

Operational Review

3rd Alarm Hazardous Substance



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Contents

Abbreviations	3
Executive summary	4
Key Findings	5
Part 1 - The incident.....	8
Incident description	8
Hazardous Substance description	13
Part 2 - Operational review framework	14
Operational Efficiency and Readiness	14
Terms of Reference and scope of work	14
Operational review team	15
Methodology	15
Part 3 - Operational review findings	17
1 Pre-incident planning and intelligence	17
2 Mobilisation.....	17
3 Operations	18
4 Command and control	20
5 Communications.....	26
6 Safety and Hazard Management	27
7 Personal Protective Equipment (PPE)	28
8 Inter-agency and Stakeholder Relationships	29
9 Legislative compliance: environmental impact	29
10 Incident debriefing	30
Conclusions	31
Part 4 - Operational report approval	33

Abbreviations

The following abbreviations may have been used in the report text.

Fire and Emergency New Zealand Rank Titles

AC	Area Commander
AAC	Assistant Area Commander
ANC	Assistant National Commander
DNC	Deputy National Commander
SO	Station Officer
SSO	Senior Station Officer
CFO	Chief Fire Officer
CFO	Deputy Chief Fire Officer

Fire and Emergency New Zealand Command Functions/Roles/Facilities and tools

AA	Assembly area
BASO	Breathing Apparatus Support Officer
CIMS	Coordinated Incident Management System
Comcen	Communications centre
ECO	Entry control officer
eIAP	Electronic incident action plan
OIC	Officer in charge
ECP	Entry control point
FCP	Forward control point
FSA	Forward staging area
HAULET	Height, Area, Used as, Location of fire, Equipment, Tactical mode
IAP	Incident action plan
IC	Incident Controller
ISO	Incident safety officer
NAHS	National Hazardous Substances Advisor
SFP	Safe forward point
SHEP	Significant Hazard Exposure Protocol
SHURTS	Size-up, Hazards, Using, Requirements, Tactics, Structure
Sitrep	Situation report
UN#	United Nations Number

Fire and Emergency New Zealand Vehicles & Equipment

BA	Breathing apparatus
DSU	Distress signal unit
HCU	Hazmat/command unit
HPD	High pressure delivery
IGC	Incident ground communications
LMR	Land mobile radio
LPD	Low pressure delivery
PID	Photo-ionisation detector
PPE	Personal protective equipment
TIC	Thermal imaging camera

Other

CFBT	Compartment fire behaviour training
HSTLC	Hazardous Substance Technical Liaison Committee
ICAD	Intergraph Computer Aided Dispatch
ICAM	Incident Cause Analysis Method
MBIE	Ministry of Business, Innovation and Employment
NZPFU	New Zealand Professional Firefighters Union
OSM	Operational skills maintenance
PDA	Predetermined attendance
QFES	Queensland Fire and Emergency Services

Executive summary

On 21 September 2018 at 14.27 hours the Fire and Emergency Central Communications Centre (ComCen) received a call from the Ambulance Communications Centre to investigate numerous children feeling nauseous at South End School, Carterton. There had been a 1080 protest in town that day and Ambulance had been given information of a plane dropping an unknown substance on the school.

When Fire and Emergency arrived, there were three Wellington Free ambulances (WFA) in attendance and reports of 25 children feeling unwell. This number had escalated rapidly in the time the paramedics had been in attendance, so they had declared a level 2 mass casualty incident and placed their Chemical Biological Radiation (CBR) team on standby.

With this information available, Comcen contacted the on-call Commander who ensured Hazmat/Command appliances were responded from Wellington prior to them being requested from the incident ground.

The Fire and Emergency OIC immediately cordoned the school grounds preventing people from entering or leaving, and because parents were beginning to arrive to collect their children ensured an officer was tasked to manage the situation and liaise with them. A second alarm was transmitted, with the incident ultimately being upgraded to a third alarm but resourced with a fourth alarm response.

The OIC met and discussed the situation with paramedics, including the need for decontamination of several children. At this stage there was no obvious sign of any hazardous substance.

Four children were identified by WFA as status 2 and were deemed to require hospital treatment. The hospital requires all people contaminated by chemicals to have been decontaminated prior to treatment, so these children underwent emergency decontamination through a Portaflex shower and were then transported to hospital.

The Hazmat/Command Unit, and the on-call Commander arrived almost simultaneously. The Commander assumed command, halted further decontamination of children with the shower, and established the decontamination corridor.

At about this time a crew in level 3 PPE identified a steaming compost pile and it was suggested to the Police to make enquiries as to whether this could be the source of the illness. Although not ruled out as a possible cause, due to children supposedly falling ill prior to the arrival of the compost, police and the environmental officer present from the district council could not be sure this was the source. It would not be until the following Monday when the plane could be discounted, and that the compost was confirmed as the likely source of the children's condition.

Close liaison with other responding agencies was established, and due to the plane theory causing community unease and the sheer number of children falling ill, a Public Information Manager (PIM) was provided through Civil Defence to communicate with all agencies involved, media, and the community. Unfortunately, the Wairarapa District Health Board who were fielding multiple media enquiries, were unaware a PIM role had been established, meaning they were not fully informed so felt they were "working in the dark".

People from outside of the immediate school zone then began presenting at the hospital with signs of illness so a second HazMat/Command Unit was responded in case a second decontamination corridor was required. These people were found to be suffering from unrelated illnesses.

Decontamination was proceeding at a very slow rate so waiting parents were assembled in a nearby kindergarten. They were instructed to get a change of clothes for their children, report back, and when they returned their child would be decontaminated and released to them.

By this time the ill children waiting decontamination were beginning to feel better, and soon were displaying no signs of illness. The IC made a tactical decision to use the Army EOD detection equipment and the PID to ascertain each child's level of possible contamination and only decontaminate those who tested positive. He released the uncontaminated children into the care of their parents once they had changed their clothes.

Four children were decontaminated using the Portaflex shower and were transported to hospital, and 27 children were decontaminated in the decontamination corridor with seven being transported to hospital. In all 167 people were triaged making this the largest mass casualty event attended since the Wahine disaster in 1968.

At 20.38 hours a stop message was transmitted.

