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INVESTIGATION & OFFENCE SUMMARY

Incident: Alleged¹ breach of containment by *Arabidopsis thaliana* plants suspected to be genetically modified, at the Plant and Food Research Physical Containment 2 (PC2) facility number 420, building 235, on 23 November 2009.

Date of report: 31 May 2010

Matter Number: 4823

OC File: [REDACTED]

2IC: [REDACTED]

Team Manager: [REDACTED]

1. Outline the facts (CM1)

1.1 Introduction

This matter relates to an alleged¹ breach of containment controls of approvals for the genetic modification (GM) of *Arabidopsis thaliana* granted by the Environmental Risk Management Authority (ERMA) under the Hazardous Substances and New Organisms (HSNO) Act 1996. The alleged breach resulted in the escape of two *A. thaliana* plants strongly suspected to be GM. The scope of this investigation summary is specifically focussed on work carried out to establish if there is any criminal liability on behalf of Lincoln University, Plant & Food Research or the respective employees and staff involved.

1.2 Background

Regulation & Enforcement

The Hazardous Substances and New Organisms (HSNO) Act 1996 is the legislation providing for the prevention or management of adverse effects of hazardous substances and new organisms, for the purpose of protecting the environment, and the health and safety of people and communities.

The Act is administered by the Ministry for the Environment.

The Act provides that a regulatory body, the Environmental Risk Management Authority (ERMA) is established with responsibility for making decisions on applications to introduce and/or develop new organisms, including GM organisms,

¹ Although testing to date has given a degree of certainty that the positive plants found in the exclusion zone outside the containment facility do arise from the Lincoln University *Arabidopsis* experiment gene lines, further testing is required to give 100% confirmation of this fact. Results from conclusive testing are expected in the next couple of weeks. At this time, there are no strong reasons to suspect the plants found outside of the facility are from any other gene line than the one investigated. Please refer to section 9 of this document for further information.



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and approving standards for containment facilities to hold those new organisms, in New Zealand.

MAF is the agency responsible for enforcing the new organism provisions of the Act, including approvals granted under the Act and any associated containment controls.

The Operational Standards and Facilities Group of the Border Standards Directorate, MAFBNZ is responsible for approving and auditing transitional and containment facilities, including all containment facilities holding and conducting work on GM plants approved by ERMA.

A containment facility is a place approved in accordance with Section 39 of the Biosecurity Act 1993 for holding of organisms that should not, whether for the time being or ever, become established in New Zealand. The primary purpose of containment is to prevent the escape of new organisms which have been approved by ERMA for importation into, or development in, New Zealand.

Containment facilities are required to have an operator and be constructed and operated in accordance with the applicable containment facility standard approved by ERMA New Zealand. In order to meet the requirements of the standard "Containment Facilities for Plants 2007", facilities must comply with the decision of the Authority specified in HSNO Act approvals, including any controls within those approvals. Controls are containment conditions imposed by ERMA under Section 45(2) of the HSNO Act.

Under Section 2A of the HSNO Act, a new organism includes a genetically modified organism.

HSNO Approvals involved in the Alleged Breach

On 22 March 2005, an application from Lincoln University was formally received by the Lincoln University Institutional Biological Safety Committee (IBSC), as properly delegated by ERMA. The application sought to genetically modify the plant *Arabidopsis thaliana* for experimental purposes in containment pursuant to Section 40 of the Act. This application was lodged under application number GMD05103.

Under Sections 42 and 42A of the Act, applications for low-risk genetic modification may be determined by way of a rapid assessment process. The regulations regarding what constitutes low-risk genetic modification are contained in the Hazardous Substances and New Organisms (Low-Risk Genetic Modification) Regulations 2003.

The rapid assessment process provides that low-risk applications may be made to an IBSC properly delegated by ERMA under Section 19 of the HSNO Act.

The application met the requirements of low-risk genetic modification and was assessed by the Lincoln University IBSC, operating under delegation from ERMA pursuant to Section 19(2)(a) of the Act.

On 12 August 2005, the Lincoln University IBSC considered application GMD05103. The application was approved with controls and that approval was notified on 20



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October 2005. The approval codes for this application were GMD004006 – GMD004009.

Approvals specify that any work undertaken on “whole *Arabidopsis* plants” be done in accordance with the MAF Biosecurity Authority Standard 155.04.09 Containment Facility for New Organisms (including genetically modified organisms) of Plant Species (now superseded by Containment Facilities for Plants 2007).

Approvals further specify that the facility in which the *Arabidopsis* work be conducted is approved and registered by the MAF Biosecurity Authority as a containment facility under Section 39 of the Biosecurity Act 1993.

The site specified in approvals for conducting *Arabidopsis* work was the PC2 plant house facilities at The New Zealand Institute for Crop and Food Research Limited, Lincoln (now called The New Zealand Institute Plant & Food Research Limited). This facility is registered as a containment facility with MAF, registration number 420.

Lincoln University had a contractual arrangement with Plant & Food for the use of Cell 1 within the PC2 facility for the *Arabidopsis* experiments.

1.3 People Map

The table below is not an exhaustive list of all the individuals involved in this investigation but it gives the reader an indication of the main parties and their respective positions.

Name	Position
[REDACTED]	MAF, Inspector (responsible for supervision of Plant & Food Research (Lincoln) and Lincoln University containment and transitional facilities)
[REDACTED]	MAF, Inspector
[REDACTED]	MAF, IDC
[REDACTED]	MAF, IDC
[REDACTED]	MAF, Enforcement
[REDACTED]	MAF, Enforcement
[REDACTED]	MAF, Enforcement
[REDACTED]	Plant & Food, PC2 Facility Operator
[REDACTED]	Plant & Food, Senior Scientist
[REDACTED]	Plant & Food, Biological Compliance Officer
[REDACTED]	Plant & Food, Portfolio Manager, Breeding & Genomics
[REDACTED]	Plant & Food, Buildings Maintenance Manager
[REDACTED]	Lincoln University, Lab Supervisor
[REDACTED]	Lincoln University, Visiting Scientist from USA
[REDACTED]	Lincoln University, Lab Technician
[REDACTED]	Lincoln University, PhD Student
[REDACTED]	Environmental Risk Management agency (ERMA)



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1.4 Timeline

The investigation to date has revealed the following timeline of events:

22 March 2005 – Application number GMD05103 from Lincoln University formally received by Lincoln University IBSC to genetically modify the plant *Arabidopsis thaliana*. The purpose of the approval was to genetic modify *Arabidopsis thaliana* to allow the characterisation of genes involved in secondary metabolism. Part of this work included proving that the much higher level of short wavelength UV-B present in New Zealand contributes to significantly higher levels of somatic mutation in plants.

12 August 2005 – Lincoln University IBSC consider and approve application GMD05103 with controls (refer to file section 9.5). The approval code was GMD004007. This approval specified the site for conducting the work on the *Arabidopsis* was the PC2 plant house facility at The New Zealand Institute for Crop and Food Research Limited (now The New Zealand Institute for Plant & Food Research Limited). This facility is registered and audited by MAF, registration number 420.

20 October 2005 – Decision of Lincoln University IBSC notified.

28 November 2006 – Permit to import (refer to file section 5.2) issued by [REDACTED] from MAF to Lincoln University to import the 1st batch of *Arabidopsis* seeds consisting of 50 grams² of GM *Arabidopsis thaliana* seeds. The permit is valid from 28 November 2006 until 28 November 2007.

4 October 2007 – The first shipment of GM *Arabidopsis* seeds from Trinity University to Lincoln University arrives in New Zealand.

5 October 2007 – BACC in relation to the first shipment of seeds issued (B2007/260415).

11 December 2007 – First batch of seeds transferred from Lincoln University to Plant & Food (P&F) by [REDACTED]. This marks the start of Experiment 1.

11 January 2008 – End of experiment 1. Hypotheses proved ie: In New Zealand the much higher level of short wavelength UV-B can contribute to significantly higher levels of somatic mutation in plants.

13 February 2008 – Permit to import, (refer to file section 5.2) issued by [REDACTED] from MAF to Lincoln University to import the 2nd batch of *Arabidopsis* seeds consisting of 50 grams² of GM *Arabidopsis thaliana* seeds. The permit is valid from 13 February 2008 until 13 February 2009.

² Approximately 2.5 million seeds



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27 March 2008 – The bulk of the seeds harvested from the first experiment were transported back to Lincoln University from P&F and the remaining plants from Experiment 1 were destroyed. A quantity of seed (less than 0.5g³) was kept in double sealed containment in the PC2 plant house facility at P&F for further study.

6 April 2008 – The second shipment of GM *Arabidopsis* seeds from Trinity University to Lincoln University arrived in New Zealand. BACC issued (B2008/120144) authorising the second shipment to be taken to Lincoln University.

15 July 2008 – Routine MAFBNZ audit carried out on PC2 facility by [REDACTED]. Corrective actions and recommendations issued as follows:

Corrective Actions

Internal audits to be completed 6 monthly and check sheets to be expanded upon. This action was closed on 21/11/08.

Recommendations

Fix mesh at the front of one of the cells (not cell 1). This recommendation was complied with on 17/09/08.

1 December 2008 – The New Zealand Institute for Crop and Food Research Limited and the Horticulture and Food Research Institute of New Zealand Limited amalgamate to form The New Zealand Institute for Plant and Food Research Limited (P&F). As a result of the amalgamation, responsibility for the containment facility, registration number 420 passed to Plant & Food (P&F).

18 December 2008 – Start of Experiment 2, which is a replicate of Experiment 1. Due to the intervening Christmas break and unavailability of staff, this experiment was terminated on 14 January 2009 without any analysis being carried out. All plants from the experiment were destroyed prior to flowering.

14 January 2009 – End of Experiment 2. This second experiment was designed to provide inter-seasonal verification of the initial finding in Experiment 1 but Experiment 2 remains incomplete and, given the alleged *Arabidopsis* breach, it is unlikely that this experiment will be repeated.

28 July 2009 - Routine MAFBNZ audit carried out on the PC2 facility by [REDACTED]. Corrective actions and recommendations issued as follows:

Corrective Actions

HSNO Act approvals and controls to be placed in the plant house. This corrective actions was closed on 06/08/09.

³ Approximately 25,000 seeds



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Cell 1 and Cell 2 of the Plant House: Non-GMO plants to be labelled and Vitis grape plants of cell 1 to be labelled. This corrective action was closed on 25/08/09.

HSNO Act approvals GMD003985, GMD004007 and GMD003999 registers to be amended to clearly show the numbers of the individual transfers as well as the required information as per section 8.3.1 of the MAFBNZ plant standard. This corrective action was closed on 06/08/09.

HSNO Act projects register to be amended to include the projects occurring in cell 1 of the plant house (HSNO Act approvals GMD003985, GMD004007 and GMD003999). This corrective action was closed on 25/08/09.

Remove key card access to Lincoln University staff until training has been completed and these people are fully aware of their requirements and procedures of the plant house. This corrective action was closed on 16/10/09.

Plant house facility to be sprayed at regular intervals (time period to be stipulated in the manual) as well as at the end of each series of experiments. This corrective action was closed on 29/10/09.

HSNO Act approval GMD000814; seeds held under this approval currently labelled with an incorrect approval number. This must be amended to accurately reflect the approval the seeds were collected from. This corrective action was closed on 06/08/09.

HSNO Act approval GMD000730; the register needs to be amended to show how many clones under this approval are growing in the plant house so that the individual destruction details can be recorded. This corrective action was closed on 06/08/09.

Recommendations

Training

Amend staff list so that it clearly shows training dates and if questionnaire has been completed.

Questionnaire to show that it has been checked and countersigned.

