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**Explosives Inspectorate  
File Note**

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Date: 4 June 2013

**Subject: INVESTIGATION INTO FIRE FROM FIREWORKS DISPLAY AT PENGARI STEINER SCHOOL**

**References:** Investigation report by Inspector of Explosives John Forcier

1. The investigation report was reviewed in a telephone compliance meeting on 3 Jun 2013. The committee decided to not take the matter to prosecution as the investigation did not include adequate evidence and statements to proceed. [REDACTED] s78B(2) the nominated representative for KC's Fireworks is currently being called in under s97 to address matters found to be deficient in relation to NYE fireworks and a recent firework display at Eumundi.
2. The compliance committee recommended that this matter be included in the discussion with KC's fireworks and this investigation can be closed out. That discussion should focus on the point that the display item was placed at an inappropriate distance and that fire fighting equipment was not located at a point where a fire was most likely to occur. The s97 discussion may lead to other compliance action taken against the fireworks contractor.

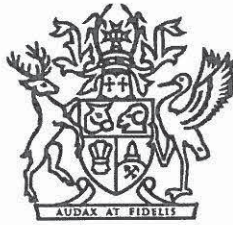
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File: 1655  
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RTI DL RELEASE - DNRPM



Queensland  
Government

DEPARTMENT OF NATURAL RESOURCES AND MINES

Safety and Health  
Explosive Inspectorate

*Explosives Act 1999*

*Explosives Regulation 2003*

INVESTIGATION REPORT  
TO  
CHIEF INSPECTOR OF EXPLOSIVES

ON THE  
**FIREWORKS DISPLAY FIRE ON 15 NOVEMBER AT NOOSA  
PENGARI STEINER SCHOOL, 86 NYELL ROAD DOONAN  
INVOLVING KC FIREWORKS DISPLAYS AUSTRALIA PTY  
LTD**

At  
86 Nyell Road, Doonan QLD  
on  
15 November 2012

Version 5

Prepared by



John Forcier  
Inspector of Explosives

Approved for Release

sch4p4( 6) Personal information

3 Jun 2013.

Chief Inspector Name  
Chief Inspector of Explosives

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## Foreword

The Department of Natural Resources and Mines is responsible for the regulation and use of explosive and fireworks in Queensland.

The Explosives Inspectorate supports safety in the explosives and fireworks industries to protect the community and workers from the hazards of explosives and related materials through:

- ensuring that there are standards for the safe handling and use of explosives;
- monitoring explosives activities to ensure compliance with the *Explosives Act 1999* and the *Explosives Regulation 2003*;
- responding effectively to explosives accidents and incidents; and
- administering government reserves for the storage and distribution of explosives.

## Investigation Team Members

The investigation team comprised 1 Inspectors of Explosives. Duties and responsibilities are as follows –

- John Forcier, Senior Inspector of Explosives - Investigator.

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## Executive Summary

### Details of the incident

1 On 15 November 2012 the Queensland Explosives Inspectorate was made aware of a fire which occurred at the Noosa Pengari Steiner School located in Nyell Road, Doonan. Reports indicated that the fire was a direct result of a fireworks display.

2 The Noosa Pengari Steiner School was the event organiser, and engaged KC Fireworks Australia Pty Ltd to conduct the display. The fireworks presentation to Year 7 science students was delivered by [REDACTED] s78B(2) owner of KC Fireworks Australia Pty Ltd.

3 [REDACTED] s78B(2) holds a Fireworks Operator Licence No. 0407071 and this was a permitted activity. A Fireworks Display Notification (Ref: 12 0875) was provided to the Explosives Inspectorate on 8 November 2012.

4 The daytime display was unconventional in so far that the purpose was for education rather than strictly entertainment as described in s129(1) of the *Explosives Regulation 2003*. The specific purpose was for science students to observe each individual firework fired electronically and describe their observations of combustion.

5 The Fireworks Display Notification (FDN) submitted by KC Fireworks on 8 November 2012 noted 120 x 65mm aerial shells would be used as well as an extensive assortment of ground based products. The largest ground based products required 50 meters safe distance. However the smoke cake product used during the display is not listed in the notification. The product is known to be a "Versus of Victory" orange smoke cake.

6 Around two minutes into the display [REDACTED] s78B(2) observed that a fire had started in nearby scrub approximately 35 meters from the firing point. He stopped the presentation and tended to the fire.

7 He did not take water or a fire extinguisher with him at that time. [REDACTED] s78B(2) attempted to suppress the fire by stamping it out before realising an appliance would be needed and returned to retrieve an extinguisher.

