RAIL SAFETY INVESTIGATION REPORT

DERAILMENT OF EMPTY GRAIN TRAIN 2351

WHITTINGHAM

13 MARCH 2010

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ACRONYMS AND ABBREVIATIONS

AANCSA .......... ARTC - Ansaldo Network Control Signalling Alliance
ARTC ............ Australian Rail Track Corporation
CAN ............... Condition Affecting the Network
CoC ................ Certificate of Competency
DIP ............... Directly Involved Party
EOL ............... Emergency Operating Lock
ITSR ............... Independent Transport Safety Regulator
LPA ............... Local Possession Authority
NCCN ............. (ARTC’s) Network Control Centre North, Broadmeadow
OTSI ............... Office of Transport Safety Investigations
PN ............... Pacific National Pty Ltd
TTM ............... Train Transit Manager
# GLOSSARY OF TERMS

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<th>Definition</th>
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<tr>
<td><strong>Block</strong></td>
<td>A portion of line with defined limits, between which only one train is allowed at any one time.</td>
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<td><strong>Block limit</strong></td>
<td>The end of a temporary block location.</td>
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<tr>
<td><strong>CAN Block Working</strong></td>
<td>Manual block working using a Condition Affecting the Network (CAN) form to warn drivers and track vehicle operators about the working.</td>
</tr>
<tr>
<td><strong>Catch Points</strong></td>
<td>Single or double bladed points used to derail rail traffic that might enter or foul an adjacent running line.</td>
</tr>
<tr>
<td><strong>Certificate of Competency</strong></td>
<td>A card or other form of documentation that provides for the identification of a rail safety worker and the highest level of current rail safety related competency qualifications held. As at 1 January 2011, transition to the rail safety worker competence provisions of the Rail Safety Act 2008 required accredited operators to provide “a form of identification” and satisfy itself that all workers (including contractors and subcontractors) undertaking rail safety work are competent.</td>
</tr>
<tr>
<td><strong>Clip</strong></td>
<td>Apply a point clip, in accordance with ARTC Network Procedure ANPR 707 Clipping Points, to clamp the switch rail of a set of points to its associated stock rail.</td>
</tr>
<tr>
<td><strong>Crossover</strong></td>
<td>A portion of line which is used to divert trains from one continuing line to another.</td>
</tr>
<tr>
<td><strong>Facing points</strong></td>
<td>Points with the switch blades facing approaching rail traffic.</td>
</tr>
<tr>
<td><strong>Local Possession Authority (LPA)</strong></td>
<td>An advertised formal authority to occupy a closed defined portion of track for a specified period.</td>
</tr>
<tr>
<td><strong>Network Control</strong></td>
<td>The function responsible for managing train paths and issuing occupancy authorities.</td>
</tr>
<tr>
<td><strong>Normal speed</strong></td>
<td>A speed that does not exceed the current speed limit for the track and class of rail traffic.</td>
</tr>
<tr>
<td><strong>Points</strong></td>
<td>A track component consisting of paired pieces of tapered rail that can be moved and set to allow tracks to diverge or converge.</td>
</tr>
<tr>
<td><strong>Protection Officer</strong></td>
<td>The Qualified Worker responsible for protection arrangements at a worksite.</td>
</tr>
<tr>
<td><strong>Qualified Worker</strong></td>
<td>A worker certified as competent to carry out the relevant task.</td>
</tr>
<tr>
<td><strong>Restrain</strong></td>
<td>To prevent movement of rail traffic with signals, signalling equipment, blocking facilities, or issue of a Condition Affecting the Network (CAN) form as a warning.</td>
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<tr>
<td><strong>Route</strong></td>
<td>The path from one limit of authority to the next.</td>
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<tr>
<td><strong>Running line</strong></td>
<td>A line (other than a siding) which is used for through-movement of trains.</td>
</tr>
<tr>
<td><strong>Section</strong></td>
<td>The line between the departure-end yard limit of one location and the arrival-end yard limit of another location. A section consists of one or more blocks.</td>
</tr>
<tr>
<td><strong>Signaller</strong></td>
<td>A Qualified Worker who issues Proceed Authorities, and works points, signals and other signalling equipment to manage routes for safe and efficient transit of rail traffic in a network.</td>
</tr>
<tr>
<td><strong>System of Safeworking</strong></td>
<td>An integrated system of operating procedures and technologies used in a network, for safe operation of trains, and protection of people and property.</td>
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<tr>
<td><strong>Swingnose</strong></td>
<td>A fabricated crossing used in medium and high speed turnouts where the point of the crossing can be moved horizontally with the use of motor driven equipment.</td>
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<tr>
<td><strong>Track</strong></td>
<td>The combination of rails, rail connectors, sleepers, ballast, points and crossings.</td>
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<tr>
<td><strong>Trailing points</strong></td>
<td>Points with the switch blades facing away from approaching rail traffic.</td>
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<tr>
<td><strong>Train Transit Manager</strong></td>
<td>An ARTC position previously referred to as a Train Controller. A Qualified Worker who authorises, and may issue, occupancies and Proceed Authorities, and who manages train paths to ensure safe and efficient transit of rail traffic in the ARTC Network.</td>
</tr>
<tr>
<td><strong>Turnout</strong></td>
<td>Track components equipped with moving rails to change the route.</td>
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EXECUTIVE SUMMARY

At approximately 9:48am on 13 March 2010, Pacific National empty grain service 2531, travelling from Berrima Junction to Werris Creek, derailed as it traversed No. 203 points at Whittingham, near Singleton in the Hunter Valley Region of NSW. At the time, an altered method of Safeworking was being used to control train movements through Whittingham because of civil and signal renewal works associated with the Maitland to Whittingham Third Track Project. This method, CAN Block Working, required the points at Whittingham to be operated manually.

The events leading to the derailment commenced at 8:10am when a team, consisting of a Daywork Supervisor and two qualified workers, was directed by Network Control to manually set 203 points in the normal position for a proposed main line train movement. The turnout was made up of three elements: facing points, a swingnose and a catch point. When setting 203 points, the qualified workers did not start from the furthermost end as required by ARTC Network Procedure ANPR 743 Manually Operating Handthrow Electric Points. This resulted in the swingnose being left set in the reverse position. Further, despite it being a requirement in the procedure, the qualified workers did not check the route after setting the points despite having sufficient time to do so. Consequently, service 2531 struck the swingnose which had been left set in the wrong position and derailed. It was travelling at 55km/h at the time.