New staff must be evaluated on their understanding of the training.

Training presentation to include more information on the requirements of the registers, labelling of specimens and the requirement to be able to track the specimens.

Internal Audits

Independent internal auditor should be used.

Internal audits should be completed within a required timeframe (e.g. within a maximum of 1 month).



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To be conducted in-between the external MAFBNZ audits.

Annual quality management system (QMS) review should include feedback from laboratory managers.

Plant House

Weekly check list to be amended

HSNO Act approval GMD005269-74 register to be amended to ensure the information is easily retrievable.

HSNO Act approval GMD005269-74 number to be recorded on the boxes of the seeds being held.

Transfer register for *Arabidopsis thaliana* seeds to be amended to clearly show how many slides/seeds are transferred and the destruction details.

Change insecticide used in the airlock to a dual purpose insecticide for flying and crawling insects (containing the ingredients tetramethrin and permethrin).

Assess how access was granted to non-Plant and Food staff who have not undertaken any training to ensure this does not occur again.

28 October 2009 – P&F requested a MAFBNZ audit inspection on their pollination cages associated with GMD004830-37 to ensure that cages comply with standards. During this inspection [REDACTED] notes that mesh on the PC2 plant house was not secure. Corrective actions issued as follows:

Corrective Action

Mesh on PC2 plant house facility must be fixed in place (not linked to Cell 1). This corrective action was closed on 10/11/09.

30 October – 9 November 2009 – PC2 cell extractor fan mesh changed as part of routine P&F cell maintenance. Nylon mesh on the fan exhaust vents was replaced with stainless steel mesh.

23 November 2009 – [REDACTED], a senior P&F scientist, first discovered *Arabidopsis* plants growing within the exclusion zone of the PC2 plant house while undertaking a perimeter check. [REDACTED] notified [REDACTED], [REDACTED]
[REDACTED]

23 November 2009 (between 16:00 hrs to 16:30 hrs) – [REDACTED] (P&F) notified [REDACTED] (MAF) that they have a possible breach and have discovered *Arabidopsis* plants growing outside the PC2 facility. MAF were also informed that exploratory DNA testing was underway at P&F on the sample *Arabidopsis* plants seized.

On discovery of the possible breach, P&F commenced their immediate containment procedures including:



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All visible plants were hand pulled, double bagged, labelled and moved into storage in a cold room within the PC2 containment facility.

Samples of the plants were DNA tested to establish if the plants in the exclusion zone were from a natural population or otherwise.

25 November 2009 – P&F research staff notified MAFBNZ that two of 47 plants initially sampled, tested positive for the presence of foreign DNA sequences, specifically the *uidA* and, *bar* genes and, 35S promoter sequences. Both of these plants came from a location close to cell one in a geographic location referred to as Area A in the MAFBNZ Compliance Order (refer to file section 8.6). The combination of foreign DNA sequences found associated with these plants did not match any of the combinations present in *Arabidopsis thaliana* lines used in research at any time by P&F research staff. Enquiries were made with Lincoln University to establish a gene line match for the plants. Plant and Food immediately establish an internal response team.

P&F initiate an immediate voluntary suspension of all activity in the PC2 plant house until an investigation could be undertaken and factors contributing to the presence of the foreign DNA sequences in the *Arabidopsis* plants in the exclusion zone could be determined.

26 November 2009 – [REDACTED] (IDC), [REDACTED] (IDC) and [REDACTED] (QI) visit the P&F site to undertake an initial assessment for response action. Present for this meeting from P&F were [REDACTED], [REDACTED] and [REDACTED].

P&F provide a PC2 plant house voluntary suspension plan to MAFBNZ along with a request that MAFBNZ assist in expediting the transfer of essential plant material to alternative approved locations.

27 November 2009 – IDC staff, [REDACTED] and [REDACTED], visit the P&F site to clarify matters relating to the response required. They met with [REDACTED], [REDACTED] and [REDACTED] again.

IDC rapid assessment report completed by [REDACTED] and [REDACTED].

29 November 2009 – It is established that Lincoln University, who were leasing Cell 1 of the containment facility, were conducting *Arabidopsis* experiments using the 3 DNA sequences in a combination that could explain their presence in the 2 positive plants found in the exclusion zone outside the containment facility.

30 November 2009 – Lincoln University confirmed to MAFBNZ that the foreign DNA sequences found matched those used to genetically modify plants in experiments conducted in Cell 1 of the Plant & Food containment facility under the HSNO approval GMD004007.



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1 December 2009 – P&F initiated internal procedures to further limit approved user access to the PC2 plant house facility.

MAFBNZ notified P&F that an independent verification report was to be undertaken to validate the findings of P&F testing methodologies in relation to DNA testing of the *Arabidopsis* plants found outside the PC2 plant house facility.

2 December 2009 – P&F confirmed to MAF () that no plants tested in area C return positive results for the presence of foreign DNA sequences.

2 December 2009 - P&F restricted access to the PC2 plant house to senior staff only and swipe card access records are retrieved for the past 12 months.

4 December 2009 – Meeting between , , and held to discuss compliance order measures.

MAFBNZ granted permission for P&F to spray the exclusion zone with a herbicide spray.

All existing *Arabidopsis* plants within the PC2 plant house bagged and non-essential plants were autoclaved.

Permission granted by MAFBNZ to move transgenic *Arabidopsis* plants out of cell 2 to an approved location.

4 December 2009 – Post-incident MAFBNZ audit carried out by BSI . Corrective actions and recommendations issued as follows:

Corrective Actions

Immediately discontinue all work involving GM *Arabidopsis thaliana* within the GMO plant house by removing plants to a secure location approved to the same level of containment OR destroying the plants as per HSNO Approval GMD004007. This corrective action has been completed.

Restrict all access to the GMO plant house and the area immediately outside the facility to MAF-authorised personnel only. Record all instances of personnel accessing these areas. This corrective action has been completed. On a recommendation by MAFBNZ, Plant and Food are now requiring all staff that still have swipe card access into the facility to fill in the entry/exit log book.

The GMO plant house (building 235) is to be sterilised. Procedures regarding the method and chemicals used must be submitted and approved by MAFBNZ prior to the sterilisation occurring. This corrective action was closed on 08/02/10.



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Review and update contingency plans in the Plant and Food Research Containment Manual. This corrective action was closed on 22/12/09.

Institute a review of compliance with procedures to prevent release of plants or seeds from containment. This corrective action is still open and ongoing.

7 December 2009 – Based on a meeting with MAFBNZ, P&F develop a detailed response action plan for risk mitigation.

8 December 2009 – Compliance order completed by [REDACTED] requesting that P&F undertake the following (see map attached to Compliance order in section 9.8 for layout of areas A, B, C, D):

Test remaining samples from areas B&D (by 16 December)

Report on the testing of above (by 16 December)

Treat the soil of risk areas A, B and 5 metres from pathway of area C. Treatment can be by way of soil removal or treatment *in situ* (by 21 December).

Hard surface treatment (by 21 December).

Arrange MAF inspection to ensure compliance after completing the above (by 20 January 2010).

8 December 2009 – P&F provide the first testing report to MAFBNZ for independent validation by an external contractor.

8 December 2009 – Compliance order officially served by [REDACTED] on [REDACTED], [REDACTED] at The New Zealand Institute for Plant & Food Research Limited, Mt Albert Research Centre, Mt Albert Road, Mt Albert, Auckland.

9 December 2009 - Critical Situation Report (CSR) (file reference section 9.27) sent by MAF, [REDACTED] to P&F PC2 Facility Operator, [REDACTED].

External consultant appointed by MAFBNZ reviewed the P&F testing methodologies and conducted a site visit at P&F.

10 December 2009 – P&F began additional work on locating and testing plants in areas A, B, C and D, as specified in the MAFBNZ Compliance Order.

11 December 2009 – P&F decided to progressively discontinue all *Arabidopsis* work in external PC2 plant house facilities across all other P&F research sites.



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14 – 18 December 2009 – Risk mitigation work continued in accordance with MAFBNZ Compliance Order and CSR.

P&F made the following progress against the MAFBNZ compliance order:

Soil removed in an appropriate manner to a depth of 15cm from 3 designated areas (Areas, A, B and C), bagged and contained in bins for removal and deep burial by a MAFBNZ-approved treatment supplier.

Areas A, B and C backfilled with gravel and compacted.

Non-essential GM plant material from the GM planthouse destroyed by autoclaving.

Further testing of plants completed and MAFBNZ notified that all of the further 892 plants tested were negative for the presence of foreign transgenes.

Hard surfaces treated, cleaned and sterilised including pathways and concrete footings.

Transfer requests for MAFBNZ approval arranged for essential GM material to be moved to another facility.

Staged approach adopted to internal sterilisation of the PC2 plant house facility due to continuing presence of essential plant materials.

14 December 2009 – Site visited by [REDACTED] and [REDACTED] to check progress made by P&F against the compliance order.

14 December 2009 – Letter of inspection issued to P&F [REDACTED] with the following corrective actions:

Corrective actions

Determine where the openings at the top of steel support beams lead to and/or fill holes or place mesh over the openings. This action was closed on 31/03/10. [REDACTED] confirms that there are no holes leading out of the facility associated with the steel support beams.

Review spray effectiveness and spray interval suitability in the GM Plant House. This actions was closed on 06/04/10

Recommendations

Place a further cover/bag over *Arabidopsis* plants using seed collection vessels to prevent the spread of pollen and seeds.



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15 December 2009 – [REDACTED] and [REDACTED] conducted a site visit and took photographs of P&F carrying out work as directed by the compliance order (refer to file section 8.4).

16 December 2009 – [REDACTED] conducted another site visit to check progress against compliance order.

21 December 2009 – MAFBNZ approved the transfer of essential plant material to other approved facilities. Only GM plants that were producing flowers or seeding remained bagged in the PC2 plant house. The necessary permission to move these was not granted by MAFBNZ in accordance with the standard.

22 December 2009 – P&F commence transfer of all GM plants approved to be moved to alternative approved facilities.

23 December 2009 – Internal sterilisation of Cell 1 complete.

A second P&F report on procedures for testing *Arabidopsis* plants for the presence of foreign DNA sequences was provided to MAF. All plants described in this report tested negative.

20 – 21 January 2010 – P&F destroy all plants remaining in the PC2 plant house by autoclaving, following the harvest of seeds and bulbs for containment storage. The PC2 plant house was now completely empty and filter vacuuming commenced. Sterilisation of the plant house complete under commercial contract.

27 January 2010 - Meeting held between P&F [REDACTED] and the Te Runanga o Ngai Tahu HSNO Committee, ERMA and MAFBNZ.

5 March 2010 – MAF Enforcement, [REDACTED] met with [REDACTED]
[REDACTED] Discussions held regarding seed collection vessels and spray periods (refer to file section 6.3 & 6.4).

8 March 2010 – HSNO controls regulating the *Arabidopsis* work, application GMD05103, are amended by the Lincoln University IBSC (refer to file section 9.6).

18 March 2010 – [REDACTED], from SCION, sent his draft report validating P&F testing methodology (refer to file section 9.10) to MAF.

22 March 2009 – [REDACTED], [REDACTED], [REDACTED] attend P&F for further scene examination. Further actions identified. Enforcement investigation ongoing.



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1.5 Investigation

1.5.1 Photographs & Videos

Photographs and videos taken by various MAF staff throughout this investigation have been collected, analysed and categorised on this file. A representative sample of relevant photographs has been selected and placed into section 8 of the file with the remained being attached in section 10.2.2 as non-sensitive unused material. Photographs in section 8 have been sorted into the following categories:

General photographs around P&F prior to any response work including images of an *Arabidopsis* plant (refer to file section 8.1).

