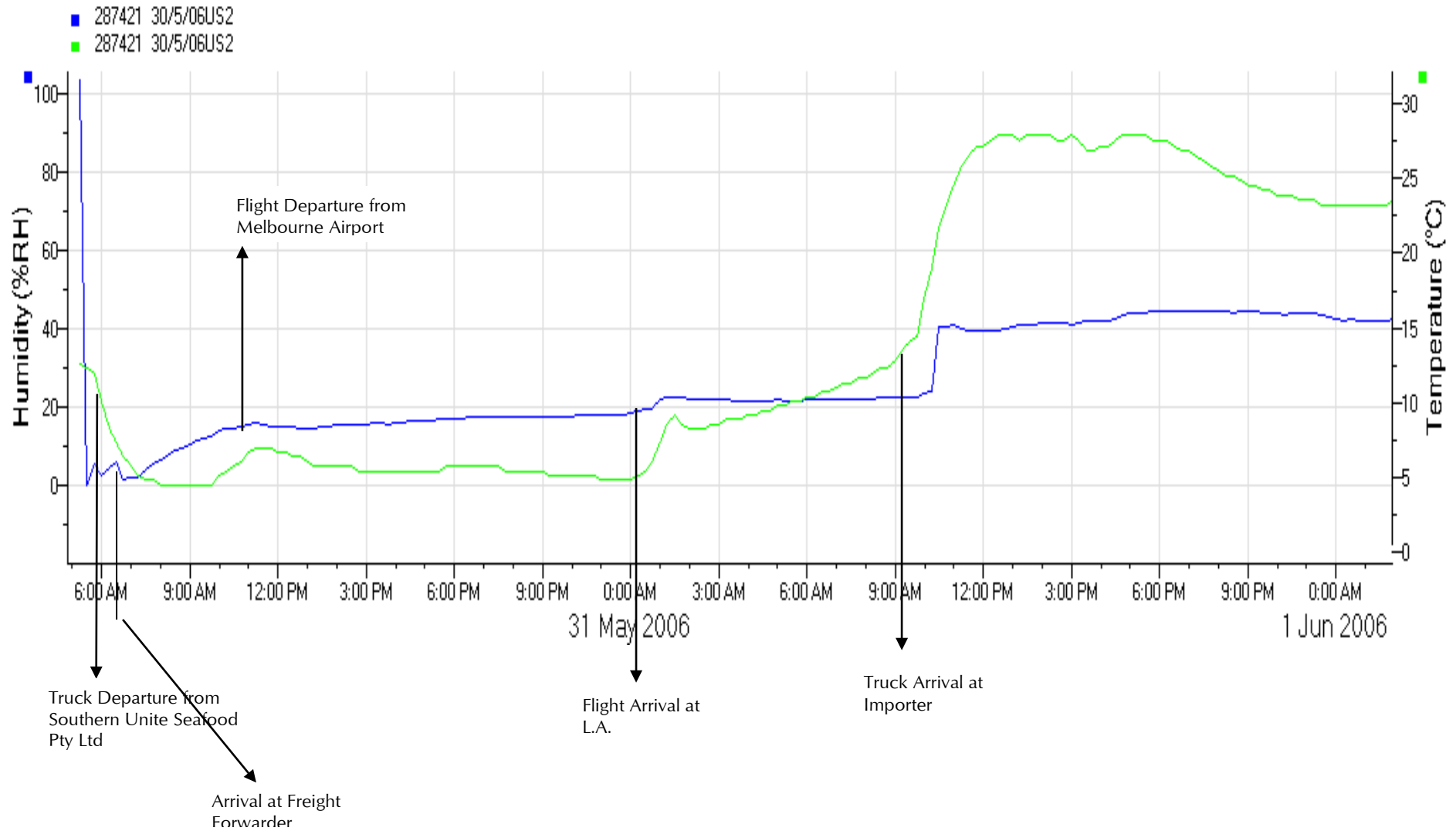


Graph 25. US – Box 1 (Amcor Cardboard): Time/Temperature Logger