Key Findings

1. The initial size up by the first arriving OIC included a briefing from WFA on the situation, who indicated a need to decontaminate several children even though there was no obvious sign of a hazardous substance.
2. The hot zone encompassed the entire school site isolating the school occupants which included the paramedics arriving prior to Fire and Emergency. The triaging of the casualties was good practice, however the Ambulance OIC was unable to effectively take part in IMT meetings due to being confined to the hot zone.
3. The first arriving crews were under immense pressure from concerned parents and public while trying to contain and assess the situation at the school. These crews are commended on their management of this tense and stressful situation.
4. Defined warm and cold zones were not formally established.

5. The selected methods of decontamination were appropriate given the information received from WFA and the constraints of the equipment provided to Fire and Emergency crews.
6. The effectiveness of a wet decontamination process needs to be reconsidered where there is no evidence of a physical contaminant on clothing, skin and eyes and there are no external symptoms on casualties.
7. Efforts were made to minimise both physical and physiological effects by reducing water pressure and time in the Portaflex shower along with providing a change of clothes. Other methods of emergency decontamination such as using the building ablution facilities, removal of outer clothing, wiping down casualties with cloths and moving casualties to fresh air were not considered.
8. The arrival of the HazMat/Command Unit with the decontamination corridor allowed deliberate decontamination to be conducted which worked well, however the time required to decontaminate many people, in particular children, was excessive.
9. Using the PID when the substance is unidentified and not detected could lead to a false negative indicating to the user that there is no contaminant present. The assumption being that the environment and people are safe or uncontaminated when there potentially could be an undetected contaminant, resulting in an unsafe situation.
10. The current detection equipment available is limited to multi-gas detection and PID which are insufficient to give confidence for detecting, identifying, and monitoring many hazardous substances including many common toxic industrial and agricultural chemicals.
11. As the substance was unknown and unidentified it would have been useful to have been able to utilise the Defence Force EOD at an early stage with their specialised equipment to assist in positive detection and identification. Unfortunately, there were delays in securing their response, but note an MOU has been agreed. The effectiveness and efficiency of the operation would have been significantly improved with an earlier option to utilise their advanced DIM equipment.
12. The Command Unit ICP was established in a position that was not easily visible to crews and partner agencies as they arrived. Some personnel from other agencies were unaware of its purpose and failed to report on arrival. This resulted in some not being briefed appropriately prior to them taking actions which included entering the cordoned area.
13. An IMT consisting of critical personnel from responding agencies was not formed. This led to inconsistent interagency briefings as well as inconsistent information gathering resulting in a lack of shared knowledge.

14. Communication between the Public Health Officer (PHO) and the IC appears to have been incomplete. The PHO can assist in providing key information and offer expert advice that may have a significant contribution to the management of the incident. Public Health representatives at the incident did not fully communicate information and advice they were receiving from the PHO to the IC.
15. The National Health Emergency Plan identifies that the Fire and Emergency role and responsibilities include scene management, containment and management of any released hazardous substance, and decontamination of individuals at the scene, working in co-operation with the Ambulance Service.
16. The PIM function was identified early as being essential to the management of information leaving the incident ground. Due to the sensitive nature of the incident, and the community concern over a possible cause, the early establishment of PIM was crucial. Fire and Emergency PIM operated from NHQ but may have been more effective if this function operated from the scene.
17. PIM did not link all agencies external communications teams and one, the Wairarapa DHB, felt they were working in isolation.
18. Ill-informed comments to the media [REDACTED] were a factor in increasing the level of concern in the community.
19. Public confidence in the emergency response agencies remains high. The community has given positive feedback regarding the actions taken and the management of this incident.
20. Liaison and cooperation between agencies was positive and effective. The IMT wore identifying vests indicating their role however partner agencies and critical personnel such as the Mayor were not readily identified.
21. Fire and Emergency have a MOU with the Ambulances services who can provide a Chemical Biological Radiation (CBR) team, contactable through the ambulance clinical help desk. They have the capacity to be brought to an incident throughout the country by helicopter if required, and are fully trained to work within the hot zone.
22. The Hazmat appliance could not be recommissioned in accordance with the Schedule FL6-4 due to Workwear no longer stocking the packs carried on specialist Hazmat appliances. On line ordering (OLO) were out of stock of SHEP pads with tear out labels attached. OLO have reported they had lost the original file for the printing of the forms.

Part 1 - The incident

Incident description

At about 14:11 hours on 21 September 2018 Wellington Free Ambulance (WFA) were responded to a report of children feeling ill at South End School, Carterton. The caller indicated a plane had flown over the school and released a substance which was making the children ill. Around the same time there had been a 1080 protest occurring in the town.

The Area Manager for WFA responded in his vehicle and on arrival found the school quiet and the initial teachers he contacted unaware of any medical help being requested. He learned the school Principal had notified the Police of the incident due to the thought a plane had released a chemical. He proceeded to the tennis court where he located the students, finding two children "exhibiting signs" of exposure to chemicals and he could see they were having a reaction to something. He couldn't see or smell any chemical. The first ambulance arrived within 10 minutes and by this time the incident had escalated with upwards of 20 children presenting with varying degrees of the illness, so triage became a priority. He declared a level 2 mass casualty incident and Fire and Emergency were requested to attend. The children were feeling unwell and nauseous. A couple of them vomited, some complained of itchy skin, and some others had red teary eyes. The clinical desk was contacted however they couldn't provide adequate advice due to a chemical not being identified. They also put their Chemical Biological Radiation (CBR) team on standby.

At approximately 14:27 hours the Central Communications Centre (Comcen) received a call via ambulance to investigate an unknown chemical which was making numerous children nauseous at South End School, Carterton.

The PDA recommended a two pump turnout and Carterton 621 (CART621) and Greytown 647 (GREY647) were responded.

Comcen had requested a wind direction from ambulance on receipt of the call and the southwest wind direction was passed to the responding appliances.

At 14.33 hours CART621 arrived at the school gate and transmitted a K55. The OIC could see three ambulances in attendance and an ambulance manager's car located at the gate. He received a briefing from ambulance staff and was informed there were five very sick children, and while he was receiving the briefing another 10 children feeling nauseous were reported. The Principal indicated the illnesses began at about 12.30 hours and didn't know exactly where the sick children had been at that time. The OIC and WFA agreed they were dealing with an unknown hazardous substance and they would be required to isolate the incident as best they could to prevent further people becoming compromised.