Both locomotives and the eight leading wagons were severely damaged, as well as 110 metres of track including 203 points and various items of signalling equipment. Approximately 6,000 litres of diesel fuel was also spilt. The driver received a bruised shoulder and was transported to Singleton Base Hospital. The assistant driver attended hospital later as a precautionary measure.

The investigation found that the derailment was the result of a lack of process and validation by the qualified workers when setting and clipping the points. The full details of the Findings and Recommendations of this rail safety investigation are contained in Parts 2 and 3 respectively.
PART 1  CIRCUMSTANCES OF THE INCIDENT

Incident Synopsis

1.1 At approximately 9:48am on 13 March 2010, Pacific National (PN) empty grain service 2531, en route from Berrima Junction to Werris Creek, derailed as it traversed No. 203B swingnose at Whittingham, on the Main North line approximately 4½kms South of Singleton in the Hunter Valley Region of NSW (see Figure 1). 203 points form the turnout arrangement used to exit the Saxonvale and Mount Thorley Branch line which services a number of coal mines in the area.

![Figure 1: Incident location](image)

1.2 At the time of the derailment, civil and signal renewal works associated with the Maitland to Whittingham Third Track Project were being carried out, necessitating a total closedown of the track between 9 and 12 March 2010. However, the works ran overtime and, in the absence of a functioning signalling system, CAN Block Working was introduced to restore train movements, in accordance with ARTC Network Rule ANSY 512 Manual Block Working. This method required that the points at Whittingham be manually operated and clipped by a supervised team of qualified workers and assurances given to Network Control of their setting before trains were authorised to proceed through the section. The CAN Block Working was introduced at 6:15pm on 12 March 2010 and a Nightshift team was positioned at Whittingham.
1.3 Shortly after 5:00 am on 13 March 2010, two qualified workers arrived for the day shift at Whittingham after providing contact details at a project site office. Here, they were briefed about the site and the procedures for operating the points by the Nightshift Supervisor who was in charge of the site.

1.4 After a changeover of Supervisors at Whittingham at 5:45 am, one of the qualified workers expressed unfamiliarity with the operation of swingnose points to the Daywork Supervisor. The Supervisor then demonstrated the operation and clipping of the points to the team as they set the route for the next train movement from the branch line as directed by Network Control.

1.5 At 8:10 am, after the train movement from the branch line was completed, the Daywork Supervisor directed the two qualified workers to set and clip 202 and 203 points in the normal position for a later main line train movement (see Photograph 1). However, the qualified worker setting 203 points did not follow ARTC Network Procedure ANPR 743 Manually Operating Handthrow Electric Points. Instead of working from the furthermost points machine as required by the Procedure, he only operated and clipped the nearest, 203A facing points. 203B swingnose was not moved, resulting in it being left set and clipped in the reverse position. 203C catch points were found post-incident set and clipped in the normal position but it is unclear who moved them or when.
1.6 At 9:23am, after a train movement onto the branch line, the qualified workers moved 201 points to normal to complete the route for the passage of 2531 on the Down Main line to Singleton. However, neither the qualified workers nor the Supervisor confirmed the setting of the route as required by Network Procedure ANPR 743, with only a cursory inspection given by the Supervisor before he gave an assurance to Network Control that it was set.

1.7 After having been assured that the route was set correctly, Network Control at the ARTC Network Control Centre North (NCCN) at Broadmeadow authorised the driver of 2531 to proceed from Minimbah to Singleton in accordance with the instructions contained in a ‘Condition Affecting Network’ warning (CAN No.5). The CAN warning advised the driver:

- to disregard the indications of signals MH145, D227.7D, WM171D and WM175D in the Minimbah to Singleton section as they were non-operational;
- that all points for the route had been correctly set and secured; and
- to obey the indication of Signal 146.4 at the end of the CAN Block Working section.

1.8 At 9:48am, 2531 struck 203B swingnose in the reverse position derailing both locomotives and the eight leading wagons. 2531 was travelling at 55km/h at the time. The driver received a bruised shoulder and was transported to Singleton Base Hospital. The assistant driver attended hospital later as a precautionary measure. The derailed rolling stock was severely damaged along with 110 metres of track including 203 points and various items of signalling equipment. In addition, approximately 6,000 litres of diesel fuel was spilt. A NSW Fire Brigade Hazmat team contained the fuel spill, the majority of which was recovered later by contractors during recovery operations.

**Location and Track Information**

1.9 The derailment occurred at 203B swingnose, the middle element of 203 points, a three element turnout arrangement located at 234.487kms at Whittingham, in the Maitland to Singleton section on the Main North line. The track at this location is straight with a slight uphill gradient of 1:493 towards Singleton.
1.10 Whittingham is located in rail territory leased by the ARTC from the NSW Government. Under the terms of the lease, ARTC is responsible for track maintenance and train control functions.

1.11 Train movements between Maitland and Singleton, including Whittingham, are normally controlled under ARTC Network Rule ANSY 500 Rail Vehicle Detection System with signalling and points controlled remotely from the NCCN at Broadmeadow, in Newcastle. The Down Main line is also configured for bidirectional train movements.

1.12 The line through Singleton supports the movement of passenger trains and bulk commodities, such as coal and grain, and is classified as Class 1XC track under ARTC’s Engineering Standard TDS 11 Standard Classification of Lines.1 The line in the immediate vicinity of the derailment had a posted maximum operating speed of 115/130km/h2.

The Points Arrangement at Whittingham

1.13 The points arrangement at Whittingham is comprised of 201, 202 and 203 points (see Photograph 2). All three sets of points are of the swingnose type.

Photograph 2: Points arrangement at Whittingham

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1 Class 1XC track is constructed using 60kg/m rail fixed to concrete sleepers.

