

1 Executive Summary

During the Empty Sea Container Operational Trial, approximately 7114 non-Pacific empty containers from 171 consignments arrived at the three trial ports: Auckland, Tauranga and Dunedin. 414 of these containers were selected for inspection but only 364 could be inspected.

- A total of 169 BACC applications were processed as part of the pilot study
- 25 applications (15%) were formally amended by the shipping lines, some multiple times.
- BACC processing for these containers took 147 hours, and 530 authorities were issued.
- Each BACC application required 40 minutes, on average, to process.
- Each subsequent amendment added nearly an hour to this time.
- 150 (89%) applications were received by MAF at least 12 hours prior to the vessel's arrival.
- For the six shipping lines that submitted more than 10 applications during the study period, compliance with the 12 hour rule ranged from 79% - 100%.
- There were considerable errors in the information on the ICRs that required further investigations. A common occurrence was a discrepancy between the number of containers on the ICR and the number on the BACC application.

2 Background

Sea containers arriving in New Zealand have been shown to be significant sources of biosecurity contamination, and are therefore classified as risk goods. Because of this they are subject to import requirements as detailed in the import health standard for sea containers¹. Sea containers arriving without the required documentation (including the container Quarantine Declaration) are deemed to be of high regulatory interest and require further MAFBNZ intervention before biosecurity clearance is issued. Empty containers frequently arrive without Quarantine Declarations.

As individual non-compliant shipments may number several hundred empty containers, it is not feasible to inspect every container without a Quarantine Declaration for the presence of contaminants. Furthermore, mandatory decontamination cannot be justified without evidence of contamination. The current operational procedure for further intervention with these containers varies from port to port.

MAFBNZ and industry have agreed to an approach where routine MAFBNZ intervention for empty containers takes into account contamination levels, rather than based solely on documentation compliance. In order to implement this approach, MAFBNZ proposed to sample lines of empty containers (with or without

¹ <http://www.biosecurity.govt.nz/files/ih/s/seaco.pdf>

documentation), with the potential to vary the verification level based on levels of compliance. This approach is already used to verify the status of empty containers from Pacific region countries, which are profiled for inspection at either 10% or 100% depending on compliance. This approach is also used for containers from the sea container hygiene system, which are inspected at rates ranging from 5%-100% depending on compliance².

A regime for setting the intervention rate on arrival based on compliance has been developed for empty sea containers, including a background level of audit for ongoing compliance verification (as is done for loaded containers³). Similar regimes are being developed for other types of risk goods as well.

Before implementing the proposed intervention regime, MAF conducted a pilot study to trial new operational processes required to support the new programme, as well as to determine the approximate workload impacts and resource needs associated with the new programme.

2.1 Objectives

The objectives of the pilot study were to:

1. Test operational processes for randomly selecting empty containers and notifying local MAF staff and port companies prior to vessel arrival.
2. Develop information requirements for inspected containers.
3. Identify key infrastructure and process requirements for MAFBNZ and industry that will support the new system.
4. Test work instructions and processes for MAFBNZ staff relating to empty sea container clearance including inspection, data recording and reporting.
5. Test agreed processes for ports, stevedores and shipping lines for the provision of information, movement and presentation of containers for inspection.
6. Determine approximate levels of current compliance for empty containers arriving in New Zealand.
7. Determine the likely workload impacts of the empty container intervention regime.
8. Develop a resource management model for staffing levels and rostering which provides an appropriate level of service to port companies and shipping lines.

This paper reports the results of objectives 6-7, and informs objective 8 in terms of data inputs to the resource model.

² The contamination thresholds for action are 5% for general contamination, 0.16% for ant contamination, and 0.02% for giant African snail contamination.

³ Loaded containers are subject to a 1% audit, with increased audit inspections when contamination is found.