At 14.35 hours Carterton 622 (CART622) who had self-responded arrived at the incident. The OIC CART622 was instructed to coordinate the public on scene. This was required due to

parents arriving at school to collect their children and the need to prevent these parents becoming involved in the incident. A cordon was placed across the main gate to the school and no one would be permitted to enter or leave the school grounds without approval from the WFA.

At 14.35 hours Comcen, on the instruction of the duty executive officer, responded the nearest Hazmat/Command Unit, Wellington 2118 (WELL2118), the HazMat support unit, Kilbirnie 2416 (KILB2416), and Kilbirnie 241 (KILB241) to provide a support crew for the specialist appliances.

GREY647 arrived at 14.37 hours. The OIC was appointed Safety Officer and the crew assisted CART622 with management of the parents and public.

At 14.37 hours a sitrep from CART621 indicated there were 25 students with some form of vomiting and nausea and they were relocating their appliance to the Safe Arrival Point (SAP).

By now more parents had arrived at the school and many were demanding to pick their children up and take them home. All entrances to the school were cordoned and it was explained to the parents that all the children were in the best possible care and no one would be allowed in or out until it was safe to do so. Parents whose children were sick had been contacted by phone and informed of the fact and other parents were told that if they hadn't been informed their child was sick then they were not showing any signs and at this time were unaffected. Two crews were assigned to support and look after the parents. These first arriving crews faced huge pressure from parents and the public while trying to assess what had occurred at the school.

Giving information and advice to parents assembled at the cordon was difficult in part due to the wind direction, so the same announcement had to be repeated. An attempt to use the PA system on GREY647 was ineffective because of interference.

A second alarm was transmitted at 14.42 hours and police were requested for crowd and traffic control at 14.43 hours.

At 14.48 hours a sitrep indicated there were two crews in BA and splash suits, they would attempt to close down SH2 once they had more personnel and were assisting ambulance. They also asked if CAA could get some information on the plane that was flying over and if it was a topdressing plane.

At 14.56 hours a sitrep was transmitted indicating a Command Point (South End Command) had been established and a Safety Officer had been appointed. At 14.57 hours Fulton Hogan were requested for traffic control.

At about this time WFA needed to transport the sick children to hospital. The District Health Board (DHB) have a policy whereby they won't treat hazardous substance victims until they are decontaminated, and WFA were concerned if they had children who were not decontaminated then their ambulances would be considered contaminated.

At 14.59 hours Masterton 617(MAST617) arrived and the OIC was appointed Decontamination Officer. A Hot Zone was established at the school fences and gates and the crew was instructed to set up a Portaflex shower to decontaminate the affected people. This method of decontamination was made in conjunction with advice received from WFA personnel.

At 15.07 hours a sitrep was passed indicating they were operating under a CIMS structure and were undertaking an interagency tactical meeting, preparing a decontamination shower and triage point.

At 15.15 hours another sitrep was passed indicating there were five status 2 patients and 25 status 4 patients, preparing decontamination and then all patients will be transported to hospital. WFA have Westpac helicopter transporting further ambulance staff.

At this time Wairarapa Hospital (Masterton) called in saying they required a decontamination site set up for two patients from Carterton and were advised by Comcen to send them back to the scene as all the decontamination resources are there.

At 15.21 hours a third alarm and a Safe Forward Point (SFP) location were transmitted.

At about this time there was a thought the cause of the illness may be due to a recent LPG installation at the school so one crew in level 2 and BA investigated whether this could be a possibility however it was found the LPG was already turned off. At 15.40 hours a sitrep indicated a crew in level 2 BA were checking and isolating LPG cylinders, decontamination had been set up and they were about to decontaminate the patients. The sitrep also reported the rescue helicopter was landing at Carrington Park and a WFA vehicle will transport these personnel to the incident.

By this time the Portaflex shower had been set up and the decontamination of the children began. Prior to decontamination the sick children were staged in ambulances, while others awaiting decontamination were in a classroom. The Decontamination Officer was mindful of the sensitivity around decontaminating children and arranged the site layout where ambulances shielded the shower from view ensuring modesty was addressed. There was some initial difficulty in getting the children through an unpleasant cold shower, so firefighters reassured them by making the decontamination experience into a game as well as assisting each child by walking through with them. This meant it took quite some time to decontaminate the four worst affected children who were the only ones to go through the Portaflex shower. One mother became very animated and irate which upset the children further. Another parent also became very agitated and was removed by the police.

WELL2118, KILB2416, KILB241, REGION3B and HUTTWAI1 all arrived at about 15.50 hours.

REGION3B was briefed by the IC, received a handover and at 16.13 hours assumed the role of Incident Controller and transmitted a K45.

The priorities identified were:

1. 20 children in the Hot Zone showing signs/effects and needing to be decontaminated and assessed in hospital.
2. Liaise with parents to ensure they don't become an issue.
3. Triage of the remaining children.

The incident structure at this time consisted of IC, a Liaison Officer, an Information Officer, Operations, Decontamination Officer, Hazard Control Officer, Safety Officer.

On the instruction of the IC the use of the Portaflex emergency decontamination was ceased and with the arrival of the HazMat/Command unit (KILB2416) was replaced with deliberate decontamination using the decontamination corridor which was set up just inside the main gate. The OIC of KILB2416 became the Decontamination Officer. The officer he replaced assumed a Liaison role.

About this time the Carterton Mayor arrived at the scene and he became invaluable with helping the crews and was assigned to parent welfare to assure the parents their children were being well cared for. He became a vital conduit between Fire and Emergency and the parents of the affected children.

Unconfirmed reports were being received that people outside the immediate area of the school were reporting signs of falling ill so at 16.22 hours a second HazMat/Command Unit was requested to respond with full hazmat capability in case it was required to be deployed to another area. This appliance was staged at Masterton fire station.

A crew dressed in level 3 PPE were instructed to investigate the school to try to determine the source of the contamination. A grid search was planned and at 16.25 hours a steaming compost heap was identified in an adjoining property at the southern end of the school. A UHF radio message by the crew sought to ascertain if the pile was dumped at about the time the children became ill. This information was passed on to the Police as well as being discussed with the District Councils Environmental Officer at the incident as being a possible cause. This crew searched the remainder of the school and found nothing else which might have caused the illness.

At 16.01 hours the decontamination corridor was established.

At 16.32 hours Comcen upgraded the incident to reflect the resources that had been dispatched and generated a fourth alarm.