8 [REDACTED] s78B(2) was unsuccessful in putting the fire out and it rapidly escalated. Queensland Fire and Rescue Service (QFRS) were notified, attended the scene and extinguished fire.

9 [REDACTED] s78B(2) submitted an incident report to the Explosives Inspectorate declaring that a malfunction of a product described as a 'smoke cake' had occurred. [REDACTED] s78B(2) stated that the product operated incorrectly by ejecting all effects at once into the nearby scrub. [REDACTED] s78B(2) stated he was unable to control multiple spot fires that occurred.

10 Although there were many independent 'witnesses', all but the teacher are juveniles and were not spoken to due to the complexities of the *Youth Justices Act 1992* and arranging permissions.

11 Teacher, [REDACTED] s78B(2) confirmed the event was **not** filmed or otherwise recorded and that he is unable to corroborate the exact causes of the fire or the malfunction as he was primarily supervising the students and does not have expert knowledge of fireworks. [REDACTED] s78B(2) does confirm that the fire occurred early into the presentation and that [REDACTED] s78B(2) spotted the fire immediately and appeared to do his best to extinguish the fire.

### The Evidence

12 The evidence gathered consisted of the following (as appropriate) –

12.1 Observations of the investigator;

- 12.2 Photographic evidence of relevant items from the site;
- 12.3 A drawing of the incident site;
- 12.4 Preliminary Report – 5 December 2012
- 12.5 KC Fireworks submitted notification and display plan
- 12.6 KC Fireworks post incident report and correspondence with product supplier *Fireworks Australia*.
- 12.7 Inspector's post incident sketch plan
- 12.8 Photographs of incident scene
- 12.9 Short 360° video of scene from fire ignition point
- 12.10 Bureau of Meteorology weather report for Noosa area on 15 November 2012.
- 12.11 Fireworks Australia *Quality and Compliance Assurance - Retest 2012*
- 12.12 "Verses of Victory" chemical composition table
- 12.13 Video of 'Verses of Victory' (smoke cake) being tested.
- 12.14 MSDS and Technical Data Sheet for "Versus of Victory".
- 12.15 Photograph of an unfired "Verses of Victory" product

### Nature and cause

13 The product alleged to have misfired is known as a "Versus of Victory" smoke cake supplied by Fireworks Australia Pty Ltd and imported exclusively for KC Fireworks. The product contains 50 x 30mm tubes, however the product is **delay chain fused** and the minimum safety distance must be doubled. In this product's case the minimum distance should be greater than 60 meters.

14 The minimum safe distances indicated on the map supplied by KC Fireworks was 62.2 meters from a school building and approximately 73 meters from the students observing. Safe distances supplied in notification are clearly relating to built infrastructure and spectator safety.

15 It is apparent that the notification details did not take into account the surrounding environment and vegetation status. The "Google" map used by KC Fireworks does not offer information relating to the surrounding vegetation.

16 The display firing point was approximately 35 meters from relatively dry bushland immediately to the south. Wind may also have been a factor with Bureau of Meteorology records indicating a wind speed of 19km/h at 9:00am, 35km/h at 3:00pm, and a maximum wind speed of 50km/h at 4:11pm. Wind remained out of the NNE for the day.

17 Fireworks were remotely fired electronically from approximately 60m away – water/extinguishers were not at firing point, but with [REDACTED] s78B(2)

18 The bright daytime nature of the display and remote firing position made seeing the fire seat difficult until it had grown to a noticeable size.

19 The Fireworks Post-Display Notification submitted by [REDACTED] s78B(2) and received by the Explosives Inspectorate at 12:52 pm on 15 November 2012 states that "A firework fired lower causing embers into long grass which resulted in a fire" (sic).

20 In a later document titled KC's *Fireworks Displays Incident/Injury Report* signed and dated 29 November 2012, a reconstruction of events states that, "At item no.9 there was a bang and the tubes all fired at once".

21 The "Versus of Victory" smoke cake product had apparently discharged multiple tubes at once rather than progressively. This misfire has ejected effects simultaneously and burst to the side closest to vegetation. [REDACTED] s78B(2) states this caused several fire seats and was why the fire escaped his control.

22 It is not clear if [REDACTED] s78B(2) was being ably assisted by a spotter(s). [REDACTED] s78B(2) stated that to his knowledge [REDACTED] s78B(2) was the only person present;

however [s78B(2)] insists [s78B(2)] was also present but not with the students in the viewing area. There is no evidence that [s78B(2)] was not present.

23 Sufficiency and location of fire suppression appliances may also have contributed. The remote firing arrangement enabled [s78B(2)] to speak and interact with students; it also meant that he was 60 meters from the firing point. The fire appliances remained with [s78B(2)] at the spectator point requiring transport to the fire site.