3 Methods

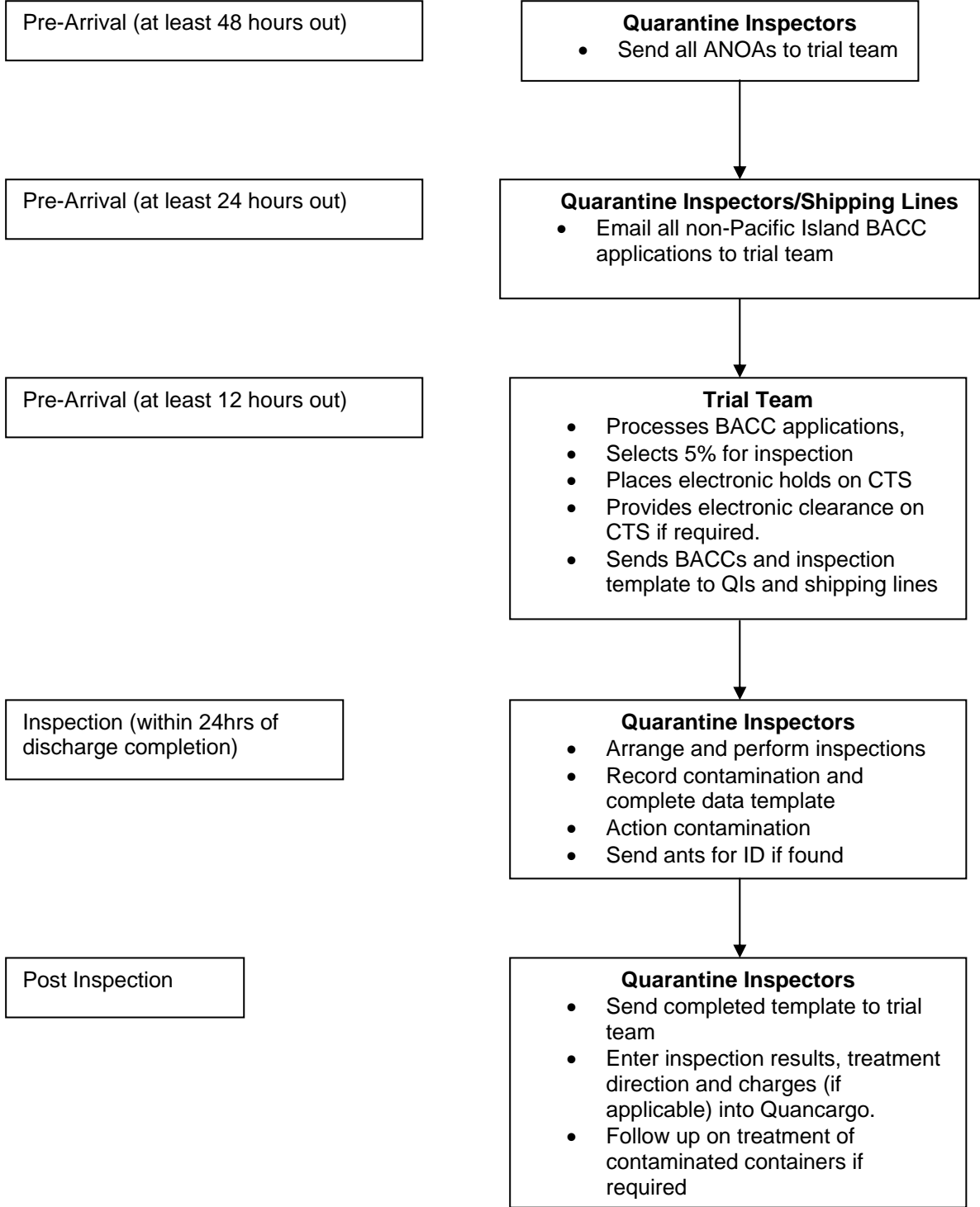
The sample population of empty containers included those containers arriving at the ports of Auckland, Dunedin, and Tauranga between 1 September and 15 October, excluding containers from Pacific ports of loading. Originally, Lyttleton port was also included but was left out due to the earthquake on September 4th.

All documentation was forwarded to empties@maf.govt.nz for centralised processing (see Figure 1). Documents included the advanced notice of arrival (ANOA) for all vessels, BACC applications for non-Pacific Island empty containers and inwards cargo reports (ICRs) from New Zealand Customs Service (NZCS).

Inspections included 5% of all non-Pacific Island empty containers from a single importer (usually a shipping line) from a single load port (e.g. Melbourne) off a specific vessel and voyage (e.g. Maersk Dunafare v 72) and discharge port (e.g. Auckland). The containers were randomly selected for a 6-sided external plus internal inspection by the trial team.

Inspection holds were placed by the trial team from their Auckland base on the local port container tracking system. Inspections were completed within 24 hours after completion of discharge of the vessel where possible.

Figure 1. Trial operational process



Information on processing times, contamination rates and resources required for inspection were collected. All contaminants were recorded and were classified based on the thresholds given in the Appendix I as either HIGH or LOW.