At 16.44 hours a sitrep indicated the crews have triaged 20 children, the decontamination corridor is established, environmental officer is on site, public health is responding to the incident, and

there are unconfirmed reports of people self-responding to local health care providers and awaiting identification of the substance.

The District Council Environmental Officer had contacted numerous local industry and topdressing firms to ascertain if their process or products could possibly be involved. The EO identified the only chemical being top-dressed at this time was sulphate of ammonia and this information was passed to the Hazardous Substance Scientist in Queensland.

At 16.48 hours a sitrep indicated 13 status 3 patients had been decontaminated and a further 126 parents, children and staff are to be decontaminated and sent to hospital.

The representative from CDEM arrived, liaised with the IC at the ICP and offered to provide public information and welfare support. A public information manager (PIM) was at the incident within 20 minutes and was able to link with communications team at Fire and Emergency NHQ to ensure consistent messages were given to media. There was a need to try to reduce the level of public anxiety with clear accurate messages as to what the situation was and what people should do. The Wairarapa District Health Board, who were fielding multiple media enquiries, were unaware the PIM role had been established and due to the lack of information felt they were working in the dark. [REDACTED] did cause some unwarranted public anxiety with an inaccurate media comment.

At 17.06 hours a request was made to respond the Army EOD to assist in sampling to identify the substance causing harm.

At about 18.00 hours the parents of 40 children still waiting to be decontaminated, were taken to a local kindergarten about 50m away from the school. Fire and Emergency and Red Cross personnel assisted in managing this welfare facility. The parents were instructed to get dry clean clothes for their children and when they returned with the clothes their child would be decontaminated. This would ensure no child would be left without a parent after decontamination. Food was organised for the people at the incident, and Red Cross issued about 150 blankets.

At 18.08 hours a sitrep indicated decontamination was continuing and children were being released to their parents. Also waiting for EOD who will identify the substance and the incident is gearing up for a long duration.

Not long after this message was transmitted, WFA reported the sick children were now apparently feeling good, running about and appearing healthy.

When EOD arrived (at about 18.45 hours) they advised they couldn't assist any further as they could not detect any product to identify. Based on this, and a change in tactics to stop decontamination, they were stood down.

The tactic of deliberate decontamination was ceased and a PID was used to check each person for contamination. Should the PID reading be negative the children would change clothes, be

released to their parents who would be instructed to wash the clothes they had been wearing and to report to the hospital if any signs of illness reoccurred.

At 18.49 a sitrep indicating the above was transmitted.

The use of the PID sped up the decontamination process significantly and by 19.41 hours the decontamination was complete.

Four children were decontaminated using the Portaflex shower and were transported to hospital, and 27 children were decontaminated in the decontamination corridor with seven being transported to hospital. A total of 167 people were triaged making this the largest mass casualty event WFA attended since the Wahine disaster in 1968.

At 20.38 hours a stop message was transmitted.

Hazardous Substance description

Emergency responders received early information that an aircraft had flown over the school and there had been a release of some chemical from this aircraft. Although this was an unlikely source of contamination, the Police and CAA vigorously investigated this theory until it could be discounted with certainty. Eight planes were determined to have been in the area and none of these were topdressing aircraft, so should this have been the source of contaminant it would have had to have been a deliberate act. The aircraft theory was finally discounted on Monday 24 September.

There were also reports of mushroom compost being delivered to a neighbouring property. It was reported the compost arrived at about 13.15 hours. Due to the principal indicating there were children reporting with illness at 12.30 hours, initially it was thought to not be a factor. Later investigations by the police found the timelines to be inaccurate.

The mushroom compost was very warm (it was heated to about 80°C prior to being transported) and delivered to a property adjacent to the school. The pile was dumped some 10m from the school boundary emitting a sulphurous smell. It was subsequently deduced the first children became sick within 5 minutes of the delivery.

Mushroom compost produces hydrogen sulphide (H₂S) gas among other things and the symptoms of headache, dizziness and nausea, are consistent with H₂S poisoning. On the morning of Monday 24 September, the Police visited and spread the compost pile which was still steaming, and one person became affected by the gasses given off.

It was concluded that the gasses given off by the pile of mushroom compost was the cause of the children's illness.

Part 2 - Operational review framework

An Operational Review examines how Fire and Emergency New Zealand (Fire and Emergency) responds to large, significant and/or unusual incidents. It considers the application of policies, procedures and operational instructions as they applied to the incident. But its primary focus is to review the incident to assist officers and firefighters to share knowledge, experience and to provide a forum to share lessons learned and inform both operations and training.

Operational Efficiency and Readiness reviews focus on the facts and do not provide conjecture or alternative opinions that could or should have been deployed. The review identifies key findings to inform senior managers about any corrective actions required as well as identifying actions that worked well. The operational review reports are written for frontline firefighters to support their training, continuous improvement and knowledge sharing. Once completed, all reports are published in the Operational Efficiency webpage for all to share.

Operational Efficiency and Readiness

Operational Efficiency and Readiness (OER) is required to be independent and objective, to provide quality assurance advice to management to support continuous improvement in regard to the operational efficiency and operational readiness of Fire and Emergency New Zealand.

The Incident Cause Analysis Method (ICAM) is used to guide the conduct of operational reviews.

Terms of Reference and scope of work

The Team Leader of the Operational Review Team has the authority to second additional resource, as required, to carry out this review.

1. Analysis of Communications Centre's actions:
 - a. receipt of the call
 - b. mobilising and appropriate appliance response (PDAs)
 - c. Service Delivery Guidelines
 - d. communication between the Communications Centre and the incident ground
 - e. appliance moves required to maintain operational cover across the province.
2. Analysis of incident ground management:
 - a. command and control procedures
 - i. initial actions of first arriving officers
 - ii. Commander notification and response
 - iii. incident management structure
 - iv. effectiveness of strategies and tactics applied
 - v. resource allocation and function
 - vi. risk analysis
 - vii. recording and reporting (field notes, SitReps etc.)