## **Trials and investigation**

24 KC Fireworks contacted the product supplier, Fireworks Australia Pty Ltd in Sydney, and copies of correspondence have been supplied.

25 Martin BRADY, Director of Fireworks Australia states that the product was retested as a result of [s78B(2)] malfunction report to them. Six (6) items from the same C615 batch were tested. All items functioned correctly during the test. A video of the item being tested was also supplied.

## **Conclusions**

26 The conclusions have been drawn from the investigation into the explosives incident and the findings. The conclusions are:

26.1 The available evidence indicates that minimum safe distances to spectators and built infrastructure were observed, however the distances were insufficient with respect to nearby vegetation and the climatic conditions.

26.2 Although the safety of juvenile spectators was clearly at the forefront; the firing point was too close to nearby vegetation. The exact firing point could not be established with products located variously within a 4m square area in the approximate centre of the playing field. The centre of this firing point was measured to be approximately 33 meters from where uncontrolled vegetation bordered the school oval and where the fire appears to have started.

26.3 The minimum safe distance for the ground products listed in the Fireworks Display Notification between 35 and 60 meters.

26.4 There is no direct evidence of a substantial breeze effecting the display location at the time it commenced. Any prevailing breeze would have pushed drifting embers towards the vegetation.

26.5 The product causing the fire has been identified as a "Verses of Victory" orange smoke cake supplied by Fireworks Australia. It is a product imported solely for KC Fireworks and is not in use by any other operator. The "Versus of Victory" smoke cake requires a 60 meter minimum safety distance by virtue of being delay chain fused. This distance is included in the product's technical data sheet (TDS) and material safety data sheet (MSDS).

26.6 The specific nature of the ignition of nearby bushland cannot be confirmed. Whether the product malfunctioned, was insecurely mounted and fell over, or whether embers simply blew into scrub is inconclusive. The investigation has not produced any evidence that the product was incorrectly set up or fired, and there was no scorching or other indicator at the firing point to indicate the product fell over.

26.7 There is insufficient evidence to determine that an offence has been committed against the *Explosives Act 1999*.

26.8 The operator did not make appropriate use of fire suppression devices available.



26.9 The product list in the Fireworks Display Notification (Ref 12 0875) did not include a "*Versus of Victory*" smoke cake.

### Recommendations

27 Recommendation are included in second part of the Investigation report.

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# 1 Aim and scope of investigation

1.1 The Chief Inspector of Explosives appointed inspector John Forcier as the investigation team leader under Section 58 of the *Explosives Act 1999* to undertake an investigation to establish the nature and cause of the incident; and to prepare a report about the incident that includes recommendations to prevent the incident happening again.

# 2 Details of the Incident

## Background

### 2.1 Site details

Name of company            KC Fireworks Displays Pty Ltd

Location:                    Noosa Pengari Steiner School, Nyell Road Doonan.

Google Map                 -26.453592,153.032159

Site Location                Lot 2 on RP216192

Description of the site     Private school

Investigation site plan



2.2 **Property Damage.** The damage to property included local vegetation, two fixed in situ caravans, two water tanks, and a tin shed all located at 129 Grays Rd. Please refer to attached QFRS Incident Report for further information. **Annex 1**

## Licensing History under the Explosives Act 1999

2.3 The Explosives Inspectorate licence records identify that.

2.4 On 15 November 2012, KC Fireworks Displays Pty Ltd, s78B(2) held two applicable licenses under the *Explosives Act 1999*, being:

- 2.4.1. 0410191 Fireworks Contractor (exp 28/7/2014)
- 2.4.2. 0407071 Fireworks Operator(exp 31/01/2014)

## Explosives Incident

2.5 On Thursday 15 November 2012 the Queensland Explosives Inspectorate was made aware of a fire which occurred at the Noosa Pengari Steiner School located in Nyell Road, Doonan. The *Fireworks Post-Display Notification* was faxed to the Explosives inspectorate at 12:52pm from s78B(2) of KC Fireworks Australia Pty Ltd. The report indicated that the fire was a direct result of the firework display, and specifically as a result of a firework firing "lower". The post-display report is located in **Annex 2**

