



Two Crowd Control Case Studies

Soni Desai

Ivan Taylor

Central Operational Research Team

DRDC CORA TN 2007–10
August 2007

Defence R&D Canada
Centre for Operational Research and Analysis

Central Operational Research Team



National
Defence

Défense
nationale

Canada

Two Crowd Control Case Studies

Soni Desai

Ivan Taylor

Central Operational Research Team

DRDC – Centre for Operational Research and Analysis

Technical Note

DRDC CORA TN 2007–10

August 2007

Author

Ivan Taylor

Approved by

Luminita Stemate
Team Leader, DRDC Valcartier Operational Research Team

Approved for release by

Dr. D. S. Haslip
Section Head, Land Operational Research

© Her Majesty the Queen as represented by the Minister of National Defence, 2007

© Sa majesté la reine, représentée par le ministre de la Défense nationale, 2007

Abstract

The Operational Research (OR) Team in Defence Research Development Canada (DRDC) Valcartier has begun work on a research project on modeling and simulating of crowd behaviour. This technical note reports on two crowd behaviour case studies. The intent of this report is twofold: the data collected on these two case studies will be utilized by the researchers to validate a crowd behavior/control model; and, the lessons learned from gathering and extracting data can be utilized by researchers at a later date when other crowd behaviour case studies are completed.

Résumé

L'équipe de Recherche Opérationnelle de Recherche et développement pour la défense Canada - Valcartier a commencé le travail dans un projet de recherche sur la modélisation et la simulation du contrôle des foules. Cette note technique documente deux études de cas. La motivation pour ce travail comporte deux volets : la collection de données sur ces deux études de cas servira plus tard à d'autres chercheurs appelés à valider le modèle de contrôle des foules ; et, les leçons apprises suite à la collection de données et l'extraction de l'information utile de ces données, pourraient s'avérer utiles dans des exercices futurs de collection de données reliées aux situations de contrôle des foules.

This page intentionally left blank.

Table of contents

Abstract	i
Résumé	i
Table of contents	iii
1 Introduction	1
2 Method	1
2.1 Gathering Data	1
2.2 Extracting Data	2
3 Data	2
3.1 Summary of the Oka Standoff Case Study	2
3.2 Summary of the APEC Summit Protest Case Study	3
4 Recommendations and Conclusions	3
References	5
Annexes	6
A The Main Incidents that Occurred During the Oka Standoff	6
B The Main Incidents that Occurred During the APEC Summit Protest	10
List of symbols/abbreviations/acronyms/initialisms	12

This page intentionally left blank.

1 Introduction

The Operational Research (OR) Team in Defence Research and Development Canada Valcartier is currently conducting a three year research project entitled, “Crowd Control Modeling and Simulation Capability” [1]. To aid in this multi-year research effort, one of the authors [SD], a social scientist from the Central Operational Research Team (CORT), was asked to gather and extract data for two crowd control case studies using a variety of sources.

This technical note will report on:

- gathering the data;
- extracting the data;
- the actual data for both case studies; and,
- recommendations for gathering and extracting data on other crowd control case studies in the future.

The actual crowd control case study data presented in this technical note will be utilized at a later date by one of the authors [IT] involved in the technology investment fund (TIF) research project to validate a crowd behaviour/control model.

2 Method

This technical note reports on work conducted on gathering and extracting data. Palys [2] states that researchers should always do a pilot test or trial run before going out and doing the research “for real”. There are things the researcher takes for granted, and there are surprises the researcher might never consider when conducting the research. The time to catch these difficulties is before committing major resources to the research. The intent of this study was first, to gather and extract data that can be used to validate a model created by the TIF researchers, and, second, to report on the process of gathering and extracting data so that the TIF researchers might encounter less difficulties when they gather and extract more data for the project.

2.1 Gathering Data

This effort is essentially made up of the analysis of two case studies. The first is the Standoff that occurred in Oka, Quebec in 1990. The second is the Asia-Pacific Economic Cooperation (APEC) Summit protest that occurred in Vancouver, British Columbia in 1997. These case studies were chosen from a list of several crowd control incidents because of their significance yet diversity.

The main differences between the two case studies are:

- the reason for the crowd forming;
- the duration of the event;
- the control forces (provincial police, RCMP, or military); and
- the use of non-lethal weapons.

The data on these case studies was obtained from secondary sources, including books, film documentaries, and from news/media sources. The researcher intended to use journal articles but could not find any relevant journal articles for either case study. Because the events being examined occurred some time ago, the data collection process was not conducive to primary sources.