- b. were the appropriate operational instructions applicable to this incident implemented
 - c. knowledge and adequacy of water supplies available in the immediate area
 - d. operation of Coordinated Incident Management System (CIMS)
 - e. inter-agency and/or stakeholder relationships.
- 3. Analysis of safety and wellbeing:
 - a. application of the Safe Person Concept
 - b. injuries to Fire and Emergency personnel (L2 Investigation) or members of public
 - c. appropriateness and effectiveness of PPE
 - d. monitoring of safety and wellbeing during incident
 - e. welfare of Fire and Emergency personnel.
- 4. Analysis of emergency planning and preparedness
 - a. effectiveness of Site and/or Tactical plans
 - b. application of plans and procedures
 - c. familiarisation of Fire and Emergency personnel with site.
- 5. Analysis of the findings of the fire cause investigation, including:
 - a. fire safety awareness of the occupants of the building
 - b. status and effectiveness of the evacuation scheme.
- 6. Analysis of the liaison, communication and coordination of partner emergency services and/or government agencies and/or Territorial Authority officers who attended and/or had a role, or had an interest in the fire and/or firefighting operations.
- 7. Analysis of any other information that has relevance to this investigation.
- 8. Provision of any other information arising from the review that may be of benefit for fire risk management, safety and wellbeing, operational practices and the safety of others in the future.

Operational review team

Sponsor:	Bruce Stubbs	Assistant National Commander
Team leader:	Doug Bennett	Manager Operational Efficiency and Readiness
Team member:	[REDACTED]	UFBA representative
SME	Bryan Dunphy	SSO Hawkes Bay

Methodology

The operational review team used the Incident Cause Analysis Method (ICAM) Advanced Investigation Techniques model to investigate this incident.

Once assembled, the review team visited the site to get a visual perspective of the location and surrounding environment.

A Command debrief and separate multiagency debrief were conducted at the Carterton Fire Station beginning at 1800 hours on 26 September 2018. All Fire and Emergency personnel in a command role attended the command debrief and the multiagency debrief had representation from the following:

- Fire and Emergency New Zealand
- NZ Police
- Wellington Free Ambulance
- Regional Public Health
- Wairarapa DHB
- WREMO
- Red Cross
- WEQC (Civil Defence)

A further meeting was conducted between Fire and Emergency Commanders and the Principal to discuss the incident. An invitation was extended to the board of trustees to meet should there be any concerns.

Part 3 - Operational review findings

This section outlines the findings from the operational review investigation based on the investigation's terms of reference. Generally, the findings are grouped chronologically from pre-incident to mobilisation and also cover operational and command and control aspects. Specific attention is directed at safety and PPE. Other findings relate to external agencies, legislative compliance and the post-incident debrief. The Operational Review team will measure compliance against Fire and Emergency Operational Instructions and Policy.

1 Pre-incident planning and intelligence

Our expectations

That the Operational planning policy (RD2 POP) has been followed to identify sites within the first response zone where significant fire or other risks may indicate the need for a Site Report and/or Tactical Plan.

Our findings

A current Site Report was available for the school and contains tactical considerations, however due to the nature of this event the report was of limited value.

2 Mobilisation

2.1 Communications Centre

Our expectations

That the Central Communication Centre would meet the schedule of *incident response service delivery guidelines (N7a)* and all standard operating procedures in relation to call receipt and dispatch, as well as incident ground communication and subsequent actions.

Our findings

The response of the first appliance by Comcen was two minutes 20 seconds after the initial call which is outside the requirements listed within N7a. This delay appears to be related to the information the ComCen were trying to gather for responding appliances.

Initial actions which included the early response of a dedicated Hazmat appliance and Command Unit showed initiative and should be commended.

Comcen ascertained wind direction from Ambulance and this was communicated to first responding appliances.

2.2 Response

Our expectations

That responding appliances (paid and volunteer) would meet the *incident response service delivery guidelines (N7a)* in relation to call notification, response from station, through to arrival at the incident.

Our findings

Initial appliances met the guidelines contained within N7a in relation to response from the station and arrival at the incident.

2.3 Assistance mobilisation and cover moves

Our expectations

That the priority message requests and assistance message requests would be processed in a timely manner and made using the greater alarms process as outlined in the *mobilisation policy (M2)* and *land mobile radio communications policy (M3-2)*. Also, actions were taken to provide operational cover across the affected stations.

Our findings

Due to a projected one-and-a-half-hour travel time, dedicated Hazmat/Command Unit appliances were dispatched from Wellington prior to an assistance message being transmitted.

The alarm level was updated by ComCen to fourth alarm when appliances on scene reached a fourth alarm response.

Comcen took appropriate actions to ensure there was operational cover across affected stations.

3 Operations

3.1 Operational Skills Maintenance (OSM) compliance

Our expectations

The review team expected to find that all personnel would be in compliance with the requirements of the *Operational Skills training policy (OS5 TRP)*.

Our findings

All personnel were compliant regarding Hazardous Materials, Medical, and Respiratory Protection.

3.2 Safe driving to incident and appliance positioning

Our expectations

The review team expected that officers and drivers would:

- ensure the principles of the Driving Policy (FL1 POP) were adhered to when responding to the incident
- ensure the principles of the Driving Policy (FL1 POP) were adhered to when parking appliances with care for firefighter safety, by ensuring they are parked away from exposure to fire, building collapse, or other hazards
- re-evaluate the position of the vehicle as the incident progressed.

Our findings

There were no issues identified during response to the incident.

The wind direction was communicated to responding appliances en route and on arrival appliances were positioned considering this.

Appliances were relocated when a Safe Forward Point (SFP) was identified.

The Command Unit ICP was established in a position that was not clearly visible to crews and partner agencies as they arrived.

3.3 Respiratory Protection (BA & APR)

Our expectations

The review team expected to find compliance with all aspects of:

- Policy - Respiratory protection equipment (E3-2 POP)
- Respiratory protection equipment (E3-2 RG)
- Air purifying respirator guide (E3-2 GD)
- Quick reference guide - BA Draeger PSS 5000: Telemetry Set and Equipment
- BA maintenance and testing manual (RD5-1).

Our findings

There was no evidence of noncompliance with any of the respiratory protection policies

4 Command and control

4.1 Size-up

Our expectations

The review team expected to see the first arriving officer undertake an initial size-up and risk assessment of the incident site in line with the principles outlined in Section 3 of the *Command and Control Technical Manual (M1 TM)*. It is expected that the size-up would include a 360° observation if possible, information gathering, hazard identification and an assessment of the potential for escalation.

Our findings

The first arriving officer received wind direction information en route and positioned the appliance appropriately. On arrival the OIC saw three ambulances in attendance and a WFA commander's car located at the gate.