4 Results

4.1 Pathway statistics

Approximately 16,500 empty containers arrived in New Zealand between 1 September and 8 October 2010. Of these, 11,614 (70%) were from non-Pacific ports of origin (Table 1). 7114 (61%) of the non-Pacific containers arrived at the three trial ports. 414 of these containers were selected for inspection; however, only 364 were inspected due to logistical issues.

Table 1: Empty sea container arrivals during survey period

Discharge port	Pacific origin	Other origin	Total
TP1	2553	1839	4392
TP2	319	1967	2286
TP3	1596	3308	4904
P1	1	503	504
P2	103	1253	1356
P3	75	869	944
P4		742	742
P5		44	44
P6	19	841	860
P7	120	248	368
P8	96		96
Total	4882	11614	16496

4.2 Clearance documentation

4.2.1 Submission of information

A total of 169 BACC applications were processed as part of the pilot study⁴, although not all had containers inspected, either because the vessel was only calling at non-trial ports or because the vessel was arriving after the cut-off date for inspections. One application had no processing time recorded. As shown in Table 2, 25 applications (15%) were subsequently formally amended by the shipping lines, some multiple times, although a number of other applications required amending, either due to incorrect or changed container quantities, discharge ports, loading ports or other reasons.

Table 2: BACC applications and amendments

Number of amendments	Number of BACC applications received	Total time taken for BACC processing	Average time taken for BACC processing
0	144 (143 with times)	96hrs 2 min	40 min (+/ 2 min)
1	19	29hrs 38 min	1 hr 34 min
3	6	21 hrs 14 min	3hrs 32 min
	Total: 169 (168)	146 hrs 54 min	Overall: 52 min

⁴ Two applications resulted in creation of additional consignments

BACC processing for these containers took 147 hours, and 530 authorities were issued. Each BACC application required nearly an hour, on average, to process, although this depended on whether applications were amended. The average processing time for un-amended applications was 40 minutes. Each subsequent amendment added nearly an hour to this time, e.g. processing took an additional 54 minutes for applications with one amendment and an additional 2 hrs 52 minutes for applications with three amendments.

4.2.2 Compliance with MAF Documentation Requirements

Of the 169 original applications, 150 (89%) were received by MAF at least 12 hours prior to the vessel's arrival (Table 3). However, 129 of the 150 (76%) did not have subsequent amended applications submitted. As noted above, processing amendments adds considerably to the time required, and also results in discrepancies in Quancargo (discussed later).

Table 3: Number of original applications meeting MAF's 12-hour requirement

Requirement met	Amendments submitted			Total
	0	1	3	
Yes	129	17	4	150
No	15	2	2	19
Total	144	19	6	169

For the six shipping lines that submitted more than 10 applications during the study period, compliance ranged from 79% - 100%. Shipping lines have been identified by letter in this document to protect company privacy.

Table 4: Compliance with 12-hour requirement by shipping line

Line Operator (Importer)	12-hour requirement met		Total	Compliance
	No	Yes		
A	4	27	31	87% (71%-95%)
B	5	19	24	79% (59%-91%)
C	1	22	23	96% (79%-99%)
D	1	16	17	94% (73%-99%)
E	0	12	12	100% (75%-99.8%)
F	1	10	11	91% (62-98%)

The 12-hour requirement is to give MAF sufficient time to profile arriving containers and place the required holds in the relevant port systems. If holds are not placed, ports do not have sufficient time to plan discharge. This will result in delays with inspections and/or additional moves of containers. These delays may result in additional costs for shipping lines and possibly biosecurity risks related to delays in inspection and/or treatments a total of 114 original or amended applications had holds placed on empty containers during the study period. Of these, 90 applications (79%) had holds placed in time, an average of 1 day prior to the vessel's scheduled arrival time (Table 5). The remaining 24 applications had holds placed an average of 3 days after the vessel had arrived.

Table 5: Holds put on before and after vessel had arrived

	Number of applications with holds	Average number of days
Before arrival	90	1 day 21 min
After arrival	24	3 days 7 min

4.2.3 ICR submission and accuracy

When a shipping line submits an inwards cargo report (ICR) to New Zealand Customs, an electronic cargo information (ECI) report is created in Cusmod and automatically sent to MAF’s Quancargo application. This enables MAF to store all of the container numbers without manually entering them (there may be several hundred on one application). However, if MAF has begun to process an ECI report in Quancargo and a revised ICR is sent (resulting in a revised ECI), the revision can not be loaded automatically. Depending on the circumstances, the containers given clearance based on the BACC application are not the same as those entered in Quancargo.