2.2 Extracting Data

The data on these case studies will be used as input into a crowd behaviour/control model. Unfortunately, the model was in early development at the start of the data collection. Therefore, the intent was to extract as much information as possible from the data sources to understand: who, what, where, why, when, and how. The goal was to determine:

- the size of the forces on both sides throughout the period, if they changed substantially during the period and when.
- the significant incidents that occurred during the period, the time the incidents occurred, the actions of both sides, the types and effectiveness of the weapons used by both sides in each incident, and the potential gains or losses from each incident from the point of view of both sides.

A further note is also required with regards to the protocol that was employed in the extraction of data. The various data sources covered the same factual events. There was little controversy about what happened in Oka and APEC (who did what, when, etc.). When there was congruence, more value was attached to these “facts”. When there were disagreements between the sources, the extraction process was subjective and based on an interpretation of the potential biases in the sources. Materials were sampled across different sources until the point of diminishing returns was reached.

3 Data

The data extracted from the secondary sources for the Oka Standoff and the APEC Summit are summarized below.

3.1 Summary of the Oka Standoff Case Study

The Oka Standoff occurred between 11 Mar 90 and 26 Sep 90 in Kanasatake, near Oka, Quebec. Events relating to the Oka Standoff also took place during this time frame at the

Kahnawake reserve and in the towns of Oka and Chateauguay. On 11 Mar 90, an unknown number of Mohawk Indians set up barricades to prevent the expansion of a nine-hole golf course into an eighteen-hole golf course that was built on sacred grounds owned by the Mohawks [3]. On 11 Jul 90, 100 Quebec Provincial Police, Sûreté du Québec (SQ), were called in and set up their own barricades. On 29 Aug 90, 2,400 Canadian Forces troops were called in to relieve the SQ. The Mohawk Warriors fired guns, destroyed 6 police vehicles, seized a bulldozer, and a SQ officer was shot and killed. The SQ and the Canadian Forces tried to control the crowd using tear gas, firing shots, using tripwires, razor wire, light towers, cutting phone lines, setting up road blocks, using concussion grenades, and beating a Mohawk Warrior. On 26 Sep 90, the Mohawk Indians surrendered. Annex A provides a table describing the main incidents that occurred during the Oka standoff.

3.2 Summary of the APEC Summit Protest Case Study

The Asia Pacific Economic Cooperation (APEC) Summit was held on 25 Nov 97 at the Museum of Anthropology on the University of British Columbia (UBC) campus in Vancouver, British Columbia. One thousand five hundred protesters and activists turned out to protest “the absence of human rights on the APEC agenda and the presence of atrocious human rights abusers like China’s Jiang Zemin and President Suharto of Indonesia,” [4]. Five thousand police officers were brought into Vancouver to assist with APEC security. Prior to 25 Nov 97, the protesters set up a tent city on campus, created signs, and raised flags and banners. On 25 Nov 97, protesters displayed signs, held a large rally, tore down a section of a chain link fence separating the police from the protesters, walked into the police line, and created roadblocks by standing and sitting on three roads leading to the UBC museum. The police and RCMP attempted to control the crowd by arresting protesters, removing signs, flags, and banners, and using pepper spray. Annex B provides a table listing the main incidents that occurred during the APEC Summit protest.

4 Recommendations and Conclusions

During the gathering and extracting of data from secondary data sources for these two crowd behaviour/control case studies, many lessons were learned.

In the data gathering phase, it became apparent that the sources used in this study had their advantages and disadvantages. The advantage of the internet is the speed at which it can be searched and quantity of information that can be found. The disadvantage is that the quality of the information must be scrutinized. One way to improve the quality of information provided on the internet is examine reliable news/media sources. The advantage of film documentaries is the visual capture of the event and the ability to collect data on the nonverbal element. The disadvantage is that one can only see what is captured from the angle and vantage point at which it is being filmed. The advantage of books can be the in-depth narrative detail. The disadvantage is that they can be time-consuming to digest. In this study, no journal articles were available on the Oka or APEC case studies.

The authors would recommend that when gathering data in the future on other cases, the researcher consider contacting and interviewing individuals who were in the crowd and individuals who were trying to keep the crowd under control. Interviews involve an exchange of information which other data sources do not offer. Also, through the connections made during interviews, further sources of information might be uncovered (e.g. police reports, raw film footage).