Photographs showing the *Arabidopsis* samples collected for testing after the suspected breach notification (refer to file section 8.2).

Images showing various plants held within the PC2 plant house facility (refer to file section 8.3).

Photographs showing P&F response work to the Critical Situation Report and Compliance Order (refer to file section 8.4).

Photographs showing cell 1 fans and fan mesh examination (refer to file section 8.5).

Reconstruction photos showing where the *Arabidopsis* plants were found in exclusion zone A (refer to file section 8.6).

Photo of cell 1 drain mesh (refer to file section 8.7).

Photo of wild *Arabidopsis* seeds to demonstrate their small size, (refer to file section 8.8)

Photos of seed transportation vessels and filing cabinet H416 at Lincoln University, (refer to file section 8.9)

CD: Video created 18 March showing P&F area B and people looking for weeds, (refer to file section 8.10)

CD: P&F site visit images, (refer to file section 8.11)

1.5.2 Pathway identification

A site visit was conducted by Enforcement investigators and Cell 1 of the PC2 plant house facility was examined. The following possible pathways of containment breach were identified for consideration:



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Wind dispersal by the cell extractor fans:

Investigations revealed that the cell extractor fans were changed as part of routine P&F cell maintenance during the period 30 October 2009 to 9 November 2009. Nylon mesh on the fan exhaust vents was replaced with stainless steel mesh.

The reason for the mesh screen changes was to ensure the maximum possible tensile strength for cleaning, corrosion and insect resistance. The specifications of the old mesh were: Diameter = 0.28 mm, Aperture = 0.5333 mm and the specifications of the new mesh size are: Diameter = 0.183 mm, Aperture = 0.2313 mm.

Although both mesh sizes meet with the MAF and ERMA New Zealand standards, the average *Arabidopsis* seed size (0.44 mm – 0.61 mm) is smaller than the apertures in the old mesh, raising questions if the old mesh was fit for purpose for this experiment.

As part of the investigation, the cell fans were dismantled and examined by [REDACTED] from P&F for evidence of *Arabidopsis* seeds. Thirty "sticky tape" samples were taken from the mesh for examination and dust and particulate matter was examined from the inner cavity of the fans.

There was no evidence of *Arabidopsis* seed found. It is important to note however, that just because there was no evidence of seed, this cannot exclude the fan as a possible pathway.

Water dispersal by means of waste water overflowing and seeping out between the containment facility walls and floor:

Investigators conducted a trial experiment to test the integrity of the joints between the cell walls and cell floor. Water from the cell hose pipe was sprinkled in the corner of the cell near the location in the exclusion zone where the positive plants were found.

It was noted that water does seep out between the joints. The point at which the water seeps out of the cell in this corner is extremely close (approximately 30 cm) to the location of the positive plants in the exclusion area outside the cell. This is much closer than the proximity of the fan exhaust vent to the same location.

Accidental human dispersal via attachment to clothing or similar:

The HSNO approval for the GM *Arabidopsis* work lists a number of controls that need to be met. These controls will be explored later in this report under the "Offence" section. Included in the controls is a requirement that:

"standard containment procedures will be employed such as wearing



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of lab coats and slip-on overshoes that remain in the facility to reduce the risk of transfer of seed from the facility”.

Several interviews (refer to file section 5) have taken place and there is no evidence to suggest that lab coats or overshoes were worn outside the facility in breach of any controls.

For the purposes of this investigation, the lab coats and overshoes that were used for the experiment were unfortunately autoclaved in the sterilisation procedure after the breach notification and are unavailable for further inspection for evidence of the presence of *Arabidopsis thaliana* seeds.

Intentional human dispersal:

Various site visits, interviews and background checks have been conducted which have provided no evidence or motive for an intentional release of *Arabidopsis* by staff working within the PC2 plant house.

1.5.3 Interview – [REDACTED]

[REDACTED] was interviewed under Bill of Rights on 1 April 2010 at P&F premises. A full transcript of this interview has been prepared (refer to file section 4.1). In summary [REDACTED] confirms the following:

He is employed by P&F [REDACTED] in the Vegetable and Arable Plant Pathology area reporting to group leaders.

He is the [REDACTED] and also provides advice to other people on how to open and run various facilities.

He does not know how the *Arabidopsis* plants got out of the PC2 plant house facility.

He does not directly line-manage anyone that uses the plant house facility.

He is involved in writing and updating the P&F containment manual.

He is not “Grow Safe” registered for spraying so they have a spray manager but he does have a general awareness on spray types.

Within the PC2 plant house, there are weekly inspections that are carried out by the plant house manager ([REDACTED]). These inspections are a tick box type inspection for things like structural integrity and spray records. At the end of the month these check sheets are sent to [REDACTED] and he signs them off.

There are also 6-monthly internal audits of the facility where the facility is audited against a checklist.



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The last internal audit on the facility was done by [REDACTED] who reports to [REDACTED] but historically [REDACTED] has done the internal auditing.

There is now an annual training session for everyone covering the content of the entire containment manual. The last session was in May / June 2009 and the next one will be in a May / June 2010.

They now use a Power Point presentation (refer to file section 9.20) for the training that covers all aspects of the manual. All senior researchers attend the session [REDACTED] runs and then group managers train their lab staff. At the end of the training, there is a questionnaire to assess participants understanding of the module.

This method of training was implemented in June 2009 following an audit report by MAFBNZ. Prior to June 2009, the old system of training involved students being talked through the manual, given a 3-4 page summary of the things they really needed to understand and then they would sign a form to say they had been trained.

The difference between the old training and the new training is that there never used to be a Power Point presentation, there were no specific written assessment questions and there was no proof that the student had actually absorbed and understood the training.

The new training was implemented as a result of an MAFBNZ corrective action report by [REDACTED].

The training provided to Lincoln University staff was under the pre-July 2009 system. [REDACTED] was trained by [REDACTED], and then confirmed to [REDACTED] that he had trained his research staff. [REDACTED] is not able to locate any documents in relation to this training so he suspects it may have just been a verbal notification by [REDACTED] that the Lincoln University staff received training.

[REDACTED] does have documentation in relation to [REDACTED] training (refer to file section 9.16 & 9.17).

[REDACTED] is responsible for making sure the corrective actions from the external MAFBNZ audits are complete.

[REDACTED] is the appointed deputy operator of the facility.

Access to the PC2 plant house is limited to persons with authorised entry cards. There are two types of access, full access and entry only. Full access is for people doing research in the facility. Entry only access is for people who need entry to the facility, but not for research purposes. These include contract workers for maintenance and spraying. The process of obtaining an access card requires the applicant to undergo training, [REDACTED] then approaches the office manager, [REDACTED], who arranges the access cards. This may need the authority of someone more senior in P&F.



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The authorised user list held by [REDACTED] contains additional users (mostly contractors) who are not on [REDACTED] list. One of the audit checks in the future will be to go through [REDACTED] list and check that the people have had the appropriate training.

All visitors need to sign in and be accompanied by an authorised user of the facility.

Lab coats should be worn inside the PC2 plant house and taken off prior to leaving. Lab coats from the PC2 plant house facility are not permitted to be worn outside the facility.

He has never seen anyone wearing a lab coat from the PC2 plant house outside the facility.

He is not aware of any breach of conditions that may have caused the *Arabidopsis* seeds to escape containment.

1.5.4 Interview – [REDACTED]

[REDACTED] was interviewed on 1 April 2010 at P&F premises. A full transcript of this interview has been prepared (refer to file section 5.3). In summary [REDACTED] confirms the following:

He has recently taken on a new role at P&F [REDACTED].

Approximately 2 or 3 months into this new role he decided to inspect the exclusion area around the PC2 plant house since they were trying to enforce a heightened awareness amongst staff of complying with procedures and “doing things properly”.

On the day in question he recalls some repair work taking place in the exclusion zone meaning the door was unlocked and the exclusion zone alarm was off. This is what prompted him to carry out the inspection. His initial intention was to inspect the quality of some recent maintenance work but as he walked around the grassed area to the west of cell 5 (area B in the Compliance Order) he saw a population of *Arabidopsis* plants growing.

He describes this initial population as a “sward” of plants which he clarifies as a “mass of plants growing on the ground”.

Having found this population of plants in area B he immediately informed [REDACTED].

He and [REDACTED] then went back to examine the plants and they decided to pull them for testing.



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Further inspection of the exclusion area then revealed the 4 plants growing in the area described as area A on the compliance order.

All in all 47 plants were initially hand pulled, double bagged and tested from area A and B.

Access to the PC2 plant house is controlled by electronic tags and that anyone new has to undergo training in order to gain access.

Visitors to the facility are signed in and accompanied at all times by someone who is trained.

On entering the foyer area of the PC2 plant house everyone dons overshoes and lab coats. Lab coats used in the PC2 plant house remain in the plant house.

Staff coordinate entry and exit to the PC2 plant house to ensure that only one of the two entry doors is open at any one time.

The only way plant material can move between the lab and the greenhouse is in a double zip click box.

Other plant material such as soil, pots etc are autoclaved prior to leaving the facility.

Plant material can also be moved out of the facility under transfer permit.

In 2007 he trained [REDACTED] in the PC2 procedures.

Having trained [REDACTED] it was [REDACTED] responsibility to train his staff who would be using the facility.

He thinks that two of [REDACTED] staff were issued with access cards which allowed them entry to the PC2 facility.

1.5.5 Interview – [REDACTED]

[REDACTED] was interviewed on 26 March 2010 at Lincoln University premises. A full transcript of this interview has been prepared (refer to file section 5.1). In summary [REDACTED] confirms the following:

He is currently a senior lecturer in [REDACTED] at Lincoln University.

They leased the cell in the PC2 plant house at Plant and Food.

He confirms that [REDACTED] is the Operator of the PC2 plant house facility.



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As far as he is aware, there was nothing in the lease agreement requiring Lincoln University staff to be responsible for the actual PC2 facility.

The *Arabidopsis* seeds were imported from Trinity University, Kansas as part of a project that was set up in conjunction with a visiting scientist at the time, [REDACTED] was in New Zealand on sabbatical for six months from Trinity University.

[REDACTED] ran the initial experiment over the 2007 / 2008 summer period and then asked [REDACTED] to repeat the experiment the following year which would have been the 2008 / 2009 summer period. Each experiment was conducted from separately imported seeds from USA.

Experiment 1 ran from 11 December 2007 to 11 January 2008.

Experiment 2 ran from 18 December 2008 to 14 January 2009

Due to staffing shortages over the Christmas period in 2008 [REDACTED] was not able to repeat the second experiment in its entirety. Hence the plants were destroyed on 14 January 2009 and they were not able to do the analysis they needed to do.

With regards to seed transfer some seed was transferred back to Lincoln University and some was retained in the PC2 plant house just to reduce the load of having transfers between the two organisations.

Plant destruction was carried out by bagging and autoclaving at the PC2 plant house.

Seeds being imported would have come directly into [REDACTED] laboratory at Lincoln University where they were logged and stored in a locked filing cabinet. These seeds would then have been moved under a transfer permit down to the P&F PC2 facility.

When seeds are transferred they are contained in an eppendorf tube, inside a falcon tube, placed inside a snap-lock box, contained within a Manheim ice bucket, sealed up and moved by car.

The sowing of the plants occurred in cell 1 of the PC2 plant house facility.

[REDACTED] transported the initial batch of seeds to the PC2 plant house facility.

Besides [REDACTED] and [REDACTED], other Lincoln University staff with access to the PC2 plant house facility were [REDACTED]

Although [REDACTED] was given access to the PC2 plant house, as far as he is aware, he never actually accessed the facility.