■ 271296 30/5/06US3

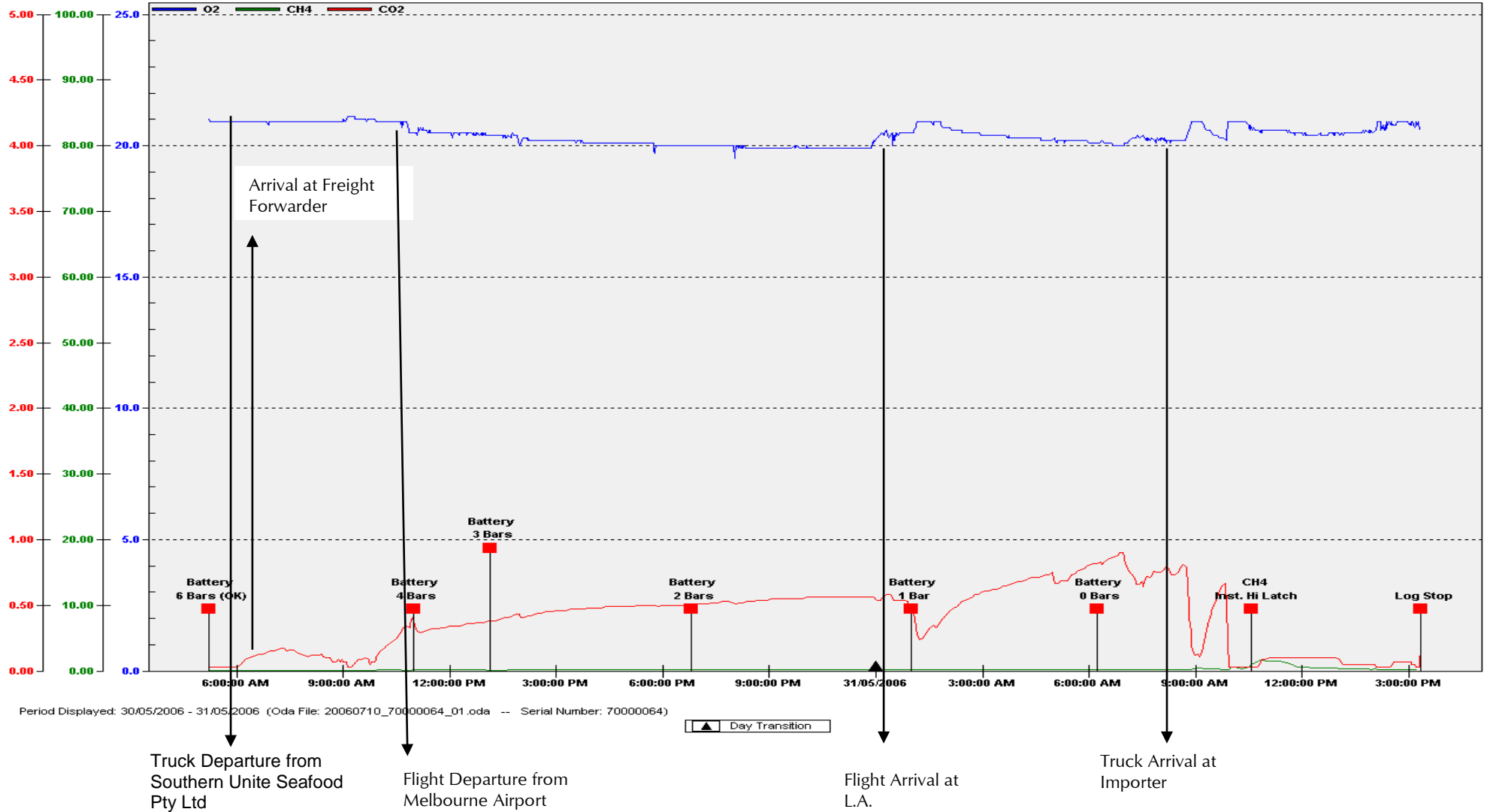


Graph 26. US2 – Box 1 (Amcors Cardboard): Humidity Logger