- 2.6 The Noosa Pengari Steiner School was the event organiser, and engaged KC Fireworks Australia Pty Ltd to conduct the display. The fireworks presentation to Year 7 science students was delivered by [s78B(2)], owner of KC Fireworks Australia Pty Ltd. This is apparently the third year this display has been run as a part of the school's year 7 science curriculum. There have been no previous incidents of this nature. [s78B(2)] has offered a written apology to local residents and school **Annex 3**
- 2.7 [s78B(2)] holds a Fireworks Operator Licence No. 0407071 and this was a permitted activity. A Fireworks Display Notification (Ref: 12 0875) was provided to the Explosives Inspectorate on 8 November 2012. **Annex 4**
- 2.8 The "Versus of Victory" orange smoke cake did not appear on the list of products to be used in the Fireworks Display Notification.
- 2.9 The daytime display was unconventional in so far that the purpose was for education rather than strictly entertainment as described in s129(1) of the *Explosives Regulation 2003*. The specific purpose was for science students to observe each individual firework fired electronically and describe their observations of combustion.
- 2.10 The weather on the day was fine with a temperature of approximately 26°C and a northerly breeze with gusts estimated to be around 25kph at time of display. Bureau of Meteorology weather observations are attached. **Annex 5**
- 2.11 Around two minutes into the display [s78B(2)] observed that a fire had started in nearby scrub approximately 35 meters away. He stopped the presentation and tended to the fire.
- 2.12 It appears he did not take water or a fire extinguisher with him at that time. [s78B(2)] attempted to suppress the fire by stamping it out before realising an appliance would be needed and returned to retrieve an extinguisher.
- 2.13 [s78B(2)] was unsuccessful in putting the fire out and it rapidly escalated. Queensland Fire and Rescue Service (QFRS) were notified, attended the scene and extinguished fire.
- 2.14 In the Fireworks Post-Display Notification to the Explosives Inspectorate [s78B(2)] stated that the product operated incorrectly and "fired low" causing projectiles to be ejected into nearby scrub.
- 2.15 In a later KC's Fireworks Displays Incident/Injury Report, [s78B(2)] states that, "At item no.9 there was a bang and the tubes all fired at once". [s78B(2)] stated he was unable to control all spot fires that occurred at once.
- 2.16 The "Versus of Victory" smoke cake is a 50 x 30mm tube cake product and is **delay chain fused**. This makes the minimum safe distance for the product 60 meters which confirmed in the product technical data sheet.
- 2.17 Although there were many independent witnesses, all but the teacher are juveniles and were not spoken to due to the complexities of the *Youth Justices Act 1992* and arranging permissions.
- 2.18 Teacher, [s78B(2)] confirmed the event was **not** filmed or otherwise recorded and that he is unable to corroborate the exact causes of the fire or the malfunction as he was primarily supervising the students and does not have expert knowledge of fireworks. [s78B(2)] does confirm that the fire occurred early into the presentation and that [s78B(2)] spotted the fire immediately and appeared to do his best to extinguish the fire, however he does not recall [s78B(2)] taking a fire fighting appliance with him.

## Notification of the incident through emergency services

2.19 The incident was notified to Principal Inspector Martin Land by s78B(2). The incident is recorded in the Explosives Inspectorate Task Tracker system under 12 3322. A summary of the response and arrival if applicable should be included

- 2.19.1. Queensland Fire and Rescue – 11:02 am on 15 November 2012
- 2.19.2. Queensland Police Service – attended scene.
- 2.19.3. Queensland Ambulance Service – attended scene.
- 2.19.4. Department of Natural Resources and Mines Explosives Inspector, John Forcier on Friday 16 November 2012

## Response to the incident

2.20 Upon identifying that a fire had been started a brief attempt to extinguish the fire seats was made by the fireworks operator, however it was quickly established that the fire could not be controlled with existing resources and appliances.

2.21 Queensland Fire and Rescue Service (QFRS) were called by the school at 10:45 am. QFRS dispatched 4 appliances which arrived shortly after 11:00 am.

2.22 QFRS dispatched 38 appliances in the course of extinguishing the fire with the last appliance leaving the scene at 3:30 pm on 15 November 2012.

2.23 DNRM Explosives Inspectorate attended on Friday 16 November 2012.

2.24 Upon arrival at the scene it was apparent that the fire had caused considerable damage to immediate vegetation. The site had been mostly cleaned of fireworks debris. The firing point was identified by s78B(2) and confirmed through debris left from product. Photographs, distance measurements, statements were obtained and discussions with teachers held.

## Control of evidence at site

2.25 Photographic evidence was taken by FORCIER, sketches and distance measurements were also made and entered into FORCIER's official notebook.

## Preliminary Report

2.26 A preliminary report of the incident was prepared by Inspector Forcier for the Chief Inspector of Explosives on 20 November 2012; a copy of the preliminary report is at Annex 6

## 3 Legislation

3.1 Fireworks are defined as an explosive and regulated in Queensland under the *Explosives Act 1999* and *Explosives Regulation 2003*. All persons and companies using fireworks must be appropriately trained and licensed under the Act. The *Queensland Code of Practice – Control of Outdoor Fireworks Displays* provides the framework and risk management procedures that should be applied to conduct fireworks displays.