[REDACTED] trained both [REDACTED] and [REDACTED].



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The training involved [REDACTED] going through the manual that had been provided by [REDACTED] and getting the staff to "sign off" on the training. Paperwork was given back [REDACTED] regarding the training.

Staff were "drilled" never to leave the PC2 plant house wearing lab coats or overshoes.

In terms of seed collection devices they were using paper bags for these experiments.

They have only just started using the [REDACTED] tubes as a seed and pollen restriction device.

Plants would be bagged at the point that they flowered and started to set seed.

The hose in the PC2 was used to water the plants.

Excess water from watering drained onto the concrete floor and across into the drain where he assumed it goes into a sump.

P&F employed a technician who would water the plants daily.

He is of the opinion that seeds collected on the end bench may have somehow been picked up by the air draft and exited through the cell ventilation system into the exclusion area.

Lincoln University staff had no access to the exclusion zone.

Waste would include water from the plant watering that could be contaminated.

They used a handheld vacuum to remove anything from the benches. Waste from the vacuum would be autoclaved.

1.5.6 Interview by way of email questionnaire – [REDACTED]

Having returned to the USA, information from [REDACTED] was obtained by way of email questionnaire (refer to file section 5.4). In summary [REDACTED] confirms the following:

He was in New Zealand on sabbatical from Trinity University to Lincoln University.

He was given access to the PC2 plant house at the Lincoln P&F campus.

He was trained by [REDACTED] and one of the glass house staff (who he thinks was [REDACTED]) who personally demonstrated standard



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procedures for entry / exit from the facility and on routine decontamination. [REDACTED] and [REDACTED] observed him carrying out the approved procedures several times before he was allowed entry to the PC2 plant house unaccompanied.

He was given an access card sometime in November 2007 and the access lapsed by June 2008. He still has the physical access card.

According to his lab notes the last time he harvested GM *Arabidopsis* plants was in March 2008.

Other people working in the facility at the same time as [REDACTED] were [REDACTED], [REDACTED] and [REDACTED] (this is assumed to be [REDACTED]).

He is not aware of any breaches of quarantine procedures and confirms all plants were killed at the end of the experiment. Lab coats and overshoes remained inside the facility. All waste was disposed of in the facility by way of autoclaving.

The GM *Arabidopsis* plants involved in the test were mostly contained in the shadehouse area of the PC2 plant house facility. The plants were germinated in Cell 1 but transferred to the shadehouse for the actual experiment. They were returned to Cell 1 for approximately 1-3 hours at the end of the experiment when they were killed by immersion in FeCN solution. Soil and any remaining plant material from these trials was bagged and autoclaved.

He never entered the quarantine area marked as area A on the compliance order.

It is unlikely that he either approached or departed from the entry to the PC2 plant house past where the (suspected) GM *Arabidopsis* plants were found. The route he usually travelled to depart the PC2 plant house facility was across the grass in the direction of area C. Hence, if he was to have inadvertently carried seeds out of the PC2 plant house facility they would have most likely germinated in area C.

Having seen the map of the location of the positive plant samples in area A his opinion is that the (suspected) GM *Arabidopsis* seeds escaped from Cell 1 and not the shade house.

If exclusion zone surveys for *Arabidopsis* plants were done between March 2008 and November 2009 and proved negative then he suggests that the seeds left containment after he was no longer allowed access to the PC2 plant house facility (and was no longer present in New Zealand).

If there were no such surveys complete then it is possible that he was responsible for the escape but he never violated quarantine procedures.



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Approximately half a dozen plants were set aside at the conclusion of the experiment which were allowed to seed. Bags were placed over these plants as soon as the siliques (seed capsules) filled / dried. Given the usual yield of *Arabidopsis*, it is very likely that a few seeds were not retained in the bags but they did the best they could to get 100% recovery. They then swept up and washed down all the benches where these plants were grown and put all residue in bags for autoclaving.

He believes that it is entirely possible that *Arabidopsis* seeds could have been swept onto the floor and exited the PC2 plant house via the identified water pathway. He comments that he tried very hard to recover all seeds not in bags and implies that the small size and adhesiveness of *Arabidopsis* seeds makes this extremely difficult. [REDACTED] also comments that "We probably should have wiped down the bench with bleach. But even then the seeds are pretty hardy".

1.5.7 Interview – [REDACTED]

[REDACTED] was interviewed on 21 April 2010 at Lincoln University premises. A full transcript of this interview has been prepared (refer to file section 5.6). In summary [REDACTED] confirms the following:

She is a research technician working for [REDACTED] and has held this position since 2008.

She was originally granted access to the Plant House in 2007.

Her training included reading the manual and being shown all the procedures for entry, exit and for dealing with waste.

[REDACTED] was the person who demonstrated the above procedures.

She can't remember if any records were kept in relation to the training or if she was required to fill in any forms.

She thinks the training was given prior to being allowed access to the facility.

She was issued with an access card.

She did not notice any breaches of procedures in relation to the wearing of lab coats and overshoes outside of the facility.

She does not know how the *Arabidopsis* came to breach containment.



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1.5.8 Interview - [REDACTED]

[REDACTED] was interviewed on 21 April 2010 at Lincoln University premises. A full transcript of this interview has been prepared (refer to file section 5.5). In summary [REDACTED] confirms the following:

He is a [REDACTED] working with [REDACTED] and [REDACTED].

He has been working with [REDACTED] since 2006.

He confirms that he has been to the P&F campus on approximately 2 – 3 occasions which were towards the end of 2007 and start of 2008.

He confirms he was given access to the plant house.

He was trained by [REDACTED] and [REDACTED] on the facility procedures prior to being given access.

He does not recall if any records were kept of the training but each time he entered the facility he signed the register.

He was issued with an access card.

He did not see anyone breaching the training procedures.

He does not know how the *Arabidopsis* came to breach containment.

1.5.9 Exclusion zone management

Extract from P&F internal review (refer to file section 9.11) of the *Arabidopsis* breach gives the following information in relation to exclusion zone management:

[REDACTED]

[REDACTED]



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[REDACTED]

Enquiries with [REDACTED] from MAFBNZ Border Standards indicate that there is no condition attached to the "Containment Facility for Plants 2007" standard requiring P&F to either conduct exclusion zone spraying at specified time intervals or to keep documentary records. This topic will be discussed further in the latter stages of this investigation summary.

1.5.10 PC2 plant house water drainage

It was noted by investigators that water from Cell 1 in the PC2 plant house is funnelled down a channel in the concrete floor and then down a drain with a mesh filter covering. In relation to drainage The P&F Containment Manual states (refer to file section 9.25):

"All floor drainage points in the facility have siphoning gully traps to stop the entry of insects and rodents. The traps are fitted with fine mesh baskets to trap plant material and are regularly cleaned. There are no requirements for containment of effluent from a PC2 or PC3 facility but all of the drainage is channelled into one sump that can be treated if required".

Although it is not considered a breach of regulations, our investigations to date have revealed that effluent travelling down this drain is not channelled into one sump and cannot be treated as specified in the manual but instead it leads straight into the storm water system. It is also understood that the mesh filter in this drain is the equivalent size of the original mesh on the extractor fan exhaust vents (Diameter = 0.28 mm, Aperture = 0.533 mm) which is larger than the *Arabidopsis* seed size.

The drain in cell 1 was inspected as part of the pathway investigation and no evidence of plant material was seen.

Questions were also raised regarding the integrity of the seal between the mesh and the actual drain to ensure all waste actually passed over the mesh as opposed to washing down the side of the mesh and continuing down the drain.

Of comparative interest page 7 of the Biotron manual (refer to file section 5.2), which is the manual relating to containment facilities at Lincoln University, makes the following comments in relation to "Growth Room Protocol" and waste water under the heading "Some common sense, basic rules will ensure that contamination is minimised":



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“Do not-over water plants, as the waste water generated needs to be collected and treated before disposal. Over-watering is also a factor in spreading pests, pathogens and diseases”.

Purely for comparative purposes it is interesting to note that the Biotron manual lists water as waste which requires treatment but the P&F facility has no provisions for the treatment of waste water and investigators have been informed by [REDACTED] that the water waste is directed straight into the storm drain having simply passed over a mesh filter.

1.5.11 Access and training records for the PC2 plant house

Having investigated the swipe card access (refer to file section 9.19) and training records (refer to file section 9.16 & 9.17) for the PC2 plant house it was established that:

P&F were notified by MAFBNZ in the July 2009 audit that some Lincoln University staff had swipe card access to the PC2 plant house but their details had not been updated on the training records held by the operator of the facility.

Training records were located for the Lincoln University project leader, [REDACTED], and it was established that there had been an expectation that [REDACTED] would subsequently train any additional staff from Lincoln University.

Interviews with [REDACTED] and the other Lincoln University staff confirmed that this training had been carried out. As a result of the July 2009 MAFBNZ audit, processes around training and access control have both been improved. Training is now conducted solely by P&F on site and documentary records are kept regarding assessments and understanding of the training module.

It was established that there is a visitor system in place which requires visitors to be signed in, briefed and supervised at all times whilst within the facility.

External contractors have been provided with access cards, but access records listed against that card simply record the details of the security company as opposed to the name of the individual guard who is gaining access. Subsequently, it is not able to be checked if contractors gaining access have received formal training on procedures to be adopted when entering and exiting the facility.

Documents have been obtained from P&F (refer to file section 9.26) demonstrating that they do carry out some form of training and record keeping for contractors who require access to the PC2 plant house. However, these documents only date back as far as November 2009.



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Enquiries were made with P&F as to what happened prior to this and investigators were advised that (refer to file section 4.2):

“A number of necessary outside personnel (for instance, the Police, Fire Brigade, [REDACTED] Security, [REDACTED], [REDACTED]) were given access to the Plant House by the Buildings Maintenance Manager. They were told to follow instructions at the entrance to the facility. Almost all outside personnel enter only the anteroom, or the anteroom and potting area. None of these people had access to Plant House cells, which were kept locked at all times.

In a further improvement to our procedures, a new system for entry-only training and access to facility #420 (in particular for necessary contractors) was instituted in early November 2009. Training document dated 6 November, with training and approval occurring in the following weeks (refer to file section 9.26). This new system is working well.”

It would appear that, prior to November 2009, external contractors were given access to the PC2 plant house by the building maintenance manager ([REDACTED]) and none of these contractors were given any formal training. The expectation was that the contractors would “follow instructions at the entrance to the facility”. This issue was picked up as part of the audit and review process and formal training has now been implemented for access only external contractors.

In addition, entry procedures for the PC2 plant house facility now require that every person entering the facility sign a logbook. This allows the specific individual working for the contracting firm who enters the facility to be traced.

Some entries on the access card audit trail documents display the message “Invalid Access”. It was determined that this message means someone attempted to enter the PC2 plant house but was refused access. Such messages would usually be attributed to tradesmen who, having been refused access, would approach [REDACTED] [REDACTED] for the appropriate training.

The access card audit trail documents also make reference to facility 157. Investigators established that this is purely a code associated with the access card manufacturer and has no relevance to MAFBNZ site codes.



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1.5.12 Seed Collection Vessels

P&F internal report (refer to file section 9.11) into the alleged breach states the following:

“HSNO approval GMD004006-4009 notes that sturdy paper bags or seed collection vessels will be placed on the *Arabidopsis* plant to prevent the spread of pollen and seed and to facilitate the collection of seed for further analysis.

Research staff commonly use commercially produced seed collection vessels known as [REDACTED], which are specifically designed for use on *Arabidopsis*. [REDACTED] seed harvesting devices are easy to install and are designed to automatically collect seeds produced by individual plants.