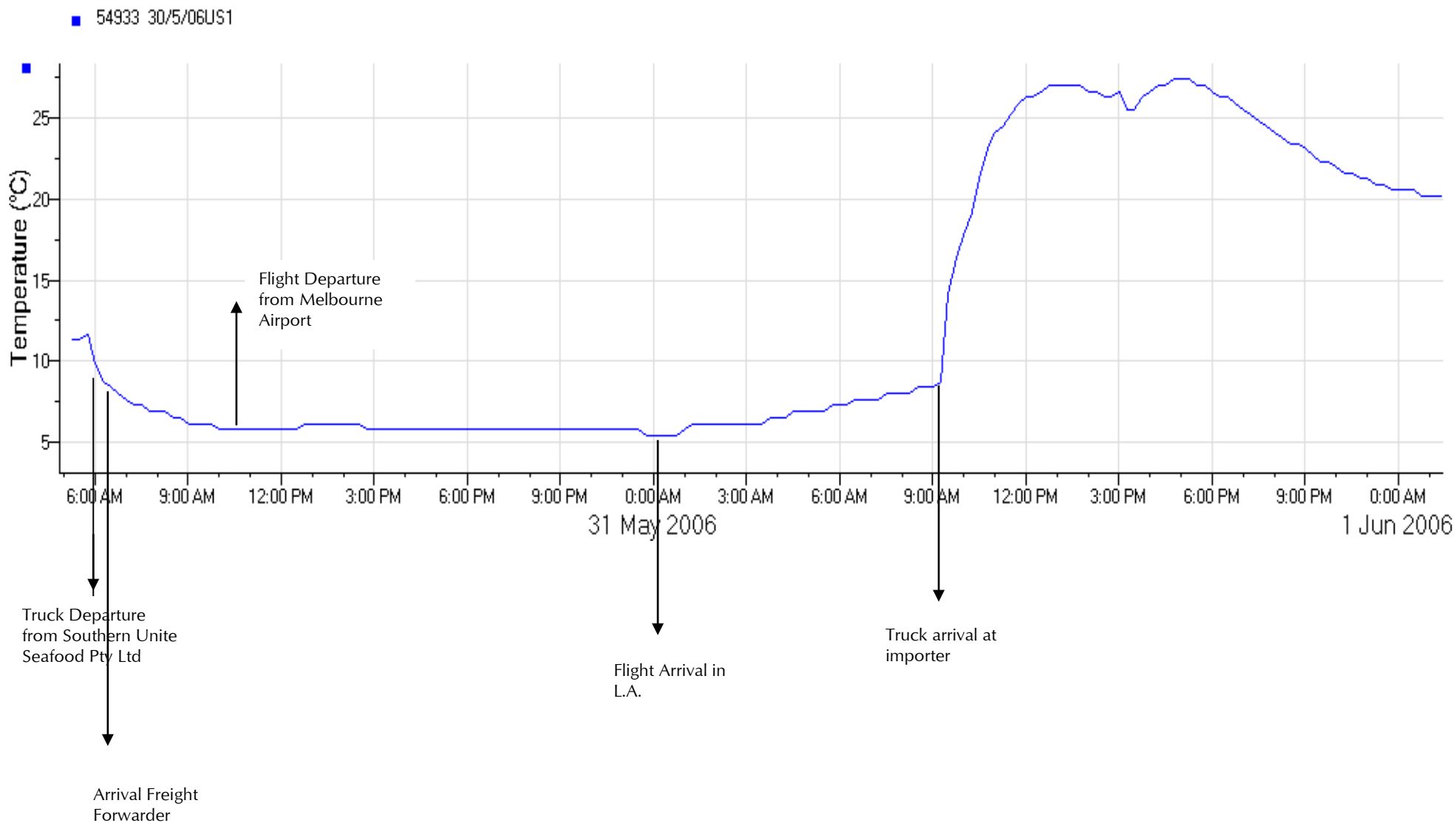
Graph 27. US2 – Box 1 (Amcor Cardboard): CO₂ Logger