He gathered as much information as he could from the WFA personnel present, ascertained there were sick children requiring hospital treatment, that an unidentified chemical had been involved, the school was not isolated, and parents were beginning to arrive to collect their children. He then initiated tactics to ensure no one else became compromised and to support the WFA personnel.

4.2 Situation Reports

Our expectation

The review team expected to find that:

- the initial situation report (SitRep) to Comcen was transmitted as per the requirements of the Land Mobile Radio Communications operational instruction (M3-2) using the "HAULET" format
- incident ground SitReps were transmitted at regular intervals throughout the duration of the incident, to keep officers and firefighters informed of command structure, strategy and tactics, as per the principles outlined in the Command and Control Technical Manual (M1 TM).

Our findings

An initial SitRep was transmitted within four minutes of arrival and it contained information that there were 25 students with some form of vomiting and nausea, a SFP location was announced, and their appliance was relocating to the SFP.

One officer expressed concern with the inaccurate recording of his Sitrep content by Comcen.

Further SitReps were transmitted at regular intervals for the duration of the incident.

The structure of the SitReps was appropriate and content was comprehensive and current.

There is no evidence to suggest Incident Ground sitreps were communicated to personnel at the incident.

4.3 Incident management team structure

Our expectations

The review team expected to see a command structure and incident management team established for an incident of this magnitude in accordance with Section 4 of the *Command and Control Technical Manual (M1 TM)*. It is also expected that the command and control structure implemented would provide clear lines of communication and would be a major contributor to the successful conclusion of the event.

Our findings

The Fire and Emergency roles within the incident management team (IMT) structure were appropriate for an incident of this size and complexity. The incident was structured in line with HazMat management principles.

At every handover there was clear communication and K45 messages were transmitted.

The complete structure consisted of:

- Incident Commander
- Operations Commander
- Logistics Commander
- Decontamination officer
- Safety officer
- Liaison Officer
- Information Officer

A CIMS style IMT with members of each critical support agency was not formed. A PIM was supplied by WREMO (Wellington Region Emergency Management Office)

4.4 Hazardous substance management

Our expectations

The review team expected to find:

- any incident involving a hazardous substance would be managed in accordance with Hazardous Materials operational instructions (H1-H6) and the Hazardous Materials Technical Manual (H1 TM)
- the first arriving officer and subsequent Incident Controllers adopted a strategy and developed tactics based on the initial size-up and/or information obtained by monitoring the incident
- the 'Safe Person Concept' and 'Dynamic Risk Assessment' processes were considered when implementing the chosen tactics as outlined in Section 3 of the *Command and Control Technical Manual (M1 TM)*

Our findings

The initial strategy based upon the size up conducted was to cordon the school to ensure no one could enter or leave, to contain and inform the parents who were beginning to arrive, and to decontaminate the children prior to transport to hospital.

The second arriving officer was detailed to manage and control the public, while the OIC arranged for the school's entrances to be cordoned. Closure of the State Highway was also prioritised.

The third arriving OIC was appointed Safety Officer.

In conjunction with WFA a decontamination plan to enable the children to be received at hospital was implemented and the OIC of the fourth arriving appliance was appointed Decontamination Officer. Emergency decontamination of the worst affected children took place using the Portaflex shower once it arrived on scene.

The initial plan was effective in isolating the incident, preventing escalation, containing and reassuring parents, and enabling the children to be transported to hospital.

As the incident developed and specialist resources became available the decontamination tactical options available to the IC widened. Decontamination of the children became deliberate decontamination using the decontamination corridor. When information became available that the children were no longer displaying symptoms, the need to decontaminate was assessed by using a PID. No substance was detected by the PID and decontamination was discontinued.

(NB: The PID is a very useful instrument when used within its operating parameters, however has limitations especially when dealing with unidentified substances. As the substance was still unknown and unidentified the Army EOD equipment was requested to assist in positive detection and identification.)

On receiving information people were apparently affected from outside of the school zone, the IC planned for escalation of the incident by staging a further specialist decontamination appliance in Masterton.

4.5 Decontamination procedures

Our expectations

The review team expected to find any decontamination would be carried out as detailed in the Decontamination policy (G7 POP) and following the decontamination process as described in the Hazardous Materials Technical Manual, figure 5.11.

Our findings

- Decontamination of the most severely affected was delayed until the arrival of a Portaflex shower.
- Efforts were made to minimise physical and physiological effects by reducing the water pressure and time in the shower and providing a change of clothes. The Portaflex, high flow cold water shower is designed for firefighter decontamination wearing L3/L4 PPE and BA. It is not designed or recommended for public decontamination. Other methods of emergency decontamination could have been considered including removal of outer clothing, wiping down casualties with cloths, moving casualties to fresh air.
- Warm or cold zones were not formally established however there were clear working areas, distinguishing the warm/cold zones.
- All crews involved in conducting decontamination were dressed in the appropriate level of PPE.
- The arrival of the decontamination corridor allowed for deliberate decontamination however the time to decontaminate such large numbers of people was excessive. Decontamination crews had difficulty clearly communicating instructions to children while wearing BA.
- Crews were briefed on the sensitive situation of decontaminating young children and the need to preserve their modesty.
- Slight undulations made it difficult to find a suitable site for the decontamination tent. Waste water pooled in the shower chambers rising above the board walk.
- The humidity within the tent caused fogging of L3 visors hindering the decontamination process
- It was difficult for decontamination crews to work effectively, particularly the left side as it is narrow and cramped
- Interior tent lighting during the hours of darkness was inadequate

- Later in the incident, as the symptoms of the remaining group were significantly improving, the IMT instructed the PID to be used to determine if decontamination was still necessary. Using the PID when the substance is unidentified and not detected could lead to a false negative, indicating that there is no contaminant present when in fact there is.
- The Army EOD advised they couldn't assist any further when their equipment indicated there was no product found to identify. Based on this, and due to a change in tactics to stop decontamination, they were stood down.

4.6 Incident ground structure

Our expectations

The review team expected to find the appropriate incident ground facilities in place to suit the size and complexity of the event, in accordance with Section 4.2 of the Command and Control Technical Manual (M1 TM).

Our findings

An early SFP was identified and communicated to all responding appliances.

Initially a cordon was established at the school gates with the perimeter fence deemed to be the limit of the cordon. This was to keep people within the school grounds, and to prevent more people from entering. This cordon tape was reinforced with hot zone tape as decontamination was set up.