According to the manufacturer's specifications, they are reported to prevent cross pollination of flowers, prevent plant to plant contact and cross pollination of plants and reduce the risk of uncontrolled release of transgenic seeds.

[REDACTED] are about 40cm high and have asymmetrically placed ventilation holes for aeration along the length of the tube.”

Although [REDACTED] are described as commonly used seed collection vessels there remains a question if these meet with the conditions which specifically use the word “prevent” in the sentence “prevent the spread of pollen and seed”. Even the aforementioned manufacturers description describes the vessels as “reducing the risk of uncontrolled release of transgenic seeds” as opposed to “preventing” the risk. The question is, were the [REDACTED] fit for purpose. This will be discussed further in the offence section below.

Confusion was created around the use of seed collection vessels. As can be seen above, P&F appear to have been under the impression that [REDACTED] tubes were used, however, in his interview with investigators, [REDACTED] advises that paper bags were in use and [REDACTED] originally informed investigators that plastic bags were being used. Further investigation into these discrepancies has determined that the seed collection vessels in use were in fact paper bags.

P&F were asked to further comment on this discrepancy and we were advised that they thought [REDACTED] tubes were being used since that is what is industry standard. In addition, they report that [REDACTED] had a box of [REDACTED] tubes available at the PC2 facility.



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██████████ was invited to comment on why he informed investigators that “plastic bags” had been used and it has transpired that his recollection of the exact material of the seed collection vessels in use is not clear. There is no reason to doubt the evidence offered by ██████████ that the vessels were in fact paper bags.

1.5.13 MAF Permits and authorisations

Investigators researched paperwork including permits to import, BACC’s and transfer permits in relation to the importation and movement of *Arabidopsis* seeds from USA and between Lincoln University and P&F worksites. Both Lincoln University and P&F appear to have complied with MAFBNZ requirements regarding these imports.

1.5.14 MAFBNZ audits

Enquiries were made with ██████████ from MAFBNZ Border Standards and all relevant information in relation to the timing of audits, corrective action reports and recommendations has been inserted to the aforementioned timeline.

1.5.15 Seed Storage at Lincoln University

The HSNO approval controls state:

“Seeds will be stored in a locked filing cabinet in H416 according to the Lincoln Quarantine Manual”

The filing cabinet in lab H416 was examined and photographed by investigators. Audits involving the H416 lab were checked with ██████████. The storage of transgenic *Arabidopsis* seeds in H416 was compliant with the controls and there were no issues raised in relation to this part of the investigation.

1.5.16 Plant & Food response and contingency plans

The HSNO approval controls state:

“If for any reason a breach of containment does occur the applicant shall notify the facility Supervisor and ERMA New Zealand immediately the event is noticed (and at least within 24 hours of the breach being detected) and shall immediately implement a



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contingency plan for the recovery and eradication of any organisms or viable material that has escaped.”

It must be acknowledged that, despite all the adverse attention and publicity P&F knew they would receive, they continued to fulfil their duties in relation to both notification and subsequent contingency planning.

The aforementioned timeline lays out the specific actions taken by P&F in response to the alleged breach and there is no evidence to suggest they have been anything but transparent and cooperative in assisting the response and subsequent investigation.

1.5.17 CCTV

It was considered that CCTV evidence may be available but it was established that [REDACTED]

1.5.18 Police records

Investigators conducted police background checks in relation to reported crimes and incidents at both P&F PC2 plant house facility and Lincoln University H416 seed storage filing cabinet. The reason for the checks was to confirm there were no reported incidents where a breach of building structural integrity may have occurred. Background checks revealed nothing of particular note for the investigation in hand.

Background checks have been sent off in relation to parties closely associated with the use of the facility to rule out any historic motive of foul play regarding an intentional release of *Arabidopsis* seeds. At the time of writing we are still awaiting the results of these checks. When they become available the file will be updated accordingly. There is no reason to suspect anything untoward will transpire from these checks for the investigation in hand.

1.5.19 MAF System Checks

MAF Quansuite background checks were conducted in relation to parties closely associated with the use of the facility to rule out any historic motive of foul play regarding an intentional release of *Arabidopsis* seeds. These checks revealed nothing of particular note for the investigation in hand.



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1.5.20 Other miscellaneous enquiries and documents examined in the course of the investigation.

The New Zealand Institute of Plant and Food Research Limited certificate of incorporation was obtained (refer to file section 9.1). The company number is listed as 547965.

The certificate of approval as an operator of a containment facility issued to [REDACTED] was obtained (refer to file section 9.2). Examination of this certificate revealed nothing of particular note for the criminal investigation in hand.

The certificate of approval as a containment facility was obtained (refer to file section 9.3). Examination of this certificate revealed nothing of particular note for the criminal investigation in hand.

Investigators obtained a copy of the contract between P&F (formerly the New Zealand Institute for Crop and Food Research Limited) and Lincoln University relating to the lease of Cell 1 in the PC2 plant house facility. Examination of this certificate revealed nothing of particular note for the criminal investigation in hand (refer to file section 9.4).

Investigators obtained a copy of the Lincoln University IBSC decision form authorising the GM *Arabidopsis* testing (refer to file section 9.5). This document lays out the conditions attached to the approval which will be discussed further in the latter stages of this report.

MAF Investigation and Diagnostic Centre (IDC) provided their Rapid Assessment Report dated 27 November 2009 (refer to file section 9.7). Although informative, examination of this report revealed nothing of a controversial nature for the criminal investigation in hand.

Investigators obtained a copy of MAFBNZ Compliance Order dated 8 December 2009 (refer to file section 9.8). Although informative, examination of this report revealed nothing of a controversial nature for the criminal investigation in hand.

Investigators obtained a copy of the P&F report entitled "PCR testing of pooled *Arabidopsis thaliana* plant material from area B" (refer to file section 9.9). Although informative, examination of this report revealed nothing of a controversial nature for the criminal investigation in hand.

MAF IDC provided a copy of the [REDACTED] report validating P&F report entitled "PCR testing of pooled *Arabidopsis thaliana*" (refer to file section 9.10). Although informative, examination of this report revealed nothing of a controversial nature for the criminal investigation in hand.

Investigators obtained a copy of the draft P&F internal report entitled "Internal review of compliance procedures in relation to the presence of *Arabidopsis thaliana* in the exclusion zone surrounding Facility 420 GM plant house (Lincoln)" dated March 2010. This has been a



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particularly useful document and is referred to in various other sections of this investigation summary (refer to file section 9.11).

Investigators obtained a copy of the P&F internal document entitled "Plant & Food Research:- GM Arabidopsis Breach – Response Planning" dated December 2009 (refer to file section 9.12). Although informative, examination of this report revealed nothing of a controversial nature for the criminal investigation in hand.

Investigators obtained a copy of the P&F internal document entitled "Annual Maintenance check of GMO Glasshouse Lincoln", dated 30 October – 2 November 2009 (refer to file section 9.13). Although informative, examination of this report revealed nothing of a controversial nature that is not mentioned elsewhere in this report for the criminal investigation in hand.

Investigators obtained a copy the P&F internal documents entitled "Monthly Inspection Sheets" (refer to file section 9.14). Although informative, examination of this report revealed nothing of a controversial nature that is not mentioned elsewhere in this report for the criminal investigation in hand.

Investigators obtained a copy of the P&F internal document entitled "Chemical / Spray Data Sheet" (refer to file section 9.15). Although informative, examination of this report revealed nothing of a controversial nature for the criminal investigation in hand.

Investigators obtained a copy the P&F internal documents relating to training (refer to file section 9.16 & 9.17). These documents are referred to in other sections of this investigation summary.

Investigators obtained a copy the P&F internal documents relating to access audit records for the PC2 (refer to file section 9.18 & 9.19). These documents are referred to in other sections of this investigation summary.

Investigators obtained a copy the P&F internal document entitled "Training Course: Facility 420" (refer to file section 9.20). This document is referred to in other sections of this investigation summary.

MAFBNZ provided a copy of the document entitled "Containment Facility for Plants: 2007" (refer to file section 9.23). This document sets out the MAFBNZ & ERMA standards and is referred to in other sections of this investigation summary.

MAFBNZ provided a copy of the document entitled "Lincoln University Quarantine and Containment manual" (refer to file section 9.24). Some points to note from this manual are discussed later in the offences section.

MAFBNZ provided a copy of the document entitled "Plant & Food Research containment manual" (refer to file section 9.25). This



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document is referred to in other sections of this investigation summary.

Investigators obtained a copy the Lincoln University document entitled "Biotron Induction Manual" (refer to file section 5.2). This document is referred to in other sections of this investigation summary.

Investigators obtained historic alarm activation records for the PC2 facility in question (refer to file section 9.21). Examination of these records and related security guard attendance reports revealed nothing of concern in relation to a breach of the facilities structural integrity and the criminal investigation in hand. [REDACTED] further advised that they have had no confirmed intruder alarms of a suspicious nature concerning the PC2 from the time that the *Arabidopsis* experiments started to date.

Investigators obtained copies of documents relating to internal P&F Audits (refer to file section 9.22). With specific reference to the case in hand, examination of these records highlights an emphasis placed on training and annual tests to check the knowledge of all authorised users. This topic of training and subsequent testing was also subject of a MAFBNZ corrective action report arising out of the July 2009 MAFBNZ audit.

2. Identify offences relevant to the facts (CM2)

Detailed below is an analysis of all the charges that have been considered for this case, including the various reasons why certain charges are unsuitable.

Paragraph 2.1 at the end of this section narrows the charges down further to focus purely on the viable offences worthy of further consideration.

Offences under the HSNO Act 1996

Section 109

(1) Every person commits an offence under this act who-

(a) Manufactures any hazardous substance in contravention of this act; or

This charge is not applicable as no hazardous substances (as defined in section 2) were manufactured.

(aa) imports, manufactures, uses, or stores a persistent organic pollutant in contravention of this act; or.

This charge is not applicable as no persistent organic pollutants (as defined in section 2) were involved in this matter.

(b) Develops or field tests a new organism in contravention of this act; or

This charge is not applicable as no field testing was undertaken. Section 2 defines a field test as "field test means, in relation to an organism, the carrying on of trials on



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the effects of the organism under conditions similar to those of the environment into which the organism is likely to be released, but from which the organism, or any heritable material arising from it, could be retrieved or destroyed at the end of the trial.”

The situation deals with an experiment done under PC2 lab conditions. These conditions are dissimilar to the natural environment in that conditions such as the temperature, rainfall, wind conditions, ability to seed, and exposure to other natural biota including insects and other animals are all strictly controlled.

These constraints are specified in the standard AS/NZS 2243.3:2002, and MAF Standard 155.04.09 “Containment Facilities for Plants”.

The definition of field test also requires the ‘carrying on of trials’. In this case the growth of two plants outside the PC2 plant house facility can hardly be considered a trial being carried on.

For these reasons I submit a charge under section 109(1)(b) **is not appropriate**.

**(c) Knowingly imports or releases a new organism in contravention of this Act;
or**

This charge is not applicable as there is no evidence to suggest that P&F knowingly released the *Arabidopsis* plants found outside the PC2 plant house. Further, their response to the release, notifying MAF and immediately undertaking corrective action before being legislatively required indicates absence of the required *mens rea* component.

The definition of ‘release’ in section 2 states “release, in relation to new organisms, means to allow the organism to move within New Zealand free of any restrictions other than those imposed in accordance with the Biosecurity Act 1993 or the Conservation Act 1987”. I submit that the *Arabidopsis* plants were not free of any restrictions as they were still covered under HSNO approval GMD004007.

(d) Knowingly, recklessly, or negligently-

(i) Manufactures, imports, develops, uses, or disposes of any hazardous substance or new organism where any approval is suspended in accordance with section 64 of this Act:

This charge is not applicable as no such suspension of approval under section 64 has been issued.