Factory Settings: OdaLog 7000IR S/N:70000064
20060710_70000064_01: Session 3

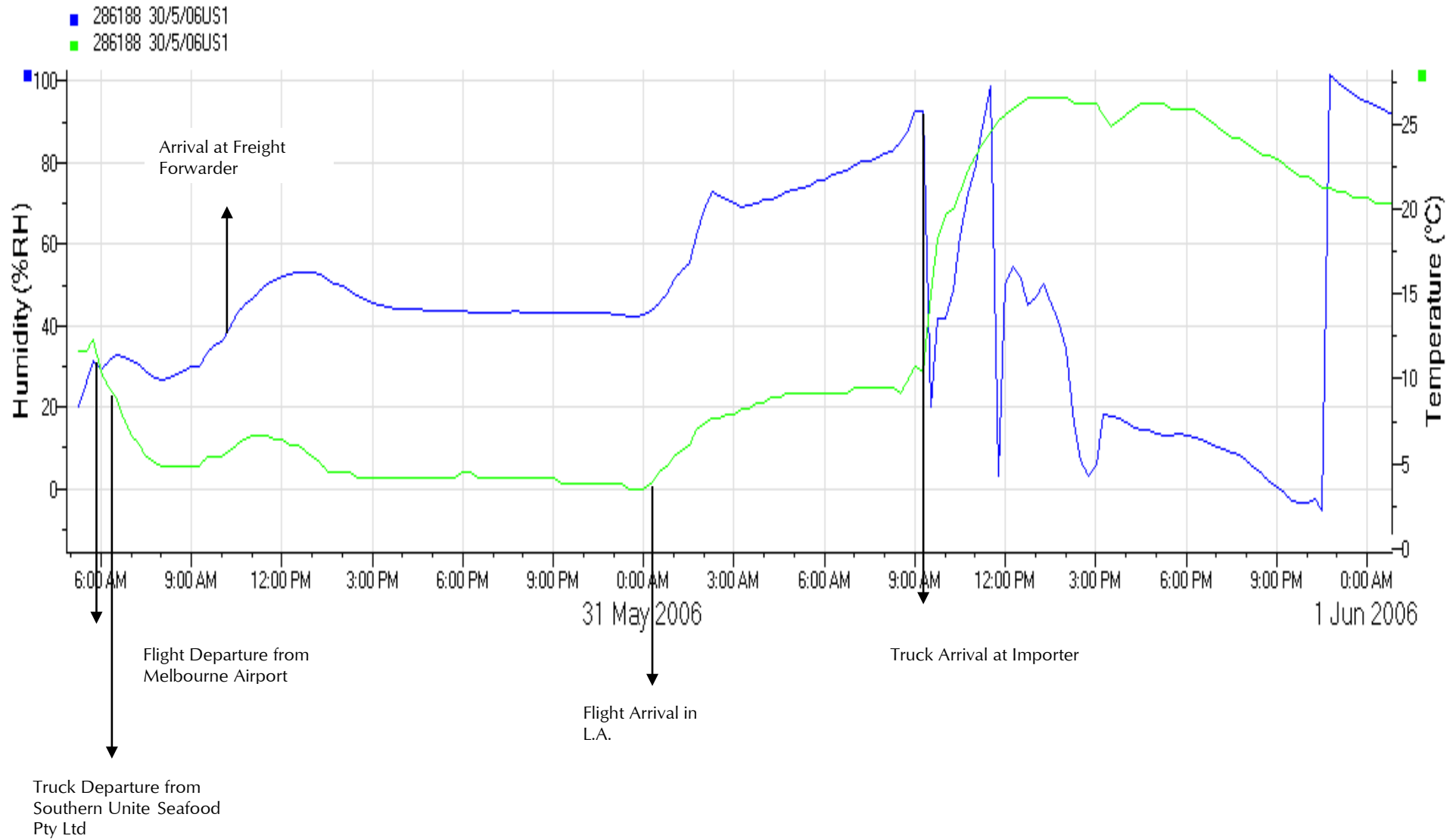


Extending innovation in Integrated Environment & Product Management: Implementation of value chain management & traceability in the Australian Rocklobster Industry.