The zones were indistinct and lacked some clarity however were effective in excluding and containing people.

WFA personnel were prevented from leaving the hot zone making communication with the IC available only by face-to-face. This affected other agencies understanding of the agreed plan.

An ICP was established, however not all support agencies were aware of the requirement to report to the facility prior to becoming involved on the incident ground.

An assembly area, forward staging area and forward control point were established.

4.7 Resourcing of the incident ground

Our expectations

The review team expected to find that the incident was resourced in accordance with standard operating procedures using the "make alarms" procedure as per:

- the Land mobile radio communications policy (M3-2), and
- Section 4.6 of the Command and Control Technical Manual (M1 TM).

Our findings

All requests for additional resource were made using the greater alarm system. Additional special appliances were requested on an ad hoc basis as appropriate. One appliance was identified as having self-responded.

There was confusion at the incident as to what appliances would be responded on third alarm. Personnel on the fireground were told by ComCen the upgrade to third alarm would only increase the incident resources by one hazmat unit. This was most likely due to a self-response earlier and a pump allocated to respond with a hazmat unit.

Third alarm was transmitted on three occasions:

- At 15.21 hours by GREY647
- At 15.40 hours by GREY647
- At 16.18 hours by WELL2118

Fourth alarm resources attended the incident without a fourth alarm being transmitted. Comcen adjusted the alarm level to reflect the resource.

4.8 Commander notification and response*Our expectations*

The review team expected to find the appropriate notifications of an escalating incident to the on-call Commander (and subsequent Commander response) reflected the Region's *Commander and Support Officer Notifications and Response policy*.

The review team expected the executive response to be timely, and that Commanders would arrive on the incident ground dressed in appropriate uniform for the role they are to assume.

Our findings

Appropriate notifications were made to on call Commanders and the response from Commanders was timely.

The first arriving Commander received a briefing from the OIC, assumed command, and appointed the outgoing IC to the role of Operations Commander.

The second arriving Commander filled a Liaison role with agencies such as Public Health, District Council Environmental Officer and WREMO (who supplied the PIM)

4.9 Command Unit operations*Our expectations*

The review team expected the command unit to provide excellent command support to commanders, with operators having in-depth knowledge of systems, including the eIAP as described in the *HazMat Command Vehicle Technical Manual (HCV_1)*.

Our finding

The initial ICP "South End Command" was established early using GREY647.

WELL2118 provided excellent command support.

There is evidence the HCU prepared and monitored the IAP, populated command whiteboards, implemented a communications plan, controlled entry to the fireground, kept an activity log, and communicated with the fireground and Comcen

The Command Unit ICP was established in a position that was not clearly visible to crews and partner agencies as they arrived. This may have contributed to support agencies not reporting to the facility prior to becoming involved on the incident ground.

5 Communications

5.1 Incident ground communications

Our expectations

That an effective communications plan was developed and employed based on the command and control policy (CAC-1). This plan should contribute to the safety and effective management of the incident. The style of communication utilised will be dependent on the size and scale of the incident. Communications may be achieved through a combination of electronic devices and/or face to face discussions,

Fire and Emergency personnel will routinely carry IGC radios as part of their general operational equipment to enhance fire ground safety for crews at the incident and ensure fire ground communication is effective when face to face communication is not appropriate.

Our findings

A two channel communications plan for Fire and Emergency personnel was implemented. The operations channel was used by decontamination and personnel in level 3 who were trying to identify the source of the contamination. External agencies did not have access to Fire and Emergency fireground channels.

Communication with other agencies was face to face. Fire and Emergency (the lead agency) were comfortable communication with other agencies was effective, however at the debrief it was identified many did not have all the information they required and felt interagency communication was poor. If face to face briefings are used as the preferred communication, regular structured briefings at the ICP are required to ensure all agencies are aware of the plan.

A PIM was appointed to ensure information and advice leaving the incident was appropriate and consistent. This PIM liaised with the NHQ communications team, however not all agencies received the information. The DHB who were fielding numerous media and public enquiries failed to receive any information from PIM.

5.2 Land Mobile Radio (LMR)

Our expectations

The review team expected to find that effective communications would exist between the ComCen and responding appliances.

Our findings

There were no reported issues with LMR

6 Safety and Hazard Management

6.1 Compliance

Our expectations

That Fire and Emergency comply with the *Health and Safety at Work Act 2015* at all times.

That a Safety Officer be appointed in compliance with *Operational Safety (IS1)* and Section 5 of the *Command and Control Technical Manual (M1 TM)*. All hazards and control measures will be recorded on the Incident Ground Hazard Assessment form and transferred to a Hazard Assessment Board and/or eIAP.

Our findings

The appointment of a Safety Officer complied with IS1 and M1 TM.

Hazards were identified, and control measures were implemented. The hazard board was populated, and the hazards risk assessed. There is no evidence the control measures were assessed as adequate by the IC.

6.2 Personnel welfare and monitoring

Our expectations

The review team expected to find that processes and systems were in place to monitor operational crews for fatigue, and that robust control measures were in place to establish a work rotation for prevention of overuse of crews, in accordance with *Operational safety (IS1)*.

Additionally, there is an expectation that a rehabilitation area was established to ensure that fire fighter welfare was maintained, and to allow for recuperation.

Our findings

The incident, although resource heavy and of long duration, did not pose a fatigue danger for crews.

There was consideration given to food for children, parents, and response personnel.

As it became cooler, waiting parents were relocated into an adjacent kindergarten to wait for the children being decontaminated.

6.3 Injuries to Fire and Emergency personnel or members of the public

Our expectations

The review team expected to find that all policy and procedures would have been complied with in regard to the management of any injuries to Fire and Emergency personnel or members of the public.

Our findings

There were no reported injuries to Fire and Emergency personnel or members of the public.

7 Personal Protective Equipment (PPE)

7.1 PPE performance

Our expectations

That PPE performed to the expected level and that if any issues were identified they would be reported.

Our findings

The PPE performed to the expected level.

7.2 Wearing of PPE

Our expectations

The review team expected to find that all personnel would be dressed in the appropriate level of PPE, in line with the requirements of the *Fire and Emergency Uniform and Personal Protective Equipment (PPE) manual (N2 TM)*.