### Scope of Licences under legislation

3.2 s78B(2) holds a current Fireworks Operator Licence and is permitted to conduct outdoor fireworks displays with no restriction on authorised products he uses.

### Requirement for safety management system

3.3 Sections 42, 43 and Schedule 3 of the *Explosives Regulation 2003* require that a licence holder must have and give effect to a safety management system:

(1) This section applies to the holder of a prescribed authority if 1 or more employees of the holder carry out activities under the authority.

3.4 A safety management system is required for.

### General Duty of Care

3.5 A licence holder has an obligation under the Act as follows:

*that a person who is doing an act involving explosives must take reasonable precautions and use reasonable care to avoid endangering any person's safety, health or property.*

## 4 Investigation

### The Investigation Plan

4.1 The planning for the investigation included development of the following:

4.1.1 On-site investigation that examined the incident site and collected the evidence.

### The evidence

4.2 The evidence considered was of four types, namely –

- 4.2.1 physical evidence;
- 4.2.2 observations at the site; and
- 4.2.3 photographs and video evidence.

### Observations



Google Image 1 Noosa Pengari Steiner School (Field – C)

4.3 The following observations taken by the Explosives Inspectorate investigators in conjunction with QFRS are as follows:–

**Observations 16 November 2012**

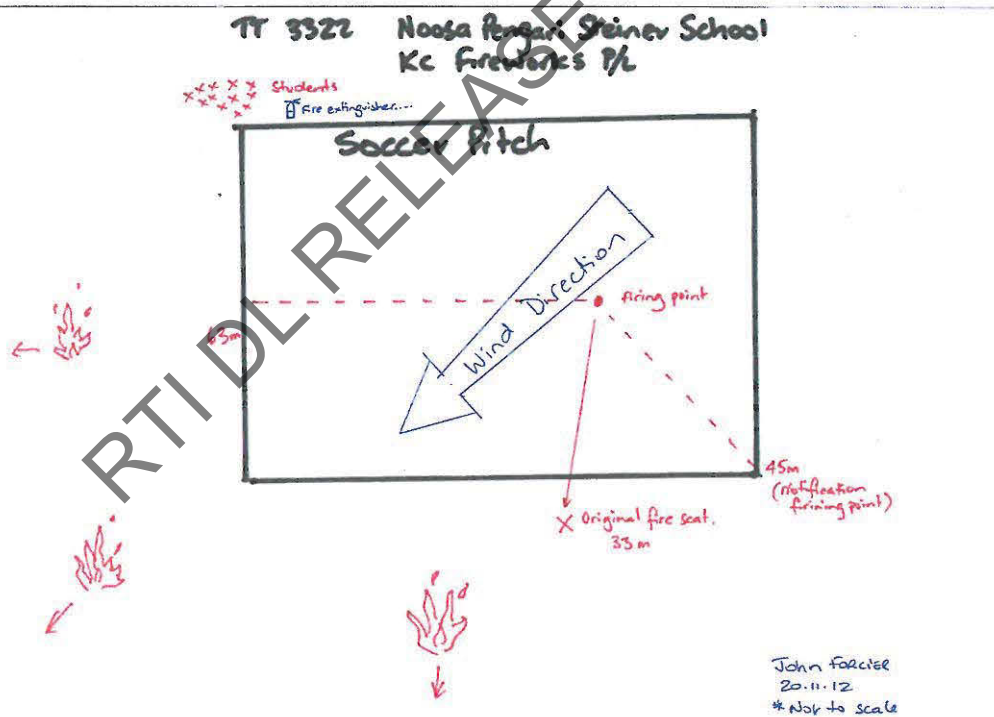
4.3.1 Initial observations of the scene noted that the firing point was a school playing field. There was some debris remaining from the display in the form of coloured streamers still on the field, however very little of the actual firework product remained. The firing points of several products were visible owing to localised debris on the grass; however investigations could not identify an exact firing point.

4.3.2 To the south of the playing field it was noted that the vegetation was brown in the foreground and burnt in the background.

4.3.3 A hand drawn sketch of the playing field was made and measurements made using a rangefinder.

4.3.4 A position was taken up based on where teacher s78B(2) identified the majority of products were located. The original tire seat (as estimated by fire officers) was measured by rangefinder to be 33 meters away. However it is impossible to say precisely where the alleged misfired product landed relevant to where it was fired from and this could account for a 2-3 meter discrepancy.