Graph 28. US2 – Box 2: Time/Temperature Logger



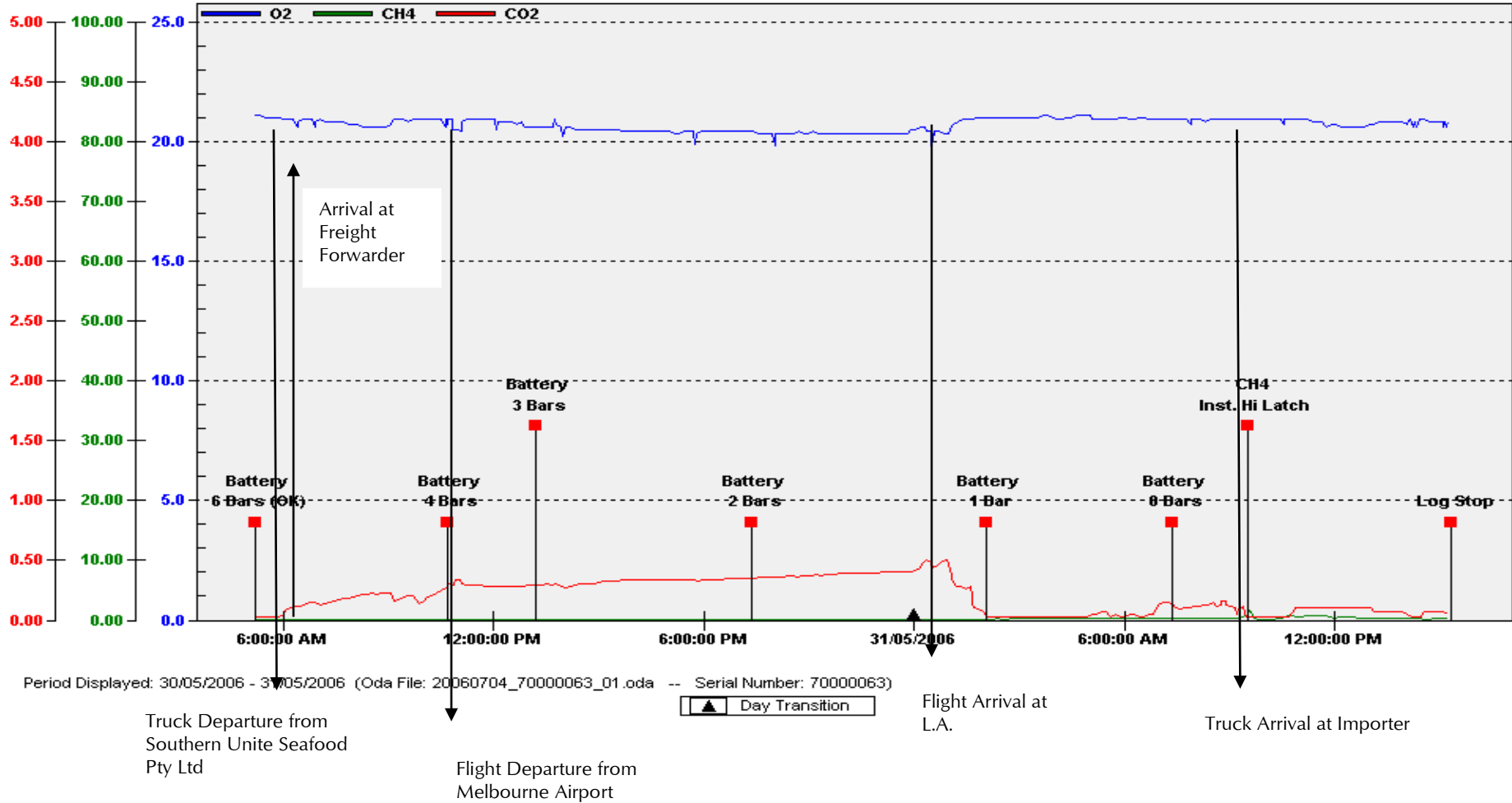
Graph 29. US2 – Box 2: Humidity Logger