2 The posted speed limit of 115km/h is applicable to certain classes of locomotive-hauled (freight and passenger) trains, while the posted speed limit of 130km/h is applicable to RailCorp’s passenger trains, i.e., XPT, Xplorer/Endeavour and Hunter Railcar.
1.14 Both 201 points and 203 points are turnout arrangements that provide for bidirectional train movements between the Down Main line and the Saxonvale and Mt Thorley Branch line. Both sets of points consist of a set of facing points (the A points), the moveable swingnose (the B points – see *Photograph 3*) and the catch points (the C points). A four element crossover arrangement, 202 points, is used to cross train movements exiting the Branch line via 203 points and the Down Main line onto the Up Main line.

1.15 The moveable swingnose used at 201, 202 and 203 points is designed to minimise the gap within the rail head and provide full support of the wheels through the crossover. This eliminates noise and vibration as the train traverses the crossover. The design also reduces damage and wear to the rails and permits higher train speeds through the crossover.

1.16 Each element of the points is driven by a Westinghouse points machine which is electrically controlled, powered and detected by the signal interlocking system which also controls the signalling system.

1.17 The machines are not connected together mechanically. Instead, as well as being electrically driven, each points machine is equipped with an emergency operating lock (EOL) (see *Photograph 4*) to manually operate the points in authorised situations. Release keys, located on a wall panel in a nearby relay
hut, are required to unlock the machine and operate the EOL. Removal of the keys from the wall panel is interlocked with the signalling system. An advisory sign warning that all elements of the points are to be operated together is affixed to the wall above the release key panel. However, no such warning signage is provided at or near the machines.

The Train and Crew

1.18 PN grain service 2531 was travelling empty from Berrima Junction to Werris Creek at the time of the derailment. It was comprised of two 81 Class locomotives (8141 and 8103) and 28 empty NGKF and NGPF grain hoppers. The train weighed 588 tonnes and measured 442.8 metres in length.

1.19 2531 was crewed by two PN employees based at PN’s Werris Creek Depot. Both were within their respective medical and competency assessment periods and were familiar with, and qualified for, the routes through Singleton.

The Third Track Project

1.20 At the time of the derailment, a third track was being constructed between Whittingham and Minimbah to increase rail capacity and reliability between the Hunter Valley coal mines and the Port of Newcastle. Two key organisational
entities were involved in this project. The Hunter 8 Alliance (Hunter 8) formed by the Australian Rail Track Corporation (ARTC), John Holland Group and GHD Pty Ltd was responsible for project management and civil works. A separate ARTC - Ansaldo Network Control Signalling Alliance (AANCSA) was responsible for signal renewal and commissioning aspects in the project.

1.21 Stage 1 of the Third Track Project called for the construction of the Up Relief line by Hunter 8 on the northern side of the existing Up Main line between Whittingham and Minimbah. In conjunction with this work was the design, installation and commissioning of signalling and communications equipment and systems associated with the new infrastructure by AANCSA.

1.22 Signalling commissioning works, as agreed between AANCSA and Hunter 8, required a Local Possession Authority (LPA) to be implemented between Minimbah and Whittingham for the period between 6:00am on 9 March 2010 and 6:00pm on 12 March 2010 (84 hours), in accordance with ARTC Network Rule ANWT 302 Local Possession Authority. The use of the LPA for the project works was advertised to all operators vide ARTC SAFE Notice 2-1259 (2010) and precluded the running of all freight and passenger trains through the LPA territory during this period.

Planning of Altered Safeworking Arrangements

1.23 On 11 March 2010, a project review conducted by Hunter 8 and ARTC Network Operations North identified that delays were occurring within the signal commissioning schedule. To overcome these delays and restore train movements between Minimbah, Singleton and the Saxonvale/Mount Thorley Branch line, it was proposed to reopen the lines at the fulfilment of the LPA at 6:00pm on 12 March 2010 and introduce CAN Block Working. The CAN Block Working would be in accordance with ARTC Network Rule ANSY 512 Manual Block Working, Network Procedures ANPR 722 Manual block working and ANPR 723 Using block posts. It was subsequently promulgated as ARTC SAFE Notice 2-1271 (2010) (see Appendix 1).

1.24 This altered method of working required placement of qualified workers at each end of the designated territory (block limits) and at the points at Whittingham. The qualified workers at Whittingham, under the control of a supervisor, were responsible for the manual operation and clipping of the
points at Whittingham in the absence of the power supply and control system for the points. The qualified workers at the block limits were responsible for reporting the arrival or clearance of trains to Network Control in order for Network Control to issue CAN warning forms and proceed authorities to train drivers. The CAN warning forms and proceed authorities were only issued after Network Control had received assurances from the qualified workers that the section between the block limits was clear and that all points had been set and clipped in the direction for the intended train movement.

1.25 The planning for the CAN Block Working involved the following:

- the determination of the block limits, in this case between controlled Signal MH145 at Minimbah and Signal 146.9 at Singleton on the Down Main, Signal 148.4 at Singleton and Signal MH150U at Minimbah on the Up Main, and Signal 185 at Whittingham on the Mt. Thorley Branch line;
- arrangements for points to be manually set and clipped as appropriate for train movements;
- stationing qualified workers at designated block locations to act as directed by Network Control; and
- ensuring that effective communication was established between signallers and Network Control.

1.26 A risk assessment for the proposal to use CAN Manual Block Working was conducted at the 11 March 2010 project review meeting and was recorded in a document titled “Singleton Extension Yard Limits and CAN Manual Block Working”. In this, ARTC identified 11 areas of risk, including the potential for a derailment or run-through at turnouts and crossovers caused by points “incorrectly manually set or not clipped properly”. The assessment identified the following controls to mitigate the risks:

- a Safe Notice;
- ARTC Network Rules and Procedures;
- worksite inductions/briefings;
- competent personnel to be used for the altered Safeworking;
- Hunter 8 Safeworking Checklist;
• demonstration of task;
• correct instruction of point clipping procedure; and
• one point of contact between Network Control and the Supervisor at Whittingham.

1.27 These controls were considered adequate and Hunter 8 was assigned full administrative responsibility for implementing all except for the Safe Notice and Network Rules and Procedures. The Hunter 8 Rail Safety Manager then conducted another, but localised, risk assessment and introduced two supplements to the controls. These related to the marking of normal and reverse positions on the points and the position to fit the points clip, and covered the matter of the single line of communication with Network Control in the Pre-Work Brief. However, he did not give consideration to any worksite protection arrangements at Whittingham.