There were considerable errors in the information on the ICRs that required further investigations. A common occurrence was a discrepancy between the number of containers on the ICR and the number on the BACC application. In some cases this was only a few containers, but in other cases it was 70 or more.

Considerable resource is required by MAF to reconcile and process amended applications; it is very difficult to determine the number of containers landed at a particular port by specific shipping lines from specific overseas ports. Shipping line and overseas port are the two primary fields that will be initially used to profile containers for compliance, so the accuracy of data in Quancargo is extremely important.

4.3 Inspections

4.3.1 Contamination rates

In total 364 containers were inspected at the three trial ports: 28% at Auckland, 27% at Dunedin and 45% at Tauranga. The overall contamination rate was nearly 13% (external or internal contamination), and 6.9% for contamination rated as “high” (Table 6). Note that the contaminants included in the table below include biosecurity contaminants only, and exclude bits of cardboard, paper, polystyrene, dust and light films which were also reported as “low” contamination in some instances.

Table 6: Number of containers inspected and contamination rates

Containers inspected	Containers contaminated	Percentage contaminated	Containers with high contamination	Percentage with high contamination
364	47	12.9% (9.9% - 16.8%)	25	6.9% (4.7% - 9.9%)

The measured rate of “high” contamination was above the general contamination threshold of 5%: this is the level of general contamination that MAF considers

acceptable on this pathway. Also see section 4.3.3 for weighted overall contamination rates.

4.3.2 Types and locations of contaminants

Soil was recorded for 27 containers (12 instances of “high” contamination and 15 instances of “low” contamination), and was the most frequently recorded contaminant. This includes only contaminants recorded as “soil”, not those recorded as dust, light road film or powder. All soil contamination was found on the exterior of the containers.

Plant material was the next most frequently recorded contaminant, found in 16 containers (11 “high” contaminants and 5 “low” contaminants). Live organisms (mainly spiders) were reported from 4 containers, and animal material (feathers, manure, etc) was also reported from 4 containers.

No ants were reported from the surveyed containers. The results give 95% confidence that the incidence of ants is no more than 0.82% in non-Pacific containers, or 44% confidence that the incidence is no greater than the tolerance level (0.16%).

Of the 33 containers with external contaminants recorded, 24 (73%) had contamination on the underside or top, and 15 (45%) had contaminants on the four lateral sides.

4.3.3 Contamination by country of loading

Over 90% of the non-Pacific containers arriving during the survey period were from five countries (Table 7), with half coming from Australia, mainly Sydney and Melbourne.

Table 7: Non-Pacific container arrivals and contamination rates (high) by country/port of loading

	Containers arriving	Percentage of arrivals	Containers surveyed	Containers contaminated	Percentage contaminated
Australia	5,964	51.4%	169	9	5.3% (2.9% - 9.8%)
<i>Sydney</i>	2,730	23.5%	94	2	2.1% (0.7% - 7.4%)
<i>Melbourne</i>	2,413	20.8%	49	6	12.2% (5.8% - 24.3%)
<i>Other ports</i>	821	7.1%	26	1	3.9% (0.9% - 19.0%)
Singapore	2,102	18.1%	90	6	6.7% (3.2% - 13.8%)
USA	1,116	9.6%	30	8	26.7% (14.2% - 44.6%)
Malaysia	1,057	9.1%	40	0	0.0% (0.1% - 8.6%)
China	526	4.5%	6	0	0.0% (0.4% - 41.0%)
Other countries	849	7.3%	29	2	6.9% (2.1% - 22.1%)
Total	11,614	100.0%	364	25	6.9% (4.7% - 9.9%)

When the “high” contamination percentage is weighted by the percentage of arrivals by country/port, the weighted pathway contamination rate is 7.6%, slightly higher than the sample rate shown in Table 6.

As the sample size was relatively small, most differences in contamination rates between countries are not statistically significant (overlaps in the 95% confidence intervals in Table 7). However, the contamination rate for the USA was much higher than the rate recorded for any other country, and significantly greater than the overall average. All but one of the USA contaminated containers was rated with “high” contamination, resulting in a “high” contamination rate of 26.7% – over 3 times greater than the pathway “high” contamination rate, and over 5 times the general contamination threshold of 5%. As the USA accounts for nearly 10% of arriving non-Pacific containers, this high contamination rate has the potential to create substantial workloads at ports receiving large shipments of US-origin empty containers.

4.3.4 Contamination by shipping line

The number of containers inspected for most shipping lines was too small to evaluate individually. For those lines with more than 10 containers inspected, contamination rates ranged from 0 – 30%, but these differences were not statistically significant and may reflect differences in container origin (Table 8). Letters used in the table correspond with those used in Table 4.