Graph 30. US2 – Box 2: CO₂ Logger

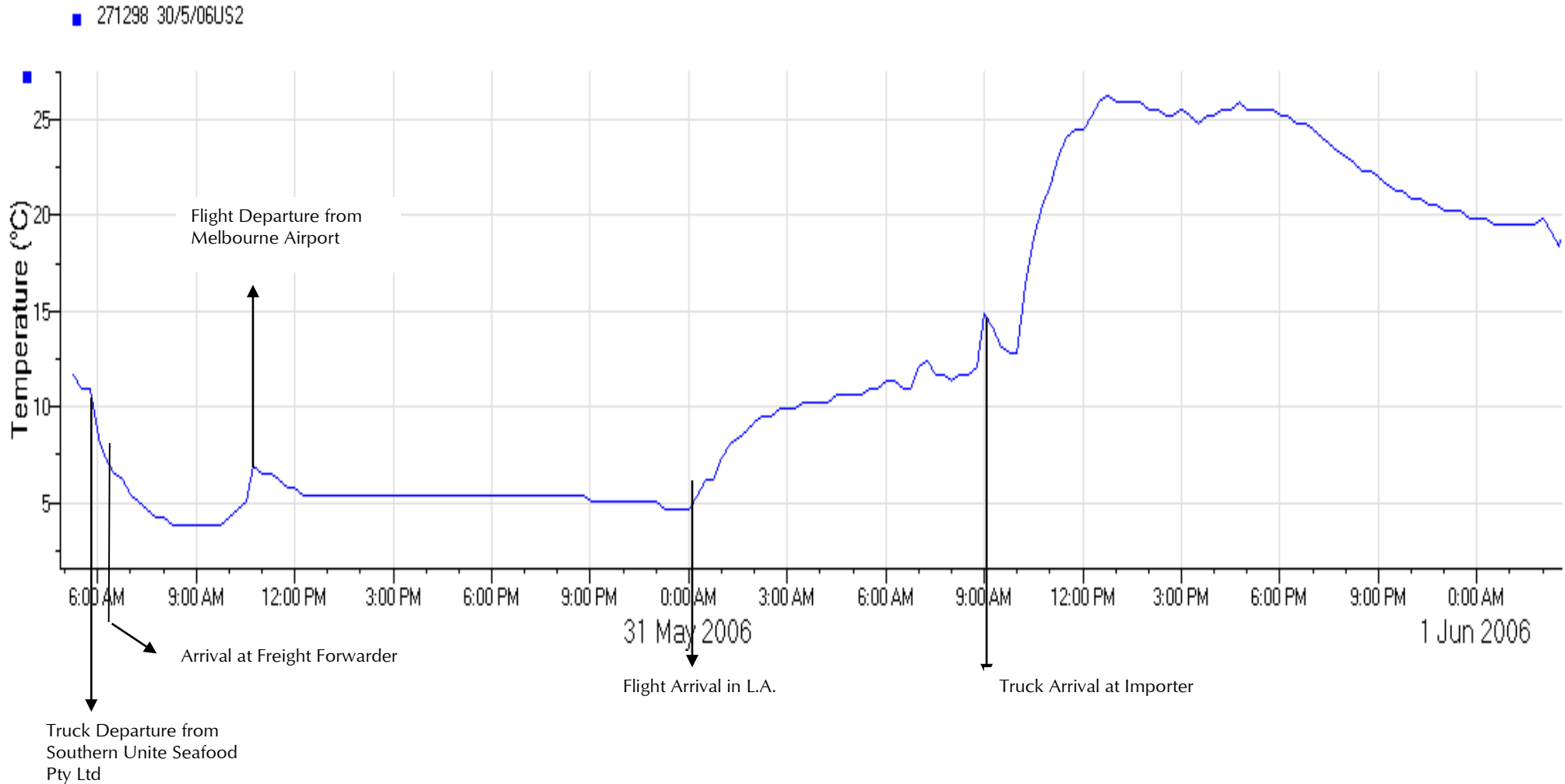
Factory Settings: OdaLog 7000IR S/N:70000000