1.28 Advice of the delay to the commissioning and the altered Safeworking arrangements was advertised on the ARTC Network in SAFE Notice 2-1271 (2010) which was issued on 12 March 2010. An overview of the proposed arrangements was also provided to the Network Controllers and Train Transit Managers at NCCN. This actioned the risk assessment control for Safe Notice and Network Procedures.

1.29 At the completion of the planning phase, Hunter 8’s Rail Safety Manager then commenced procuring staff to implement the altered Safeworking arrangements. Because of the limited timeframe, he sought information on availability from a number of individuals who had worked on projects in which he had been involved and for whom he had contact details. The workers who were available and were offered work by the Rail Safety Manager contacted their employers to gain permission to accept the offer. This included the workers directly associated with the Whittingham site arrangements. The Rail Safety Manager was able to engage sufficient staff to roster in 12 hour shifts for the expected duration of the work.

1.30 The workers were not engaged under any formal contractual arrangements other than a verbal agreement that fee for service invoices from their employers would be honoured. Significantly, as the Rail Safety Manager did
not confirm any details of the workers’ qualifications or competencies, the relevant control listed in the risk assessment was not properly managed.

1.31 The Rail Safety Manager then implemented the following in response to the controls identified in the risk assessment:

- the development of a specific Pre-Work Briefing to inform workers of the CAN Block Working arrangements and the site safety requirements;
- a Checklist for qualified workers to record the position of the points after setting them;
- markings on each set of points to indicate the normal and reverse positions; and
- markings on each set of points to indicate the position where points clips were to be applied, which partially addressed the control to demonstrate the task (see Photograph 5).

![Markings for normal position and clip position on 203B swingnose](image)
Commencement of CAN Block Working

1.32 At the commencement of the CAN Block Working, the site was being managed by the Hunter 8 Rail Safety Manager and a Hunter 8 Protection Officer.

1.33 In accordance with the risk assessment control, the Rail Safety Manager implemented the following reporting structure at the site:

This structure addressed the matter of a single point of contact between the Network Control and the Supervisor at Whittingham.

1.34 In accordance with ARTC Network Rule ANWT 300 *Planning Work in the Rail Corridor*, the Protection Officer was responsible for conducting a safety assessment and then making sure the work was done safely. He was also responsible for the implementation and record keeping of the protection arrangements at the site. However, neither he nor the Rail Safety Manager considered any worksite protection arrangements to be implemented at Whittingham as it was believed that the CAN Block Working procedures would provide sufficient protection for staff on or about the track.

1.35 All nightshift staff involved were briefed by the Protection Officer on the site safety and CAN Block Working requirements at a pre-work briefing conducted at the site office prior to its implementation. However, the Nightshift Supervisor was not informed as to whether or not his area at Whittingham was to be considered a worksite that required separate worksite protection arrangements. While copies of the Checklist and a map of the track at Whittingham were issued to the Nightshift Supervisor at the briefing, he was
not issued with a point clipping procedure nor briefed that a demonstration of the task was required. The workers were then directed to their posts and to establish communications with Network Control.

1.36 The LPA was fulfilled and CAN Block Working introduced at 6:15pm on 12 March 2010. At its commencement, the Rail Safety Manager and the Protection Officer both walked the site to ensure that the altered Safeworking arrangements had been implemented properly. They stayed on site while two train movements occurred. Satisfied with the arrangements, both left the site at approximately 9:15pm. No issues with the arrangements arose during the rest of the shift.

Dayshift 13 March 2010

Qualifications of Staff at Whittingham

1.37 Two qualified workers and a Supervisor were rostered to operate the points at Whittingham on the morning of 13 March 2010. One qualified worker presented with current medical certification and competencies as an Engineering Hand Signaller Level 2. The Supervisor held qualifications as an Engineering Hand Signaller Level 2 and Engineering Safeworking Level 2 (Workgroup Supervisor). The other qualified worker, although his competency and medical certification as an Engineering Hand Signaller Level 2 were later found to be current, presented at the site with a Certificate of Competency (CoC) and medical certification which had expired on 23 July 2009 and 10 March 2010 respectively. All three workers were also qualified as Protection Officers Level 4.

1.38 To gain these qualifications, the three were required to demonstrate competency in the manual operation of handthrow electric points machines in accordance with Network Procedure ANPR 743. However, both qualified workers claimed not to have had subsequent experience with a Westinghouse point machine but the Supervisor did.

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3 The two hand signallers were employees of the manpower provision agency Swetha International Pty Ltd and the supervisor was employed by Downer EDI Works.
Commencement of Shift

1.39 At approximately 4:30am on 13 March 2010, the two qualified workers arrived at the site office where they had their contact details recorded by the Protection Officer. They were then directed to report immediately to the Nightshift Supervisor at Whittingham. Significantly, no pre-work briefing was conducted at the site office with the Protection Officer as it was considered by the Rail Safety Manager that an onsite briefing would be better suited to the scope of works.

1.40 When they arrived at Whittingham, the two qualified workers received a briefing on the operation of the points from the Nightshift Supervisor, including a specific warning to ensure all points machines in the series were operated when setting the points, i.e., “where there are three keys, three machines must be operated, where there are four keys, four machines must be operated”. However, as he had not been briefed by the Protection Officer on the risk controls, he did not demonstrate the operation of the points or the fitting of the points clip.

1.41 The Nightshift Supervisor then advised the workers that the points had been set and clipped for the next train movement before also providing them with a map of the track arrangements at Whittingham. However, they found the map lacking in detail so used a map with better detail of the layout at Whittingham which they had downloaded and printed from ARTC’s website the previous day.

1.42 The Dayshift Supervisor arrived at the site office a little later where he was given a pre-work briefing by the Protection Officer on site safety, the hazards identified, the CAN Block Working and the requirement to double check the points. Significantly, however, only three hazards, “struck by trains”, “struck by work vehicle” and “slips, trips and falls”, were recorded on the Worksite Protection Plan and Pre-Work Briefing forms (04758) by the Protection Officer. The control given by the Protection Officer for the hazard “struck by train” was recorded as “no work in danger zone”. The absence of any instruction by the Protection Officer regarding worksite protection indicated to the Supervisor that there was no requirement to establish a separate worksite at Whittingham. Further, the Supervisor was not given any details about the
Checklist, the staff, the requirement to demonstrate the operation of the points, the procedure for clipping the points or any other specifics related to the site.