4.3.5 It was clear that the fire had progressed in a south to south-west direction away from the playing field.



**Diagram 1. Investigator's Sketch of playing field and approximate distances**

## Photographs

4.4 Photographs were taken by John Forcier of the Explosives Inspectorate.



4.4.1 Photograph 1 depicts North East corner looking to South East corner



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4.4.2 Photograph 2 depicts the North East corner looking to North West corner

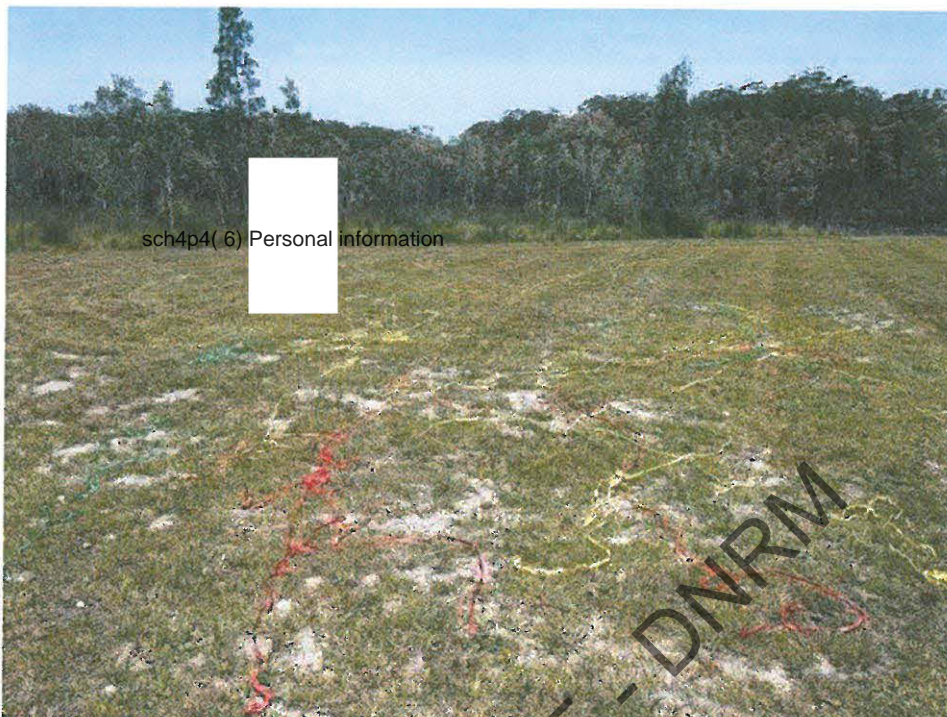


4.4.3 Photograph 3 depicts North East corner looking to South West corner



4.4.4 Photograph 4 depicts streamers from effects remaining on ground.





4.4.5 Photograph 5 depicts location of streamers on ground. It is estimated that the photo is taken at the approximate firing point of the products.



4.4.6 Photograph 6 depicts remains of used product



4.4.7 Photograph 7 depicts the southern boundary of the playing field looking south westerly and the fire seat.



4.4.8 Photograph 8 depicts view directly south from border of playing field

## Video evidence

4.5 Videos were also taken, refer to video attachments in **Task Tracker 12 3435**. These include -

4.5.1 Video 1. A 360° pan of the scene taken from where QFRS officers indicated the fire began.

4.5.1 Video 2. A short video of a "Verses of Victory" cake being tested.

## Testamentary

### Statements

4.6 Statements were not taken.

### Record of interviews

4.7 No records of interview have been taken at this time.

### Supporting Reports

4.8 In addition to technical and material safety data sheets, Martin BRADY of Fireworks Australia has provided a Quality and Compliance Assurance - Retest document, chemical composition sheet and test video of the "Verses of Victory" orange smoke cake product alleged to have misfired causing the fire. **Annex 7**

### Methodologies

4.9 The methodologies adopted to conduct the investigation included the following:—

- Examination of all of the collected physical evidence, observations, photographs, measurements and statements
- Diagram of incident site based on the examination above
- Examination of product MSDS and video

### Nature and cause

4.10 A specific product known as a "*Verses of Victory*" orange smoke cake was used in a daytime fireworks display, and this product is alleged to have caused the fire. The product is imported into Australia by Fireworks Australia Pty Ltd located in NSW and is described as a ground product in accordance with AS2178.4-1998. It is only imported on behalf of KC Fireworks Displays and is not distributed to any other operator. Material Safety and Technical Data sheets are located in **Annex 8**

4.11 The product is a ground based cake containing 50 x 30mm tubes arranged in a V configuration in two banks of 25 tubes. The dimensions are 600mm x 200mm x 250mm (refer photograph below). The product is delay chain fused.



Photograph 9 depicts a “Versus of Victory” orange smoke cake product from the same batch number as the product alleged to have failed.