(ii) Possess or disposes of any hazardous substance or new organism imported, developed, or released in contravention of this Act; or

This charge is not applicable as there is no evidence to suggest that Plant and Food knowingly released the *Arabidopsis* plants found outside the PC2 plant house.

Failing to Comply with Any Controls Imposed by Any Approval Granted under the HSNO Act 1996 – Section 109 (1)(e)(i) HSNO Act 1996

Section 109

(1) Every person commits an offence under this act who-



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(e) fails to comply with-

(i) any controls imposed by any approval granted under this act; or

This is a possible charge **worthy of further consideration**

(ii) Any controls specified in regulations; or

This charge is not applicable as there are no regulations under the act specific to this situation

(iii) Any requirement to obtain a test certificate specified in any regulations; or

This charge is not applicable as there was no requirement to obtain a test certificate.

(ea) fails to comply with a condition on a licence or permission granted under section 95A or section 95B; or

This charge is not applicable as there was licence under section 95A or section 95B granted in this matter.

(eb) fails to comply with a condition on a licence imposed under section 96B(1)(b) on an identified group of hazardous substances; or

This charge is not applicable as no hazardous substances (as defined in section 2) were involved.

(f) fails to comply with any compliance order served under section 107 of this Act; or

This charge is not applicable since P&F have completely complied with the compliance order, as confirmed by IDC. The order was served after the breach was notified.

(g) Fails to comply with any of the requirements of section 124 of this Act; or

This charge is not applicable as section 124 refers to carriers and persons in charge of craft and, as such, is not applicable.

(h) Fails without any lawful justification or excuse to obtain any transferable permit when required to do so by any Order in Council in force under this Act; or

This charge is not applicable as transfer permits have been acquired in accordance with the act.

(i) Being a manufacturer, developer, or importer of any hazardous substance or new organism knowingly fails to report any significant new information of any adverse effect of that hazardous substance or new organism; or

This charge is not applicable as no significant new information regarding *Arabidopsis* has come to light.

(j) Knowingly impersonates any enforcement officer; or

This charge is not applicable as there is no evidence to suggest that Plant and Food staff at any time impersonated an enforcement officer.

(k) Wilfully obstructs any enforcement officer in the course of his or her duties; or

This charge is not applicable as no obstruction of any enforcement officer has occurred during this response.



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(l) Falsely informs a person that an emergency exists where that person knows the information to be false; or

This charge is not applicable as no false notification of an emergency has been part of this incident.

(m) Knowingly labels any package or container in such a manner that that label could in an emergency wrongly indicate the presence of hazardous substances to an enforcement officer, fire services officer, or member of the Police.

This charge is not applicable as no hazardous substances (as defined in section 2) were involved.

Failing to Comply with Any Controls Imposed by Any Approval Granted under the HSNO Act 1996 – Section 124B (2)(c)(i) HSNO Act 1996

Section 124B Pecuniary penalty order

(1) The enforcement agency may apply to the Court for an order that a person pay to the Crown a pecuniary penalty under this Act.

(2) The Court may make the order if it is satisfied that the person—

(a) developed, field tested, imported, or released a new organism in breach of this Act; or

This charge is not applicable as there is no evidence to support a charge under this section. The experiment was not a field test, the plants were imported in accordance with the act and there is no evidence to suggest there has been any guilty knowledge in releasing or allowing the organism to move freely within New Zealand.

b) possessed or disposed of any new organism imported, developed, or released in breach of this Act; or

This charge is not applicable as the plants were imported and developed in accordance with the act.

(c) failed to comply with any controls relating to a new organism—

This is a possible charge **worthy of further consideration**

(i) imposed by any approval granted under this Act; or

(ii) specified in regulations made under this Act.

(3) The Court must not make the order if the person satisfies the Court that the person did not know, and could not reasonably have known, of the breach.



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Offences under the Biosecurity Act 1993

Caused a restricted organism to leave a containment facility Section 154(m) Biosecurity Act 1993

(m) Fails or refuses to comply with any of sections 29, 46, 52, 53, and 134 of this Act:

Section 29 Biosecurity Act 1993 - Restricted organisms to be contained

(1) No person may cause or permit any restricted organism that is in a transitional facility, a biosecurity control area, or a containment facility to leave that facility or area, except-

(a) To proceed, in accordance with the authority of an inspector, to a transitional facility, a biosecurity control area, or a containment facility; or a containment facility; or

(b) In accordance with the authority of an inspector, to be exported from New Zealand.

(2) Authority to move a restricted organism given by an inspector in accordance with this section may be given subject to conditions.

This is a possible charge **worthy of further consideration**

2.1 Offences worthy of further consideration

In relation to this case, we consider the below two offences most appropriate and worthy of detailed consideration. These offences will be discussed further in section 5 of this document under the heading "State rationale for offences considered":

Offence 1

Failing to Comply with Any Controls Imposed by Any Approval Granted under the HSNO Act 1996 – Section 109 (1)(e)(i) HSNO Act 1996

Section 109

(1) Every person commits an offence under this act who-

(e) fails to comply with-

(i) any controls imposed by any approval granted under this act

Offence 2

Failing to Comply with Any Controls Imposed by Any Approval Granted under the HSNO Act 1996 – Section 124B (2)(c)(i) HSNO Act 1996



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Section 124B Pecuniary penalty order

(1) The enforcement agency may apply to the Court for an order that a person pay to the Crown a pecuniary penalty under this Act.

(2) The Court may make the order if it is satisfied that the person—

(c) failed to comply with any controls relating to a new organism—

(i) imposed by any approval granted under this Act; or

(ii) specified in regulations made under this Act.

(3) The Court must not make the order if the person satisfies the Court that the person did not know, and could not reasonably have known, of the breach.

Offence 3

Offences under the Biosecurity Act 1993

Caused a restricted organism to leave a containment facility Section 154(m) Biosecurity Act 1993

(m) Fails or refuses to comply with any of sections 29, 46, 52, 53, and 134 of this Act:

Section 29 Biosecurity Act 1993 - Restricted organisms to be contained

- (1) No person may cause or permit any restricted organism that is in a transitional facility, a biosecurity control area, or a containment facility to leave that facility or area, except...

3. Categorise the offences (CM3)

Failing to Comply with Any Controls Imposed by Any Approval Granted under the HSNO Act 1996 – Section 109 (1)(e)(i) HSNO Act 1996

Offence Category – Strict Liability – Section 117(1) HSNO Act 1996

Jurisdiction – Summary

Failing to Comply with Any Controls Imposed by Any Approval Granted under the HSNO Act 1996 – Section 124B (2)(c)(i) HSNO Act 1996

Offence Category – Civil Proceeding – Section 124E (a)

Burden of Proof – Balance of Probabilities – Section 124E (a)

Failure or refusal to comply with Section 29 of the Biosecurity Act 1993 –

Section 154(1)(m) Biosecurity Act 1993

Offence Category – Indictable – **Section 157(1) Biosecurity Act 1993**

Jurisdiction – Indictable and Summary



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4. Decide which offences to pursue (CM4)

The law does not allow for an absolute strict liability offence to be brought against either the applicant (Lincoln University) or the operator (██████████, P&F) in relation to simple fact that *Arabidopsis* had apparently escaped containment and was found growing in the exclusion zone outside the PC2 plant house facility.

Based on the “rationale for offences considered” listed below, it is the investigators submission that there is no reasonable likelihood of a successful prosecution beyond reasonable doubt and no charges should be forthcoming against any parties in this matter.

There are however a number of points for consideration listed in the conclusion of this document which may be worthy of consideration for future practices.

5. State rationale for offences considered

Offence 1

Failing to Comply with Any Controls Imposed by Any Approval Granted under the HSNO Act 1996 – Section 109 (1)(e)(i) HSNO Act 1996

Section 109

(1) Every person commits an offence under this act who-

(e) fails to comply with-

(i) any controls imposed by any approval granted under this act

To have a detailed understanding of the liability under this offence we first need to understand the controls that were imposed. The ERMA approval for this case lists the following conditions and controls:

General Understandings

1. All manipulation will be carried out in approved laboratories. Manipulation on tissue cultures of *Arabidopsis* fragments will be carried out in PC1 laboratories (eg: laboratory H416) at Lincoln University (MAF registration number 489).

Manipulations on whole *Arabidopsis* plants will be carried out at the Crop and Food Research Ltd (now Plant & Food Research Ltd), Lincoln, PC2 plant growth glasshouse (MAF registration number 420).

These facilities meet both PC1 and PC2 physical containment levels in accordance with the Australian / New Zealand standards 2243.3:2002.

2. Genetically modified *Arabidopsis* plants will be allowed to flower and set seed and standard containment procedures will be employed (such as wearing of lab coats and slip-on overshoes that remain in the facility to reduce the risk of transfer of seed from the facility).

Sturdy paper bags or seed collection vessels will be placed on the plant to prevent the spread of pollen and seed and facilitate the collection of seed for



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further analysis. Seeds will be stored in a locked filing cabinet in H416 according to the Lincoln Quarantine Manual.

Controls

1. The operation, management and construction of the facility shall be in accordance with the:
 - a) The MAF Biosecurity Authority/ERMA New Zealand Standard Containment Facility for New Organisms (including genetically modified organism) of Plant Species, (standard now superseded by Containment Facilities for Plants: 2007) of plant species for all *Arabidopsis* whole plant PC2 work.
 - b) The Australia / New Zealand Standard 2243.3:2002 Safety in Laboratories: Part 3: Microbiological aspects and containment facilities, at Physical Containment Level 2 (PC2).
 - c) Lincoln University Quarantine and Containment Manual (QM1).
2. The facility shall be approved and registered by MAF Biosecurity Authority as a containment facility under section 39 of the Biosecurity Act, in accordance with MAF Biosecurity / ERMA New Zealand Standards.

Manipulations on tissue culture of *Arabidopsis* fragments will be carried out in PC1 laboratories in accordance with the MAF Biosecurity Authority 154.03.02 and manipulations on whole *Arabidopsis* plants will be carried out in PC2 plant growth glasshouses in accordance with MAF Biosecurity Authority 155.04.09

3. While all precautions for the prevention of escape and establishment of populations of transgenic *Arabidopsis* will be taken there remains a small risk that a population of escaped plants may establish. Should genetically modified *Arabidopsis* populations establish, they would be susceptible to common herbicides such as glyphosphate (Roundup). Routine procedures at the Crop and Food PC2 glasshouse facility routinely involve weed control around the glasshouse facility. All approved organism culture products and associated material shall be autoclaved for 15 minutes, 121°C, 15 p.s.i or incinerated before being disposed of.
4. If for any reason a breach of containment occurs the applicant shall notify the facility Supervisor and ERMA New Zealand immediately the event is noticed (and at least within 24 hours of the breach being detected) and shall immediately implement a contingency plan for the recovery and eradication of any organisms or viable material that has escaped.
5. The Authority or its authorised agent or properly authorised enforcement officers, may inspect the facilities at any reasonable time.



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Additional controls

1. Laboratory coats and slip-on overshoes worn in the glasshouse will remain in the facility to reduce the risk of transfer of seed from the facility.
2. Sturdy paper bags or seed collection vessels will be placed on the plants to prevent the spread of pollen and seed and facilitate the collection of seed for further analysis.
3. Seeds will be stored in a locked filing cabinet in H416 according to the Lincoln Quarantine manual.
4. All waste and plant material will be autoclaved for 15 minutes, 121°C, 15 p.s.i or incinerated before being disposed of.