1.43 The Supervisor arrived at Whittingham from the site office at approximately 5:45am where he relieved the Nightshift Supervisor and was given the Checklist and map for the site. He was also given a verbal briefing on the tasks at the site and the single point communication protocol with Network Control. During this briefing, he was also advised that the route had been set for the next train movement through the section and the site was being treated as a worksite. However, as the Protection Officer had recorded “no work in danger zone”, he and the Nightshift Supervisor differed in their view as to whether or not the site was a fixed worksite which required work on track protection arrangements to be implemented, particularly when clipping the points.

1.44 The Dayshift Supervisor then advised the qualified workers of the changeover between supervisors. Although recorded at the site office, no staff or supervision changes were documented on site at Whittingham. At this stage 201 points were set in reverse for the Down Branch line while 202 and 203 points were set to normal.

1.45 As he was being advised of the changes in supervision, one of the qualified workers expressed concerns about his lack of familiarity with Whittingham and the operation of the swingnose points. The Supervisor responded that he would supervise the qualified worker when the points were being operated and demonstrate the moving and clipping of swingnose points later as time permitted.

1.46 At 6:26am, the Supervisor advised Network Control that the train going from the Down Main line to the Down Branch line via 201 points had passed. He enquired as to whether 201 points needed to be moved but the Network Controller advised him to wait as he was dealing with a train failure on another part of the network.

1.47 At 6:44am, Network Control requested that 202 and 203 points be set and clipped in the reverse position for the passage of coal service MT290 from the Up Branch line to the Up Main line. Without a power supply, the four parts of
202 points and three parts of 203 points all had to be operated manually. At 203A facing points, the Supervisor demonstrated to both qualified workers the method for operating the points machine and clipping the points. This demonstration was conducted in response to the expressed concerns of one of the qualified workers, and not prompted by the control identified in the risk assessment. At 7:10am, the Supervisor gave an assurance to Network Control that the points had been set and clipped for the route. MT290 passed through Whittingham at approximately 8:05am without incident.

1.48 At 8:10am, Network Control instructed the Supervisor to set 202 and 203 points to the normal position for the passage of Up service 5422 on the Up Main from Singleton. Under instructions from the Supervisor, one qualified worker then commenced to set and clip 203 points to the normal position. The second qualified worker, who had previously expressed his unfamiliarity with the points equipment, set and clipped 202 points also to the normal position. The Supervisor observed the qualified workers operate and clip the points from the vicinity of 201 points which were still set in the reverse position. However, instead of starting at the furthermost or “trailing” end of the points as required by Network Procedure ANPR 743, both qualified workers commenced at the nearest points machines. Further, despite the previous claim of unfamiliarity and the warning about multiple points machines at the beginning of the shift, they did not verify the route with the Supervisor or confirm the number of machines that needed to be operated.

1.49 At 8:22am, the Supervisor gave an assurance to Network Control that 201 points were set and clipped in the reverse position and that both 202 and 203 points were set and clipped in the normal position, although he had not actually inspected them to confirm that the qualified workers had set and clipped them correctly.

1.50 At 8:49am, the Supervisor confirmed that 5422 had passed. He then queried Network Control about the next expected train movements. Network Control advised that the next train would be going onto the branch line via 201 points and following that, a train would be sent on the Down Main line to Singleton. The Supervisor replied that he would contact Network Control after the train movement onto the branch line.
1.51 At 9:23am, the Supervisor advised Network Control that the train going to the branch line had passed. He also gave an assurance that 201 points were now set and clipped in the normal position. Significantly, however, no effective verification of the route, as required by Network Procedure ANPR 743, was made by the qualified workers or the Supervisor before the assurance was given to Network Control. This was despite sufficient time being available.

1.52 At 9:29am, the driver of 2531 telephoned Network Control from Signal MH145 (Minimbah) for the issue of the CAN form (No.5). The form was then compiled by the driver in accordance with Network Procedures. He was then given an assurance by Network Control that all points had been set for his train movement before being authorised to proceed into the CAN Block Working territory.

1.53 Locomotive event recorder data indicated that, after departing Minimbah on the Down Main line, the driver of 2531 had stopped at Signals MH145, D227.7D, WM171D and WM175D in accordance with ARTC Network Rule ANSG 608 Passing Signals At Stop. As 2531 departed Signal WM175D, the crew stated that they could see Signal 146.9 at the end of the CAN Block Working section. The signal was displaying a “full clear” or green aspect and, in accordance with instructions to obey its indication, the driver accelerated to 55km/h and proceeded towards Singleton.

The Derailment

1.54 The crew of 2531 stated that they then “felt an abnormally rough movement underneath the locomotive” as they passed over 203 points, before the locomotive derailed. The driver immediately shut the throttle and made an emergency brake application. The crew then hung on as they waited for the train to stop. The leading locomotive (8141) came to rest approximately 110 metres past 203 points.

1.55 The point of derailment was at 203B swingnose which was set and clipped in reverse for the intended train movement. In this position, the swingnose directed the wheels travelling on the down rail of the Down Main line towards the inner or gauge face of the up rail of the Up Branch line and off the rail end (see Photograph 6).
1.56 As this was occurring, Network Control issued a CAN warning form to Up coal service UL272, which was standing at the platform at Singleton Station, and authorised the train to proceed to the block limit at Signal 146.4 on the Up Main line. The time recorded was 9:48am. Immediately afterwards, Network Control received a telephone call from the Supervisor reporting that 2531 had derailed.

![Photograph 6: Photograph showing wheel path and derailment mechanism](image)

After the Derailment

1.57 After 2531 came to rest, the crew shut down the engines on both locomotives. The Supervisor then approached the train and commenced providing an assessment of the damage (see Photographs 7 and 8) to Network Control.

1.58 The Network Controller immediately reported the derailment to the Train Transit Manager (TTM). Despite authorising Up coal service UL272 to enter the CAN Block Working section, there is no record that Network Control issued any restraint to it as a result of the derailment. UL272 remained
stationary after overhearing communications on the train radio system concerning a derailment.

Photograph 7: Damaged rolling stock from 2531

Photograph 8: Damage to rear cab of second locomotive
1.59 At 9:53am, Network Control reported the incident to the Emergency Services and requested attendance of the NSW Fire Brigade at the site.