- 4.12 s78B(2) avers that the product ‘misfired’ by firing a cluster of tubes instantaneously and burst their tubes causing the projectiles to take an unintended trajectory into low scrub 35 meters away. s78B(2) was unable to control the fire that was caused by the product.
- 4.13 There is no evidence available to prove or disprove that the product misfired or malfunctioned. Despite an audience, there are no witnesses available with fireworks knowledge to offer an opinion on their observations.

## Discussion and observations

- 4.14 The particular display that was conducted at the school was a little unusual in so far as its purpose was less about entertainment and more about a “science experiment” whereby pyrotechnics were to be demonstrated one at a time and students to observe and report their observations in terms of combustion and fire. A copy of the lesson plan is included in **Annex 9**
- 4.15 The display location is a sports field on the outskirts of the school and it is bordered to its south by coastal vegetation including grasses, banksias and dry sclerophyll forest.
- 4.16 The firing point is located centre field and to the west end of the field and appeared to be an area of approximately 4 square metres. There were coloured streamers remaining on the field and some remains of fireworks such as cardboard tube sections and clay debris. No significant scorch marks were evident.
- 4.17 The vegetation to the south and south west was brown and burnt.

## 6 Prevention

- 6.1 The main objectives in determining the preventative measures that were implemented to prevent a similar outcome in the future. Measures taken include:
- 6.1.1. The issue of a safety alert reminding operators to assess sites thoroughly and with respect to weather conditions and vegetation.
- 6.1.2. Product withdrawal and retest.

## Safety Alert

6.2 Immediate action was taken as a result of the incident in the way of a Safety Alert. The Department of Natural Resources and Mines issued Safety Alert 64, dated 24 January 2013 – Fireworks start bushfire. The purpose of the Safety Alert is to bring to the attention of persons conducting fireworks displays the dangers of dry vegetation and the importance of a thorough risk assessment relative to weather conditions. A copy of the Safety Alert is attached at **Annex 10**.

## Code of Practice for the Activity

6.3 The *Queensland Code of Practice – Control of Outdoor Fireworks Displays* identifies codes and standards that are applicable to the activity.

## Safety Management Systems

6.4 *The Explosives Regulation 2003* through Sections 42, 43 and Schedule 3 requires that a licence holder must have and give effect to a safety management system.

6.5 KC Fireworks Australia Pty Ltd do have a safety management system consistent with legislative requirement. The risk matrix section is located at **Annex 11**

6.6 A safety management system requires system procedures and operational procedures to be provided.

6.7 Section 38 of the *Explosives Regulation 2003* requires that a licence holder has satisfactory knowledge of the hazards associated with the explosives to which the licence would apply.

6.8 The relevant aspects to this event are included in KC Fireworks Australia's risk matrix and specifically include reference to the risk of fire in surrounding properties caused by falling debris and the risk of malfunction. The risk treatments include assessing wind conditions and increasing safety distances as required. Further treatments include assessment for combustible material, wetting down of surrounding areas and additional fire equipment.

## 7 Findings, Conclusions and Recommendations

### 7.1 Findings

The key findings in the investigation into the nature and cause of the explosives incident are:

7.1.1 The fire at the Noosa Pengari Steiner School was caused by a firework during a fireworks display conducted by KC Fireworks Displays Australia Pty Ltd. The fire and cause was reported to the Explosives Inspectorate by the operator. (Paragraph 2.14 and 2.15)

7.1.2 The specific product identified was a "*Versus of Victory*" orange smoke cake (Paragraph 2.8). The product is a delay chain fused cake of 50 tubes. It is a product imported solely for KC Fireworks and is not in use by any other operator. The "*Versus of Victory*" smoke cake requires a 60 meter minimum safety distance. This distance is located in product's technical data sheet (TDS) and material safety data sheet (MSDS).

7.1.3 The product list in the Fireworks Display Notification (Ref 12 0875) did not include a "*Versus of Victory*" smoke cake.

7.1.4 Although spectators and built infrastructure at the school were more than 60 meters from the firing point, uncontrolled vegetation existed approximately 35 meters from firing point.

- 7.1.5 The fireworks were ignited electronically by [REDACTED] s78B(2) located approximately 60 meters from the firing point. (Paragraph 2.9)
- 7.1.6 Water and extinguishers were located with [REDACTED] s78B(2) and not at the firing point. (Paragraph 2.18)
- 7.1.7 The cause of the fire was the smoke cake firework which discharged multiple effects in quick succession into dry vegetation located approximately 35 meters from the firing point. (Paragraph 2.14)
- 7.1.8 [REDACTED] s78B(2) was unable to immediately extinguish the fire and it soon became uncontrollable. The QFRS was called in to control the fire.