Table 8: Contamination by shipping line operator

Line operator	Containers inspected	Containers contaminated	Percentage contaminated
C	89	6	6.7% (3.2% - 14.0%)
G	89	2	2.3% (0.7% - 7.8%)
A	58	5	13.8% (3.8% - 18.7%)
B	52	7	13.5% (6.8% - 25.3%)
H	15	0	0.0% (0.2% - 20.6%)
E	11	2	18.2% (5.5% - 48.4%)
I	10	3	30.0% (10.9% - 61.0%)

Only two shipping lines had substantial numbers of containers from one country (Australia) to compare contamination rates by line for a single origin (Table 9).

Table 9: Contamination rates by line operator for Australian-origin containers

Line operator	Containers inspected	Containers contaminated	Percentage contaminated
G	75	2	2.8% (0.8% - 9.2%)
B	40	6	15.0% (7.2% - 29.2%)
Total for Australia	169	8	4.7% (2.5% - 9.0%)

As shown in Table 9, the contamination rate for Australian containers from Company B was significantly greater than the rate for Company G ($p=0.02$). Company B delivered less than a quarter of the Australian containers inspected in the survey, but delivered half of the Australian containers contaminated. This suggests that within

high-volume countries, it is worth further profiling by shipping line to target inspections to the areas of greatest risk.

4.4 Workload impacts

On average, between 8 to 12 minutes was required to inspect a single container at the trial ports (Table 10), requiring 1 hoist for each inspection. Ports have been identified by letter to protect privacy. The average number of moves required for each container varied from 2 to 4 at the trial ports. The trial has highlighted issues with the supply of labour to assist MAF inspectors during the inspection process. This will need to be resolved to ensure that both MAF and the Port Company staff are not at risk.

Table 10: Resources used for inspection on containers at trial ports

	Port A	Port B	Port C
Number of inspections	46	28	49
Number of containers inspected	100	98	166
Average time taken per container	12 min	8min	9 min
Average number of hoists used per inspection	1	1	1
Average number of moves per container	3	4	2

Appendix I

Type of contamination	Criteria	Possible Actions (actual actions taken are up to QI)
Negligible	<ul style="list-style-type: none"> • Non-organic mineral substances, gravel, fine silica, sand, crushed coral and tar, etc. • Dead invertebrates • Splash/road film: Thin film of soil adhering to the container but free of organic matter and <1 mm depth. • Less than 20g of soil • Plant material that is effectively contained e.g. embedded in tar 	n/a and don't record on template.
Soil – Low	<ul style="list-style-type: none"> • soil found in one location or in 1-2 clumps up to 200g • Must be readily able to be removed by the officer, by hand, on site, in <30 seconds. 	Remove and bag on site, Release
Soil – High	<ul style="list-style-type: none"> • No obvious attempt at cleaning has occurred • Soil in more than 2 clumps, greater than 20g. • Soil in 1-2 clumps greater than 200g • Would take >30 sec to remove by hand on site. • Is embedded or attached to a degree that requires removal by industrial means. 	Send to wash
Plant material - Low	<ul style="list-style-type: none"> • Less than 10 units of desiccated plant based contamination including seeds. • Must be able to be removed by the officer, by hand, on site, in <30 secs. 	Remove and bag on site, Release
Plant material - High	<ul style="list-style-type: none"> • Greater than 10 units of desiccated plant based contamination • Any green material or pine needles • Would take longer than 30 secs to remove by hand on site. 	Send to approved treatment
Pests - Low	<ul style="list-style-type: none"> • Any spider (except red back and widow spiders) • <4 individual ants, not RIFA and not associated with a nest • Any egg mass (except suspect Lymantriid egg masses) • Cockroaches • Must be able to be removed by the officer, by hand, on site, in 30 seconds. (ie low numbers) 	Remove/kill on site and release
Pest - High	<ul style="list-style-type: none"> • Any snails (not GAS) • >4 ants or suspect nest • Any termites • Any pupae • Any live organism perceived to be venomous • Any live organism or life stage that cannot be removed by the officer by hand in <30 seconds 	Send for approved treatment
Pest – High (exceptional)	<ul style="list-style-type: none"> • suspect Red Imported Fire Ant (RIFA) (hold line until confirmed) • Giant African Snail (GAS) • Any suspect Lymantriid egg mass 	Hold rest of line remaining on port, consult TL. Give importer the option of inspecting or treating rest of line.