1.60 At 9:56am, the driver of 2531 reported the incident to Network Control stating that he had not seen anything unusual on approach to the points.

1.61 At 10:01am, the TTM reported the incident to the OTSI Duty Officer who then organised for OTSI investigators to attend the site.

1.62 At 10:08am, Network Control telephoned the Supervisor to get an updated assessment of the incident. During this conversation, the Supervisor stated that the qualified worker had given an assurance that 203 points were set to the normal position but he must have “forgotten to wind” 203B swingnose.

**Medical and Toxicology Testing**

1.63 The driver of 2531 was breath tested on site by NSW Police with negative results. He was then transported to Singleton Base Hospital for treatment to a shoulder bruise sustained in the derailment. The assistant driver was also breath tested on site by NSW Police with negative results. Although uninjured, he later attended hospital for a precautionary examination.

1.64 The Supervisor, two qualified workers and the Protection Officer were also breath tested by NSW Police. All returned zero readings for blood alcohol concentration although the testing was conducted after the three hour time limit prescribed by the Rail Safety (Drug and Alcohol Testing) Regulation 2008. Drug samples also taken at a later time returned negative results to the presence of prohibited substances.

1.65 After arranging for the breath testing, the Rail Safety Manager was then treated onsite by NSW Ambulance for stress-related symptoms but declined to be transported to hospital.

1.66 The Network Controller at NCCN was breath and drug tested with negative results.

**Site Conditions**

1.67 Weather conditions at the time of the derailment were described as mild and cloudy, with a temperature of 17.6°C recorded at Singleton at 9:00am.
Workers reported that light rain had fallen at around 6:00am but had not persisted.

**Fatigue**

1.68 There were no fatigue related issues identified with the previous work hours of the Supervisor and qualified workers. Further, they were operating in an environment where conditions would not have significantly impaired alertness. Recorded conversations also indicated that the Supervisor was alert and responsive during his conversations with the Network Controller prior to the derailment.

1.69 There were no fatigue related issues identified with the driver of 2531 or the Network Controller. Recorded conversations between the driver and the Network Controller at the issue of the CAN Block Working form approximately 10 minutes prior to the derailment indicated both were alert and responsive at the time.

**Site Recovery and Restoration**

1.70 Two OTSI investigators were deployed to the site from Sydney arriving at 1:30pm. They completed initial investigations and returned the site for recovery at 4:30pm.

1.71 Heavy lifting equipment was required to lift the damaged rolling stock clear before the track could be repaired. The line was eventually reopened to rail traffic at 6:00am on 16 March 2010. The two damaged locomotives and eight damaged wagons were subsequently transported by road to repair facilities in Newcastle.

**Condition of Rolling Stock**

1.72 From a detailed inspection of the two damaged locomotives and eight damaged wagons, it was concluded that all damage to the rolling stock was a consequence of the derailment. No defects were identified with any safety critical components of the rolling stock, i.e., wheels, axles, brakes, bogies, couplings or vehicle bodies, which could be considered as factors contributing to the derailment.
Train Management

1.73 Locomotive event recorder data did not identify any issues with the manner in which 2531 was operated prior to the derailment.

System Failures

Supervision

1.74 One of the two qualified workers indicated that he had raised the issue regarding unfamiliarity with the points as soon as the Dayshift Supervisor had arrived at the site. However, the Supervisor had demonstrated the method of operating and clipping the points when setting 203A switches to normal between 6:44am and 7:10am.

1.75 At 8:10am, the same qualified worker was instructed to set 203 points to normal but did not recognise that, although he had set and clipped 203A facing points, he had not set and clipped 203B swingnose. This was despite movement of 203 points on two previous occasions during his shift. Neither he nor the Supervisor then effectively verified the route before the assurance was given to Network Control.

Training and Recertification

1.76 With a signaller’s authority, “handthrow electric points machines may be operated manually with handthrow levers”. In doing so, a qualified worker must, in accordance with Network Procedure ANPR 743 Manually Operating Handthrow Electric Points:

“Check the position of the points at each points machine. Make sure that your changes set the correct route.”

in particular, noting to:

“Operate points machines at crossovers in order from the trailing end to the facing end.”

1.77 Competency in applying the procedures in ANPR 743 is part of the requirements for the Engineering Hand Signaller Level 2 qualification. All three workers involved in the incident were qualified Engineering Hand Signallers Level 2. Both qualified workers were recertified as Engineering
Hand Signallers Level 2 in July 2009 and December 2009 respectively, and the Supervisor had been recertified in February 2009.

1.78 Training records indicated that the Supervisor and the qualified workers had undergone recertification assessments with different providers. While evidence was provided that the Supervisor had been assessed in his competency for manually operating point machines in hand mode, there were no documents or records to indicate that the qualified workers had undergone similar assessment. Given their stated lack of familiarity with the points and demonstrated misapplication of Network Procedure ANPR 743, and the absence of records for verification, it must be concluded that the recertification of the two qualified workers was not rigorous and probably did not test their theoretical or practical knowledge of handthrow electric points operation.

Contractual Arrangements

1.79 Section 21(1) of the Rail Safety Act (2008), Competence of rail safety workers, requires the following:

“A rail transport operator must, so far as is reasonably practicable, ensure that each rail safety worker who is to carry out rail safety work in connection with railway operations for which the operator is required to be accredited has the competence to carry out that work.”

Paragraph 5 also requires:

“A rail transport operator must maintain records in accordance with the regulations of the competence of rail safety workers who carry out rail safety work in connection with railway operations for which the operator is required to be accredited.”

1.80 Although ARTC had ultimate responsibility under its accreditation for the purposes of Section 21(1) of the Act, Hunter 8 contract documents indicated that the responsibility for contractor management had been delegated to it during the construction of the third track. Yet, when requested to provide details of the contractual arrangements made between Hunter 8 and the employers of the subcontractors for the procurement of staff for the CAN Block Working, only fee for service invoices were provided. This indicated that there were no effective contractual arrangements in place between the parties at the time of the incident.
1.81 When the two qualified workers and the Supervisor reported to the Protection Officer at the site office on the morning of the incident, he only asked for their contact phone numbers. No details were sought from the workers regarding the currency of their Certificate of Competency (CoC) cards or their experience in the operation of swingnose points. Had the CoC cards been compared against records, he may have noticed that anomalies existed between the certificate expiry dates and the records. Had their knowledge of swingnose points been questioned, it would have provided an indication of their lack of experience before they started work.