Our findings

All personnel were dressed in the appropriate level of PPE in regard to the task they were performing.

A crew sent to investigate if leaking LPG was the cause of the illness were dressed in level 2, crews assigned to try to identify chemical contamination were dressed in level 3.

Decontamination crews were dressed in level 3.

8 Inter-agency and Stakeholder Relationships

Our expectations

That effective stakeholder liaison was established and maintained during and after the incident.

Our findings

A Sitrep about 35 minutes after the arrival of the first appliance indicated they were working in a CIMS environment and the incident would be managed as a multiagency CIMS incident.

During the incident close liaisons were required between Fire and Emergency and the following:

- Wellington Free Ambulance
- NZ Police
- Public Health
- WREMO (CDEM)
- Wairarapa DHB
- District Council (Mayor)
- District Council Environmental Officer
- Red Cross
- School Principal and Board of Trustees

It was apparent in the debrief that all agencies had worked very closely together to manage the incident, and there is a commitment to ensure this continues post incident. Being a smaller community many of the key people involved are known to each other.

9 Legislative compliance: environmental impact

Our expectations

The review team expected to find that Fire and Emergency had met all its responsibilities under the Resource Management Act. In particular, that there was a record of:

- the activity that was undertaken (i.e. was it a discharge of contaminant to air, water or land where it might enter water)
- whether the activity was necessary for the purposes of saving or protecting life or health, or preventing serious damage to property, or avoiding an actual or likely adverse effect on the environment

- whether Fire and Emergency conduct was reasonable in the circumstances (i.e. were the actions within the powers afforded by section 39 and/or 40 of the Fire and Emergency Act 2017 powers)
- how the effects of the activity were mitigated or remedied after the activity occurred, whether there were any other practicable actions that could have been undertaken to do so, and if they were not undertaken, why not.

Our findings

Initial emergency decontamination of the four most affected children was by use of the Portaflex shower. Due to volume, the runoff is unable to be contained and was allowed to run to the drain. This was identified as a hazard and communicated to the Environmental Officer.

Once the dedicated Hazmat appliance arrived and the decontamination corridor was established, all decontamination waste was collected and stored in bladders. These bladders were transported by a contractor to Wellington and appropriately disposed of after assessment by environmental personnel.

Fire and Emergency personnel used the powers in the Fire and Emergency Act 2017 to prevent people entering or leaving the vicinity of the emergency. The use of cordons and a Hot Zone were necessary and appropriate.

10 Incident debriefing

Our expectations

The review team expected that a debriefing of the incident was planned and held in a timely manner and structured to allow all Fire and Emergency personnel who attended the incident to have input.

Our findings

A command debrief was facilitated by OER was conducted at the Carterton Fire Station on 26 September 2018. This gave the opportunity for all of those in command positions to examine their decisions and actions during the event.

Immediately after the command debrief a multiagency debrief was facilitated by local Commanders. Personnel from all agencies involved attended and were able to reflect on their role and how it contributed to the overall resolution of the incident. The agencies identified what worked well for them, what didn't work so well, and how improvements could be made.

Conclusions

This incident at South End School was not only unusual due to the sheer number of persons requiring medical and decontamination assistance, but unusual due to the intense national public interest caused by misinformation being circulated by media [REDACTED]

The appointment of a PIM at the incident site allowed for a consistent message to be broadcast by all who were contacted by the PIM. Unfortunately, not all agencies requiring this information were identified.

Managing the triage and decontamination of the 167 affected people required significant resource, however this was only one part of a much more complex incident. The management of anxious children, parents and the town's citizens also demanded a lot of time and resource. Due to some of the mis-information being circulated by the media [REDACTED] the Mayors presence at the incident proved to be extremely helpful. This was particularly so in assuring the parents their children were being very well cared for and their children's health was of primary concern.

Finding a suitable flat site for the decontamination corridor was made difficult by even slight undulation resulting in waste water pooling in the shower chambers. The duct boards were not high enough to clear the pooled water. The Decontamination Officer also commented that it was very awkward for crews in L3/BA to work and the humidity which caused visors to fog up inside the confined space of the tent hindered the process. Decontamination crews were briefed on the sensitive nature of the decontamination and reported difficulty clearly communicating instructions to children while wearing BA. The Decontamination Officer and crew are to be commended for their professionalism carrying out very sensitive and challenging task.

The large number of people presenting for decontamination taxed the ability of our Hazmat resource to complete this task in a timely manner, however changing circumstances did permit a tactical change to stop wet decontamination and by assessing contamination levels with the PID the process was significantly accelerated. When using the PID with an unidentified substance which is not detected, the assumption can be made that the environment and people are safe or uncontaminated, when there may be an undetected contaminant resulting in an unsafe situation.

Had more advanced DIM equipment been available, decisions to re-evaluate the tactics and de-escalate operations could have been considered earlier, significantly changing the outcomes including the resource requirements, the need for decontamination, duration of the incident and the impact on the community. A broader range of DIM instruments used to detect chemical agents in the form of vapor, aerosols, dusts and liquids specifically for hazmat use are needed to carry out timely and safe operations.

Currently the Army EOD has more advanced DIM equipment to assist in sampling to detect and identify the substance causing harm. The deploying of the EOD squad can be significantly delayed by the authorisation process.

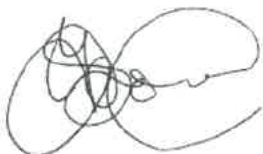
Communication with the Public Health Officer appears to have been ineffective. The PHO can assist in providing key information and offer expert advice that can contribute to the management of the incident. Review of the local notification process for supporting agencies and ensuring communication links are effective is critical as is understanding inter-agency expectations, legal mandate and capability of each organisation.

Released under the Official Information Act 1982

Part 4 - Operational report approval

Everything in this statement is true to the best of my knowledge and belief, and I made the statement knowing that it might be admitted as evidence for the purposes of the standard committal or at a committal hearing and that I could be prosecuted for perjury if the statement is known by me to be false and is intended by me to mislead.

Name: Trevor Brown



Rank: Assistant National Commander

Role: National Operational Efficiency Manager

Signed:

Date: 3 December 2018

This report has been approved by:

Name: Bruce Stubbs

Rank: Assistant National Commander

Role: Fire Region Commander, Region 3

Signed:

Date:

This report complies with the Fire and Emergency Official Information Act policy (POLCM2.2).

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