20060704_70000063_01: Session 2

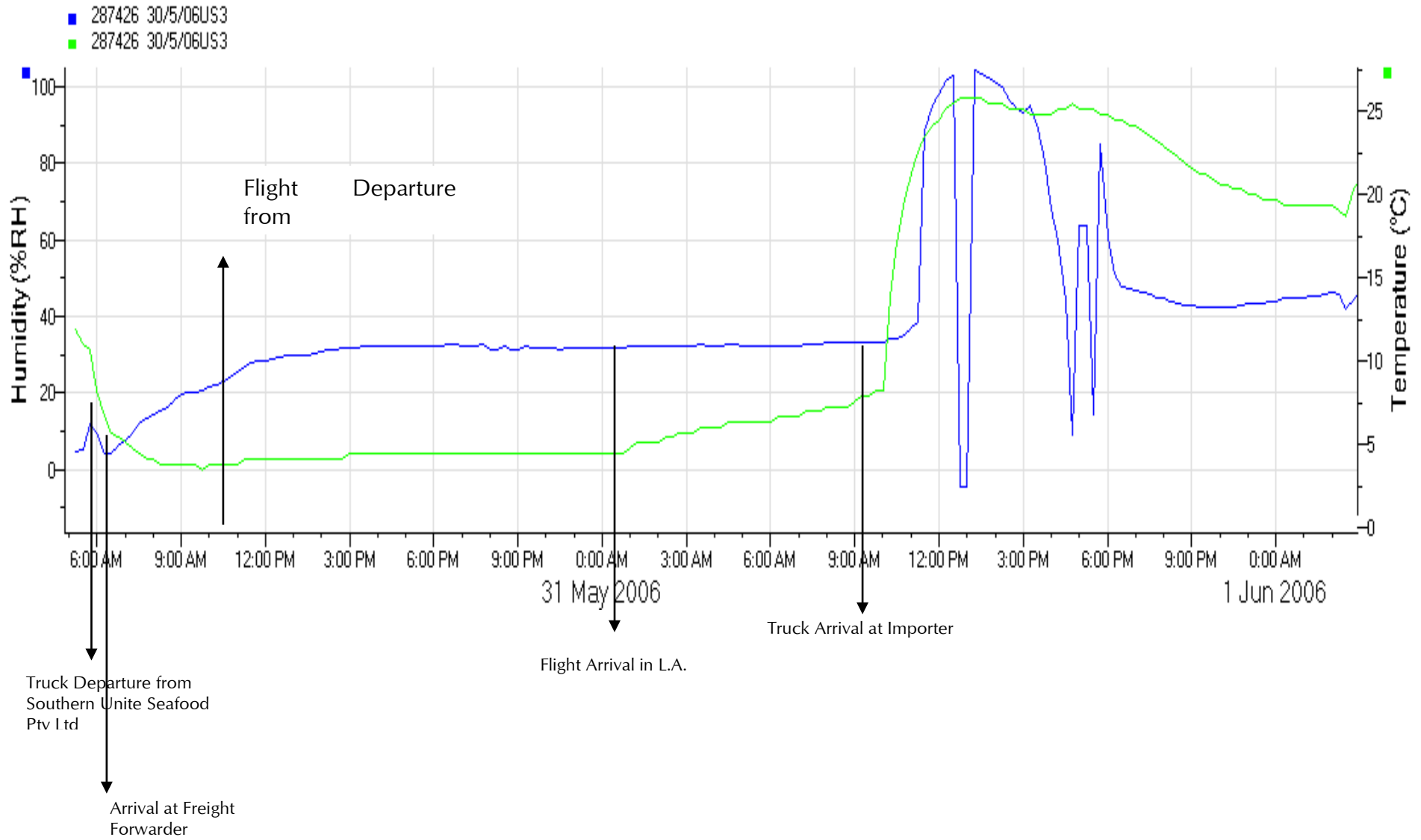


Period Displayed: 30/05/2006 - 31/05/2006 (Oda File: 20060704_70000063_01.oda -- Serial Number: 70000063)

Graph 31. US2 – Box 3: Time/Temperature Logger



Graph 32. US2 – Box 3: Humidity Logger



Graph 33. US2 – Box 3: CO₂ Logger