In relation to these controls investigations have also determined that although the above controls were in place and relevant for the entirety of the experiment, they have subsequently been updated on 8 March 2010 (refer to file section 9.6).

Assessment of liability of parties against the above controls

Control 1a & 1b

This control relates to the operation, management and construction of the facility meeting standards.

The operation, management and construction of the facility is continually assessed against the standards by means of regular MAFBNZ audits.

This investigations considered the audits carried out between 15 July 2008 and 14 December 2009. In total there were 5 inspections carried out by [REDACTED] during this time period, the results of which are listed in the aforementioned timeline.

Transpiring from these 5 inspections were the sum of 17 corrective actions and 15 recommendations. A corrective action is a request that is given to rectify a non-conformance. A recommendation is non-binding and is to assist the facility to enhance their systems to maintain compliance.

Although criminal offences can arise from failing to meet standards, the Biosecurity Act 1993 S126(3)(a) does allow for Authorised Inspectors to give directions in writing to the operator of a containment facility specifying the suspected failure to comply or unsatisfactory circumstances, stating what the operator is required to do to remedy the situation and specifying the time within which the direction must be complied with. Section 154(d) of the Biosecurity Act 1993 sets out an offence of failing to comply with a reasonable direction.

To date P&F have complied with all bar one of the corrective actions. The remaining corrective action relates to a review of internal procedures surrounding the *Arabidopsis* breach and this work is currently ongoing.



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Control 1c

This control related to the operation, management and construction of the facility being in accordance with the Lincoln University Quarantine and Containment Manual

Of specific interest to this investigation were the following points from the manual:

Page 12 – Under the heading of “Manager’s Responsibilities”: to ensure all records keeping is kept, be responsible for training staff, undertake internal audits.

Page 13 – Under the heading of “Training”: “On the job” training is shown as a minimum training requirement and there is a requirement for these training sessions / activities to be documented.

Page 13 – Under the heading “Records to be kept”: Although training records are not listed as a minimum requirement under this section, the manual does indicate that documents should be kept for a minimum of 5 years.

Page 22 - Under the heading “Work practices”: Laboratory personnel shall receive instruction and training, with regular updates in handling pathogens.

Investigations to date have shown that training for Lincoln University staff did take place, albeit training procedures were subsequently improved as a result of MAFBNZ recommendations following the July 2009 audit.

Investigations have further determined that although they were trained, documented training records could not be found in relation to the training of [REDACTED], [REDACTED] and [REDACTED] who were authorised users of the P&F PC2 plant house facility.

Further investigations surrounding training and access control have determined that prior to November 2009 external contractors such as [REDACTED] Security, [REDACTED] and [REDACTED] received no formal training. The expectation was that these contractors would comply with the instructions on the door of the facility. This has since been remedied and a formal training and documentation scheme was put in place for external contractors in November 2009.

This failure to maintain training records is a breach of standards and was properly dealt with by [REDACTED] from MAF Border Standards in the form of a corrective action as detailed below:

Remove key card access to Lincoln University staff until training has been completed and these people are fully aware of their requirements and procedures of the plant house. This corrective action was closed on 16/10/09.

The corrective action was also accompanied by the following recommendations:

Amend staff list so that it clearly shows training dates and if questionnaire has been completed.



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Questionnaire to show that it has been checked and countersigned.

New staff must be evaluated on their understanding of the training

The question of law here is whether or not a prosecution should commence for failing to maintain proper training records and for granting access to contractors who had not received a P&F training input.

On the side of the defence it may be argued that training did take place and that this failure to meet standards has already been properly dealt with by means of corrective action report.

Although not necessary to prove this offence it should also be noted that there is no direct evidence to suggest that lack of training was a causal factor in the *Arabidopsis* breach.

Control 2

This control relates to the facility being authorised as a containment facility and manipulation of the *Arabidopsis* fragments and whole plant being carried out in PC1 and PC2 laboratories respectively.

Investigations have determined that the containment facility in question was properly approved and there is no evidence to suggest that any *Arabidopsis* manipulation occurred outside of the PC2 plant house facility.

Control 3

This control gives consideration to the possible escape of *Arabidopsis* from the PC2 and subsequent treatment of infected areas by herbicides and includes comments around routine weed control around the plant house. It also gives autoclaving instructions for material identified for disposal.

The wording of this particular control was found to be more descriptive than directional and of no particular assistance to a prosecution case.

In summary the control conveys that, should the *Arabidopsis* escape, it would be susceptible to common herbicides and describes the fact that P&F (then Crop & Food) have routine procedures involving weed control around the plant house. What the control fails to clarify is the requirement it is placing upon the applicant.

A more preferred wording from an investigation / prosecution side for this control may have been something along the lines of:

“The operator of the facility will not allow *Arabidopsis thaliana* to leave containment.

Notwithstanding the above, in the event that *Arabidopsis* does escape the operator is required to immediately treat the infected area with a herbicide identified to kill the plant e.g.: glyphosphate (Roundup).



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The operator of the facility is required to conduct systematic surveys and weed control spraying every 4 weeks in the exclusion zone around the containment facility and maintain accurate records of this activity for a period of at least 5 years".

Although investigators have been advised that spraying of the entire exclusion zone with herbicide treatment (Roundup) occurred approximately three times per year we have identified that no records were kept in relation to this spraying and there are similarly no records of exclusion zone surveys.

Had the wording of this particular condition been more directive than descriptive then a consideration of prosecution may have followed but based on the descriptive nature of the wording it is our opinion that a prosecution case of "beyond reasonable doubt" will not succeed for breaching this condition.

As a side note, it has also been identified that the lifecycle of the *Arabidopsis* plant is approximately 6 weeks. An effective spraying and surveillance program would involve time intervals less than the life cycle of the plant. As such a spraying and surveillance schedule of three times per year would be insufficient for this specific organism.

Control 4

This control relates to "the applicant" notifying "the Facility Supervisor" and "ERMA New Zealand" within 24 hours of any breach of containment and implementing contingency plans for the recovery and eradication of any organism or viable material that has escaped.

The wording of this particular control does leave some ambiguity around the definition of the term "facility supervisor". There is a question if "facility supervisor" actually mean the "facility operator" (or similar supervisor from P&F) or the statutory auditor i.e. MAFBNZ. The most likely interpretation that the requirement would be to inform the facility operator i.e. [REDACTED].

It is also noted that the requirement is placed upon "The Applicant". For the case in hand "The Applicant" is listed as "Lincoln University". For clarity around responsibilities and subsequent liability it may be deemed more appropriate to name the actual person at Lincoln University who is assuming responsibility i.e. [REDACTED]

The investigation has determined that the spirit of this control has been complied with in that P&F did inform MAFBNZ within 24 hours of the suspected breach and they also implemented contingency plans as required.

The term "spirit of this control" has been used since it may be considered that a breach has technically occurred in that "The Applicant" (Lincoln University) has never officially informed "ERMA New Zealand" of the suspected breach but it may be argued that by the time Lincoln University became aware of the breach MAFBNZ and ERMA were already aware.



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Control 5

This controls related to applicants allowing authorities to inspect facilities at any reasonable time.

The investigation has revealed no issues in relation to this control.

Additional Control 1

This additional control relates to the wearing of laboratory coats and slip-on overshoes being worn in the plant house and remaining in the plant house in order to reduce the risk of transfer of seeds from the facility.

The investigation has revealed no issues in relation to this control.

Additional Control 2

This control relates to the use of sturdy paper bags or seed collection vessels being placed on the plant to prevent the spread of pollen and seed and facilitate the collection of seed for further analysis.

The investigation has shown that paper bags were in use to restrict the spread of pollen and seed. These bags were placed over the plants as soon as the siliques filled / dried.

An important point transpired from this section of the investigation in that, had [REDACTED] tubes been used as opposed to paper bags, as was originally thought by P&F, then there would be a question around them being "fit for purpose" in "preventing" the spread of seeds as per the wording of the control.

[REDACTED] tubes have large holes in them and MAFBNZ inspector [REDACTED] has seen other experiments at P&F where *Arabidopsis* plants are growing out of the [REDACTED] tubes through these aeration holes. There is a question of their effectiveness in "preventing" the spread of seeds as opposed to "reducing the risk" of spread.

Interested parties may either wish to reconsider the possible use of [REDACTED] tubes for future experiments where the purpose of the seed collection vessel is to "prevent" the spread of seeds. Alternatively, the wording of the control may be altered from "prevent" to "reduce the risk" of spread of pollen and seeds.

Although the paper bags used for the case in hand clearly did not "prevent" the spread of seeds, it is evident that the bags were in use. For this reason, this is being viewed as a technical wording issue as opposed to a failure to follow the controls and investigators are not proposing a breach of this control.

Additional Control 3

This control relates to the storage of seeds in a locked filing cabinet in H416 according to the Lincoln Quarantine Manual.

The investigation has revealed no issues in relation to this control.



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Additional Control 4

This control relates to all waste and plant material being autoclaved for 15 minutes, 121°C, 15 p.s.i or incinerated before being disposed of.

Although the investigation has not revealed any direct evidence to demonstrate an outright intentional breach of this control, investigators were informed that waste water from watering the plants in Cell 1 can simply leave the containment facility through a meshed drain and enter directly into the storm water system.

From a legal perspective one needs to consider if the word “waste” in the control would encompass any plant waste contained in excess water from watering. If it is determined that excess water from watering could contain plant waste then the control has been technically breached since such water is not being treated and is simply being directed through a meshed drain and down into the storm water system.

Concerns are also raised in relation to the integrity of the seal between the mesh filter in the drain and the concrete floor, not to mention the fact that although the mesh filter complies with standards, the filter apertures are larger than the *Arabidopsis* seed size meaning that any seeds swept up in waste water could easily leave the facility through this drain.

The P&F containment manual (refer to file section 9.25) appears inaccurate in that it states on page 33 under the heading of “Drains” that effluent from the PC2 plant house is channelled into one sump and can be treated if required. Our understanding is that no such sump or treatment option exists and the effluent simply enters the storm water system.

It is further noted that in similar containment manuals i.e. Lincoln University Biotron Induction Manual, specific mention is made under the heading “Some commonsense, basic rules will ensure that contamination is minimised” that waste water generated from over-watering needs to be collected and treated before disposal. There seems to be some clear disparity in safe practices concerning containment and treatment of waste water between different organisations.

In order to prove this case, the prosecution side would no doubt need evidence of plant material leaving the facility through the drain. No such evidence was apparent when the mesh in the drain was inspected by investigators but this is not to say that plant material has not previously exited via this route and a review of practices in making the PC2 facility “fit for purpose” in carrying out *Arabidopsis* experiments will no doubt be required.

Offence 2

Failing to Comply with Any Controls Imposed by Any Approval Granted under the HSNO Act 1996 – Section 124B (2)(c)(i) HSNO Act 1996

Section 124B Pecuniary penalty order

(1) The enforcement agency may apply to the Court for an order that a person pay to the Crown a pecuniary penalty under this Act.

(2) The Court may make the order if it is satisfied that the person—



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(c) failed to comply with any controls relating to a new organism—

Please see analysis in offence 1 above. Technical breaches have occurred and these have been dealt with by way of corrective action report.

(i) imposed by any approval granted under this Act; or

(ii) specified in regulations made under this Act.

(3) The Court must not make the order if the person satisfies the Court that the person did not know, and could not reasonably have known, of the breach.

No further action is proposed with regards to this offence.