**Implementation of Risk Controls**

1.82 The risk assessment for the Singleton Extension Yard Limits and CAN Manual Block Working was detailed and well documented. It correctly identified the risk of a derailment or run-through at turnouts and crossovers caused by points “incorrectly manually set or not clipped properly”. Hunter 8 was assigned responsibility for implementing six of the controls designed to mitigate this risk. Only one of these controls was fully actioned.

1.83 **Pre-Work Briefing.** The Protection Officer briefed the Supervisors on OH&S requirements and CAN Block Working, but did not brief the work groups on worksite protection methods or the risk controls. The task of conducting a Pre-Work Briefing was delegated to the two Supervisors at Whittingham who did not have full knowledge or understanding of the controls. Although identified as controls in the risk assessment, the use of the Checklist and the demonstrations of the manual operation of the handthrow levers and the points clipping procedure were not recorded by the Protection Officer on the Worksite Protection Plan and Pre-work Briefing forms, or communicated to the supervisors at Whittingham. Further, the Protection Officer had confused the situation by indicating on the briefing forms that there was “no work in danger zone”.

1.84 **Competent Personnel.** Neither the Rail Safety Manager nor the Protection Officer confirmed the workers’ competencies or their currency before they started work. At no stage were any of the qualified workers adequately questioned about their competency or experience with the equipment they were hired to operate.
1.85 **Checklist.** Although a checklist was developed to record the movement of the points, it was rudimentary and was not:

- designed as a train safety record and provided with traceability through being part of a safety management or document control system;
- listed as a control on the Worksite Protection Plan or Pre-Work Briefing forms;
- thoroughly checked (as it contained an incorrect reference to 201 A, B and C points); and
- developed with supporting instructions or procedures for its use by the Supervisors.

1.86 **Demonstration.** The Supervisors were not informed of the requirement to demonstrate to the workers the manual operation of the handthrow levers and the points clipping procedure, nor was it listed on the Worksite Protection Plan or Pre-work Briefing forms. The demonstration that was provided by the Supervisor between 6:44am and 7:10am was in response to the concerns expressed by one of the workers and not a consequence of it being an identified control.

1.87 **Points Clipping Procedure.** The Supervisors were not informed of a requirement to provide instruction on the correct application of point clips, nor was it listed on the Worksite Protection Plan or Pre-work Briefing forms.

1.88 **Single Point of Contact.** The arrangement of a single point of contact between Network Control and the Supervisor at Whittingham was established.

**Warning Signage**

1.89 The only signage warning qualified workers to ensure all points were wound was affixed to the wall inside the relay room above the release keys for the points. There was no signage on or nearby any point machines numbering the machines in the arrangement or reminding workers that all machines must be wound.

1.90 When the Daywork Supervisor and the qualified workers arrived at the site, the release keys had already been removed from the panel in the relay room and placed in the machines. Further, as the keys were not being replaced in the panel after each train movement, neither the Supervisor nor qualified workers had any requirement to enter the relay room after their arrival on site.
As such, the intended safety purpose of the signage in the relay room was rendered ineffective.

Roles and Responsibilities

1.91 Immediately after the incident, the Protection Officer directed that all worksite protection plans and pre-work brief forms be returned to him. This was despite his forms recording “no work being conducted in the danger zone” which indicated no worksites had been established. This created confusion at the site with various Worksite Protection Plan and Pre-work Briefing forms being compiled after the incident and not in accordance with ARTC Network Rule ANWT 300 Planning Work in the Rail Corridor which requires these forms to be compiled before the commencement of any work on the track.

1.92 The Protection Officer had sole responsibility for all worksite protection arrangements at the site. However, there were differing opinions between the Nightshift Supervisor and the Dayshift Supervisor about the use of Worksite Protection Plan and Pre-work Briefing forms at their area of control. The differing opinions related to the issue of whether their area was termed a worksite or not. While the Protection Officer documented that there was no work being carried out in the danger zone, he did not provide clear instructions to the Supervisors on how workers were to be protected while on track, particularly when applying points clips during CAN Block Working or with no functioning signalling system.

Emergency Management

1.93 A review of the voice logs indicated the workload for Network Control was constant prior to the incident. The review also noted that, once notified of 2531’s derailment, all parties followed the requirements of ARTC’s Incident Management Manual TA44. However, there was no record found that coal service UL272, which had been authorised by Network Control to depart Singleton in the minute prior to the derailment of 2531, had been formally restrained afterwards. The driver of UL272 decided to remain stationary at Singleton on overhearing train radio communications about a derailment. The potential for a collision at the derailment site would have been created had he not done so.
PART 2  FINDINGS

Causation

2.1 The derailment of 2531 was a consequence of 203B swingnose being left set in the reverse position when 203 points were set and clipped for the passage of the train. This resulted in the wheels on the down rail of the Down Main line being directed towards the inner (gauge) side of the up rail of the Up Branch line and off the rail head.

Contributory Factors

2.2 Despite sufficient time being available, neither the qualified workers nor the Supervisor ensured the route was correctly set for 2531 after the points were set and clipped, and before giving an assurance to Network Control to that effect, in accordance with Network Procedure ANPR 743.

2.3 Despite being in possession of competency certification for Engineering Hand Signallers Level 2, evidence suggests the qualified workers were not adequately assessed, if at all, in the competency of manually operating handthrown electric points before being recertified. [Recommendation 3.1]

Effectiveness of Risk Management Strategies

2.4 The risk assessment conducted for the Singleton Extension Yard Limits and CAN Block Working was detailed and well documented. However, the controls for which the Hunter 8 Alliance was responsible were not fully implemented by its Rail Safety Manager or recorded on the Worksite Protection Plan and Pre-work Briefing forms by the Protection Officer. As a result, the supervisors were not fully informed about the controls that had been determined as applicable to the assessed risks at their Whittingham site. [Recommendation 3.3]

2.5 There were no formal or effective contractual arrangements entered into covering the workers engaged by the Hunter 8 Alliance to implement the CAN Block Working, other than a verbal agreement to honour fee for service invoices.
2.6 No adequate verification was made of the competencies or the currency of the qualifications of engaged workers prior to their commencing work. [Recommendation 3.4 & 3.5]

**Adequacy of the Emergency Response**

2.7 Notification of the incident to all parties was timely and in accordance with ARTC’s Incident Management Manual TA44. However, there was no evidence that coal service UL272 had been restrained after 2531 derailed. A collision could have occurred at the site had the driver not decided to remain at Singleton on hearing about the derailment over his radio.