## 7.2 Conclusions

- 7.2.1 The fire was caused by a display conducted by KC Fireworks Displays Australia Pty Ltd, and [REDACTED] s78B(2).
- 7.2.2 The “*Verses of Victory*” smoke cake product was identified by [REDACTED] s78B(2) as being the specific product that malfunctioned. There is no information or evidence to support or rule out a misfire or malfunction of the product on 15 November 2012.
- 7.2.3 The “*Verses of Victory*” product was retested by importer Fireworks Australia. Six identical items from the same batch number C615 were fired and all operated properly with no misfires or malfunctions detected. (Annex 6)
- 7.2.4 The product is only imported for and used by KC Fireworks Australia. It has been removed from use by KC Fireworks.
- 7.2.5 The minimum safe distance for the ground products listed in the Fireworks Display Notification between 35 and 50 meters. The “*Verses of Victory*” product does not appear
- 7.2.6 Minimum 60 meter safety distance for the product was observed relevant to spectators and buildings, but not vegetation. The investigation was unable to establish the precise firing point relevant to the edge of the vegetation. However it is clear that the fire began in vegetation located inside the 60 meter safety zone – approximately 35 meters from the firing point. The firing point was too close to nearby vegetation.
- 7.2.7 The weather recordings for the area indicated that there was a breeze present; however there is no evidence available to indicate it had an effect on the display or caused debris to fall outside the minimum safe distance zone.
- 7.2.8 Whether the product malfunctioned, was insecurely mounted and fell over, or whether embers simply blew into scrub is inconclusive. The investigation has not produced any evidence that the product was incorrectly set up or fired, and there was no scorching or other indicator at the firing point to indicate the product fell over.
- 7.2.9 The operator did not make appropriate use of fire suppression devices available.
- 7.2.10 There is insufficient evidence to determine that an offence has been committed against the *Explosives Act 1999*.

## 7.3 Recommendations

### General

The recommendations are in pursuit of good work practices within the industry to ensure that *as appropriate*. The following recommendations are made to:

- prevent a similar outcome;
- minimise the consequences from activities within the type of industry; and
- encourage good work practices within the type of industry.

### Recommendations

The following recommendations are made:

- 1 KC Fireworks Australia Pty Ltd and [REDACTED] s78B(2) are required to respond to the findings, and identify the steps proposed to ensure the incident is not repeated. Particularly in relation to the positioning and use of fire suppression devices.
- 2 KC Fireworks Australia Pty Ltd and [REDACTED] s78B(2) receive written warning for failing to complete the Fireworks Display Notification to reflect accurate product use.
- 3 KC Fireworks Australia Pty Ltd and [REDACTED] s78B(2) receive written warning in relation to accurate site assessment and risk evaluation specifically related to vegetation located inside safety distances.

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## Supporting documentation for investigation

### Images

1. Google image of incident site at Noosa Pengari Steiner School, Nyell Road, Doonan.

### Diagrams

1. Site plan of playing field and approximate distances

### Photographs

1. Photograph 1 depicts North East corner looking to South East corner
2. Photograph 2 depicts the North East corner looking to North West corner
3. Photograph 3 depicts North East corner looking to South West corner
4. Photograph 4 depicts streamers from effects remaining on ground.
5. Photograph 5 depicts location of streamers on ground. It is estimated that the photo is taken at the approximate firing point of the products.
6. Photograph 6 depicts remains of used product
7. Photograph 7 depicts the southern boundary of the playing field looking south westerly and the fire seat.
8. Photograph 8 depicts view directly south from border of playing field
9. Photograph 9 depicts a "Versus of Victory" orange smoke cake product from the same batch number as the product alleged to have failed.

### Annexes:

1. Queensland Fire and Rescue report on fire
2. Fireworks Post-Notification from KC Fireworks
3. Apology letter from KC Fireworks
4. Fireworks Display Notification Ref 12 0875
5. Weather Observations for the Maroochydore area of the Sunshine Coast (approximately 30 km from fire site)
6. Preliminary Investigation Report on Post Fireworks Display Ref 12 3322
7. Re-test report on "Versus of Victory" smoke cake conducted by supplier Fireworks Australia Importers Pty Ltd
8. Material Safety Data Sheet and Technical Data Sheet for "Versus of Victory" smoke cake
9. Main Lesson Plan for Class 7 Chemistry (Combustion), Noosa Pengari Steiner School
10. Safety Alert No.64 Issued 24 January 2013 in relation to the fire
11. KC Fireworks Australia Pty Ltd Risk Matrix and Remedies