Offence 3

Offences under the Biosecurity Act 1993

Caused a restricted organism to leave a containment facility Section 154(m) Biosecurity Act 1993

(m) Fails or refuses to comply with any of sections 29, 46, 52, 53, and 134 of this Act:

Section 29 Biosecurity Act 1993 - Restricted organisms to be contained

- (1) No person may cause or permit any restricted organism that is in a transitional facility, a biosecurity control area, or a containment facility to leave that facility or area, except –
- (a) to proceed, in accordance with the authority of an inspector, to a transitional facility, a biosecurity control area, or a containment facility; or
 - (b) in accordance with the authority of an inspector, to be exported from New Zealand

To best understand this offence it may help if we first consider some definitions:

Person – includes the Crown, a corporation sole, and a body of persons (whether corporate or unincorporated)

Cause - That which produces an effect; that which gives rise to any action, phenomenon, or condition (Oxford English Dictionary)

Permit - To allow the occurrence of (an action, etc.); to allow (something) be carried out or to take place; to give permission or opportunity for (Oxford English Dictionary)

Restricted organism – means any organism for which a containment approval has been granted in accordance with the Hazardous Substances and New Organisms Act 1996

Containment Facility – means a place approved in accordance with section 39 (of the Biosecurity Act 1993) for holding organisms that should not, whether for the time being or ever, become established in New Zealand.



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With particular reference to these definitions and to understand any subsequent criminal liability we need to closely examine the terms “cause” and “permit”.

Permit – the investigation has not uncovered any evidence to suggest that any parties gave either expressed or implied permission for any breach of containment against regulations.

Cause - the investigation has not uncovered any evidence to suggest that any parties knowingly caused the *Arabidopsis* plant to allegedly breach containment. There is no evidence to support the *mens rea* of an “intentional wrong doing”.

Exploring this term further we need to consider if any party was negligent in their actions (or omission to act) which may have subsequently caused the alleged breach. It will also be necessary to prove proximate cause or a causal link between the act (or omission to act) of the defendant and the subsequent alleged breach.

It is further worth determining if there are potential acts of negligence which may have contributed to the alleged *Arabidopsis* breach: e.g. the aforementioned circumstances surrounding training, exclusion zone management, access control, water waste management and seed collection vessels, however without being able to conclusively determine the pathway by which the *Arabidopsis* plants allegedly escaped, one is not able to directly link the cause to the effect i.e. that these potential acts of negligence directly caused the *Arabidopsis* to allegedly escape.

Although there are various opinions and pathways identified on how the *Arabidopsis* plant may have escaped, there have been no conclusive pathway determined. It is probable that, if the plants are conclusively determined to be genetically modified, how they came to be growing outside the PC2 plant house will never be determined beyond reasonable doubt.

Based on this fact, it is the investigators submission that a case of potentially causing the *Arabidopsis* to leave the facility by lack of action or negligence would not be proven and no charges can be brought against any parties utilising this offence.

6. List powers/duties

Not applicable – no further action being proposed.

7. Identify every element for each offence you intend to pursue (CM5)

(Cut and paste from ED Manual)

Not applicable – no further action being proposed.

8. Specialists and other agencies assistance required

Not applicable – no further action being proposed.



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9. Proposed enquires

Although testing to date has given a degree of confidence that the positive plants found in the exclusion zone outside the PC2 plant house have arisen from the Lincoln University *Arabidopsis* experiment gene lines, further testing is required to confirm this.

Due to costs, specialist scientific ability and facility infrastructure, P&F are best placed to conduct this testing and have already offered to carry out this work at their own cost. Until investigators had determined if any charges of causing or permitting *Arabidopsis* to escape were likely to be brought against P&F, they were not in a position to request that P&F carry out this conclusive testing.

Due to the fact that Investigators are not proposing any further criminal charges, they have now requested P&F to conduct conclusive testing, at their own expense, to determine whether the positive *Arabidopsis* plants found outside the facility arose from the gene lines used in Lincoln University experiments. As soon as the results are known, the investigation summary will be updated. This further testing is being proposed purely for the “fullness of the investigation” at hand and it should be noted that the outcome of this testing will have no effect on the recommendation of this report not to prosecute. It should also be noted that, at present, there is no substantive reason to suspect the plants found outside of the facility are from any other gene line than the one investigated.

10. Time limit

The time limit for the laying of an information is **120 working days** after the time with the contravention giving rise to the information first became known, or should have become known – Section 109(2) HSNO Act 1996.

The contravention first became known to MAFBNZ on 23 November 2009, when Plant and Food staff notified the ministry.

Time Limit for Offence: 9 June 2010

The time limit for requesting a court order for a pecuniary penalty is the same as for any other civil action, i.e. 6 years under Section 4(1) of the Limitation Act 1950.

Time Limit for Civil Action: 23 November 2015

11. Possible defences

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(1) In any prosecution for an offence specified in paragraph (a) or paragraph (aa) or paragraph (b) or paragraph (e) or paragraph (eb) or paragraph (f) or paragraph (g) of section 109(1) of this Act, it is not necessary to prove that the defendant intended to commit the offence.

(2) It is a defence to prosecution of the kind referred to in subsection (1) of this section, if the defendant proves—

(a) That—

(i) The action or event to which the prosecution relates was necessary for the purposes of saving or protecting life or health, or preventing serious damage to property or avoiding an actual or likely adverse effect on the environment and

(ii) The conduct of the defendant was reasonable in the circumstances and

(iii) The defendant took such steps as were reasonable in all the circumstances to mitigate or remedy the effects of the action or event after it occurred or

(b) That the action or event to which the prosecution relates was due to an event beyond the control of the defendant, including natural disaster, mechanical failure, or sabotage, and in each case—

(i) The action or event could not reasonably have been foreseen or been provided against by the defendant and

(ii) The defendant took such steps as were reasonable in all the circumstances to mitigate or remedy the effects of the action or event after it occurred or

(c) That the action or event to which the prosecution related was within the defendant's control but—

(i) The defendant had taken all reasonable steps to prevent the action or event and

(ii) The defendant took such steps as were reasonable in all the circumstances to mitigate or remedy the effects of the action or event after it occurred.

(3) It is a defence to prosecution for any offence specified in section 109(1)(e)(ii) or (iii) of this Act that the defendant—

(a) Complied with any code of practice approved under section 79 of this Act as a method of achieving the controls that it is alleged that the defendant failed to comply with or

(b) Was the holder of any current test certificate issued by any test certifier in accordance with section 82 of this Act, certifying that the controls that it is alleged that the defendant failed to comply with had been met,— unless the defendant had reason to believe that the code of practice or the structure or goods covered by the test certificate did not meet the relevant controls.

In this case it would be a statutory defence of a prosecution under Section 109(1)(e) if Plant and Food Research can prove that the event causing a breach of the standards alleged in a prosecution was within their control; but that they had taken all reasonable steps to prevent the event; and after the breach they took reasonable steps to mitigate or remedy the effects.

With a pecuniary penalty order under Section 124B, no such statutory defences exist.

Directors and Officers of Companies

Section 116 (a) and (b) provides for liability of directors and officers of companies. It would be a defence if the offence took place without the director/company officer's authority, permission, or consent and that they did not know and could not reasonably be expected to have known that the offence was to be or was being committed.



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This only applies to a prosecution under Section 109(e)(i), and not to a pecuniary penalty order under Section 124B.

12. Case File Summary Information

Not applicable – no further action being proposed.

Complete Steps 7 and 8 of the Criminal methodology below, and in addition to any other relevant confidential information, apply Step 9 “highlighting issues that may assist any future reader of the file.” The following is a sample list of questions that should be considered and, where applicable, the box ticked. Details to be recorded on following page/s *Case File Information*.

1	Step 7 Criminal Methodology: consider and report on any justification or excuse available to the defendant	
2	Step 8 Criminal Methodology: state a conclusion and recommendation	
3	Witness (including expert) statements still to be taken?	
4	Any vulnerable, hostile or intimidated adult witnesses? Is a strategy meeting required?	
5	Have any witnesses refused to make statements? Include Names and evidence they could give	
6	Strengths or weaknesses of evidence and/or witnesses?	
7	Are there specific problems/needs of prosecution witnesses, eg interpreters?	
8	Are there any exhibits still to be obtained?	
9	Previous convictions/allegations against defendant with similar MO?	
10	Further potential defendants to be interviewed?	
11	Others dealt with whose details do not appear on this file?	
12	Other person(s) yet to be dealt with? Specify	
13	Are costs sought?	
14	Matters of local/public interest?	
15	Are there any charges you would consider discontinuing?	
16	Are there any other applications required in this case?	

13. Conclusion

From a criminal liability perspective the investigation concludes that:

The importation of the genetically modified *Arabidopsis* seeds into New Zealand was made in accordance with accepted approvals, permits and conditions.

The movement and storage of the genetically modified *Arabidopsis* seeds within New Zealand was made in accordance with accepted approvals, permits and conditions.



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Technical breaches of conditions surrounding the operation of the PC2 plant house facility have occurred and these have previously been dealt with by means of approved MAFBNZ procedures and audits by way of directions through corrective action reports.

There is no evidence to conclude that these technical breaches caused *Arabidopsis* plants to escape containment.

There is no evidence to suggest there has been any intentional act by any parties in causing or allowing *Arabidopsis* plants to breach containment.

The integrity of P&F in notifying statutory agencies of the alleged breach must be commended especially in light of the intense scrutiny, damaged reputation and adverse public reaction they knew they would receive.

With specific reference to the PC2 plant house facility, the operator and other concerned parties may wish to give consideration to reviewing the following points in order to determine if working practices need updating:

1. **Seed collection vessels:** Although it has transpired that [REDACTED] tubes were not used for these experiments, taking into account the structure of the vessel, concerned parties may wish to consider if the [REDACTED] seed collection vessel is fit for purpose in “preventing” the spread of seeds as opposed to “reducing the risk of uncontrolled release of transgenic seeds” when used with *Arabidopsis* plants.
2. **Training:** The facility operator to continue the emphasis on training, testing and record keeping in relation to authorised users of the facility as per the outcomes of the MAFBNZ July 2009 audit.
3. **Training:** The facility operator to ensure that all training is conducted on site by suitable individuals as opposed to off site cascade style training.
4. **External Contractors:** The facility operator should ensure that access cards are only issued to named individuals that have received appropriate training as opposed to a general access card issues to the contractor which can be passed around and one is subsequently not able to determine which individual has actually accessed the facility.
5. **Exclusion zone management:** The facility operator to review spray intervals and ensure these intervals are fit for purpose in relation to the life cycle of the plants contained within the facility. Maintain accurate and available documentation concerning exclusion zone spraying.
6. **Exclusion zone management:** The facility operator to conduct regular inspection surveys of the exclusion zone for any potential breaches. Maintain accurate and available documentation concerning these surveys.
7. **Structural Integrity:** The facility operator and statutory approval bodies to consider if the PC2 plant house facility is fit for purpose for each experiment on a case by case basis with specific regards to seed size, mesh size,



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drainage, waste water treatment and waterproofing of joins between walls and floors.

8. **At the conclusion of experiments:** The positive plants were found in close proximity to the water leak between the containment facility and the exclusion zone. Additionally, comments made by Professor [REDACTED] in relation to the washing down at the end of experiments, lack of use of bleach and plausibility of the water pathway lead to the recommendation that consideration needs to be given to reviewing procedures to be followed at the conclusion of experiments within the PC2 plant house facility.
9. **Access Control:** The facility operator to ensure all authorised users are suitably trained and to implement systems to ensure each entry and exit is logged as opposed to users being able to "tail gate" their way into the facility.
10. **Access Cards:** All access cards should be returned to P&F when they are no longer required. Professor [REDACTED] has advised investigators that he still has his card albeit the card is probably no longer valid.

All parties involved in the investigation have been co-operative with both the initial response and subsequent criminal investigation.

No further criminal action is proposed

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Investigator [REDACTED]
OC Investigation & File