**Other Safety Matters**

2.8 Signage was affixed near the release key switches in the relay hut to warn that all machines in the series must be operated but no similar warning signage was positioned at the machines. Further, the Dayshift Supervisor and qualified workers had no reason to enter the relay room as the release keys were already in use in the points machines. [Recommendation 3.2]

2.9 The Protection Officer did not provide a detailed briefing on protection arrangements to be implemented for the operation and clipping of points because he was of the view there was “no work on track” which he recorded on his Worksite Protection Plan and Pre-work Briefing forms. Though this led to a difference of opinion between the supervisors about protection arrangements, the Dayshift Supervisor followed the Protection Officer’s lead resulting in his not preparing his own Worksite Protection Plan or Pre-work Briefing forms. However, he did prepare forms when the Protection Officer asked for them to be submitted, but this was after the derailment.

2.10 There were no issues identified with the operation, management or condition of 2531 prior to the derailment.

2.11 Drug and Alcohol testing was conducted in accordance with the Rail Safety (Drug and Alcohol Testing) Regulation 2008 except that the two qualified workers operating the points were tested after the prescribed three hour time limit.
PART 3 RECOMMENDATIONS

To prevent a recurrence of this type of rail incident, it is recommended that the following remedial safety actions be undertaken by the specified responsible entities.

**Australian Rail Track Corporation**

3.1 Review the recertification assessment procedures for Engineering Hand Signaller Level 2 to ensure that qualified workers’ knowledge and understanding of the requirements of Network Procedure ANPR 743 is tested and recorded in a thorough and uniform manner by all assessment providers.

3.2 Provide warning signage at each swingnose points machine which, similar to that in the relay room, identifies the points and the number of points machines in the arrangement, and reminds workers that all points machines must be operated when in manual mode.

**Australian Rail Track Corporation and John Holland Group**

3.3 Review current procedures for the implementation of controls to mitigate identified risks and revise them, as necessary, to ensure details of control measures are promulgated to all concerned, including contractors and subcontractors.

3.4 Review and revise, as necessary, contractor management procedures to ensure the qualifications, competencies and currency of certification (identity cards) of rail safety subcontractors are verified prior to their engagement.

**Swetha International**

3.5 Review its record management procedures to ensure copies of recertification assessments for its employees are maintained with employee files.
PART 4 APPENDICES

Appendix 1: SAFE Notice 2-1271 2010

SAFE Notice 2010

Number: 2-1271

To be read in conjunction with SAFE Notice 2-1259

Minimbah to Whittingham

New Up Relief Line (Third Road) Commissioning
Stage 1

Due to the Minimbah Third Road Commissioning not being completed on time between Minimbah, Whittingham and Singleton the signalling infrastructure on both the Up and Down Main Lines will not be able to be booked back into use.

The new yard limits for Branxton to Singleton as advertised in SAFE Notice 2-1259, 2010 will be brought into use at 1800 hours on Friday 12th March 2010.

Safe working arrangements

The following Safeworking arrangements will be adopted for rail traffic movements within the new Singleton yard limits (Between Minimbah - Singleton – Whittingham - Saxonvale Junction)

Commencing at 1800 hours Friday 12th March 2010, until the completion of stage 1 commissioning CAN block working will be introduced on both the Up and Down Main lines and arrival and departure roads Whittingham Branch, As per the ARTC Network Rules and Procedures ANGE 206 and ANPR 722 & ANPR 723.

Normal train operations will apply between Branxton and Minimbah (Within the new Singleton Yard Limits) on the Up and Down Main Lines.

Pilot Staff Working Whittingham to Saxonvale Junction

Commencing at 1800 hours Friday 12th March 2010, until the completion of stage 1 commissioning Pilot staff working using a Large Pilot Staff will be introduced between Whittingham and Saxonvale Junction in accordance with ARTC Network Rule ANSY 516 to facilitate rail traffic movements.
Appendix 2: Sources, Submissions and Acknowledgements

Sources of Information

- ARTC Network Controller and Train Transit Manager (NCCN Broadmeadow)
- ARTC Risk and Compliance Senior Investigator, Maitland
- Bureau of Meteorology
- Crew members of train 2531
- Downer EDI Works Pty Ltd
- Independent Transport Safety Regulator
- John Holland Group
- Pacific National Pty Ltd
- Swetha International Pty Ltd

References

- ARTC Network Rules, Procedures and Safe Notices
- Glossary for the National Codes of Practice and Dictionary of Railway Terminology
- Passenger Transport Act 1990 (NSW)
- Rail Industry Safety Standards Board Rolling Stock Standards
- Rail Safety Act 2008 (NSW)
- Rail Safety (General) Regulation 2008 (NSW)

Submissions

The Chief Investigator forwarded a copy of the Draft Report to the Directly Involved Parties (DIPs) to provide them with the opportunity to contribute to the compilation of the Final Report by verifying the factual information, scrutinising the analysis, findings and recommendations, and to submit recommendations for amendments to the Draft Report that they believed would enhance the accuracy, logic, integrity and resilience of the Investigation Report. The following DIPs were invited to make submissions on the Draft Report:

- Australian Rail Track Corporation
- Downer EDI Works Pty Ltd
Submissions were received from:

- Australian Rail Track Corporation
- Independent Transport Safety Regulator
- Swetha International Pty Ltd

Downer EDI Works, John Holland and Pacific National accepted the report without comment and, where relevant, advised that previous comments provided had been adequately addressed.

The Chief Investigator considered all representations made by DIPs and responded to the author of each of the submissions advising which of their recommended amendments would be incorporated in the Final Report, and those that would not. Where any recommended amendment was excluded, the reasons for doing so were explained.

**Acknowledgements**

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Photograph 6 is reproduced with the permission of *ARTC*.