In the data extraction phase, it was realized that there were two types of data sources: those that gave an overview of the entire event; and those that concentrated on more detailed information on some of the main incidents that occurred within the larger event. Because the the crowd behaviour/control model was still under development during the data extraction process, a great deal of time was spent on getting a sense and understanding of the overall event. It was then easy to summarize “who, what, where, when, why, and how” the significant incidents took place when they were examined in more detail. It was found that creating chronological tables was the easiest way to organize and present the data on the main incidents. It was a challenge to obtain information on the effectiveness of non-lethal weapons and the perceived gains or losses of the two sides which were questions the TIF modelers specifically asked. Unless a source gave some indication of the effectiveness of a particular non-lethal weapon or stated that an incident was perceived as a gain or loss by one side in the conflict, only subjective answers to these questions were possible.

It is recommended that when extracting data in the future for crowd behaviour/control cases, multiple researchers should be used to analyze the data to control for bias. Also, knowing the details of the crowd behaviour/control model will be helpful in the parameter extraction data phase in the future.

References

1. Stemate, Luminita (2004), Crowd Control Modeling and Simulation Capability. Technology Investment Fund Project Proposal (TIF12QH07), Defence Research and Development Canada (Valcartier).
2. Palys, Ted (1997), *Research Decisions: Quantitative and Qualitative Perspectives*, Harcourt, Canada.
3. York, Geoffrey and Pindera, Loreen (1991), *People of the Pines: The Warriors and the Legacy of Oka*, Little, Brown and Company, Toronto.
4. Nuttall-Smith, Chris and Galashan, Sarah (1997), University of Toronto, Varsity Archives. <http://www.utoronto.ca/archives/118/nov27/news/APEC.html>.
5. Indian and Northern Affairs (1990), *Oka Chronology*. Ottawa, Canada.
6. Austin, Lisa and Boyd, Christina (1993), The Oka Crisis, *Peace Research Reviews*, XIII(1).
7. Kanesatake.com (2006). <http://www.kanesatake.com/heritage/crisis/>.
8. Historica (2006). <http://www.historica.ca/peace/page.do?pageID=343/>.
9. National Film Board (1993), *Kanesatake: 270 Years of Resistance*. Canada.
10. Tugwell, Maurice and Thompson, John (1991), *The Legacy of Oka*, The Mackenzie Institute, Toronto.
11. Raphals, Philip (1990), Mohawks Rouse the Captive Nations, *The Nation*, 251(12), 413–416.
12. National Film Board (1992), *Acts of Defiance*. Canada.
13. Canadian Broadcasting Corporation (1990), *Oka*.
14. British Columbia Civil Liberties Association (1997), Press Release November 23, 1997. <http://www.bccla.org/pressreleases/97apec.html>.
15. Pue, W. Wesley (2000), *Pepper in our Eyes: The APEC Affair*, UBC Press, Vancouver.
16. Schmidt, Sarah (1997), University of Toronto, Varsity Archives. <http://www.varsity.utoronto.ca/archives/118/jan06/news/APEC/html>.

Annex A

The Main Incidents that Occurred During the Oka Standoff

Table A.1: Significant Incidents in the Oka Standoff

Date	Description of Incident	Gain or Loss
11 Mar 90	Kanesatake Mohawks set up a blockade in an effort to stop the town of Oka from expanding a golf course on land the Mohawks claimed contained a cemetery. [5] and [6, p. 42]	Blockade - effective for Mohawks.
11 Jul 90	The SQ police are called in [6, p. 43]. Just before dawn the SQ arrived in rental cars and vans. The SQ fires tear gas after asking to speak to a Mohawk spokesperson and are not satisfied when a woman says she is the spokesperson. There are more than 100 officers and Mohawks fear more are to come. So they build a wall of tires and set them on fire to prevent other SQ officers from arriving. The SQ officers begin to move forward using tear gas and concussion grenades. A gun battle starts. Hundreds of rounds are shot but the battle lasts no more than a few seconds [7]. SQ Marcel Lemay is killed [8], [9], and [10]. Raphals [11, p. 414] recounts, "The SQ officers launched an ill-planned attack on the Mohawk barricade at Kanساتake. Their own tear gas blew back in their faces, one police officer was shot and killed - perhaps by his own side - and they were forced to retreat. In the aftermath the Mohawks fortified their barricade with crushed SQ cruisers, topping it off with a sign reading, 'They came, they saw, they ran.' " The SQ had retreated, leaving most of their vehicles near the barricade. The Mohawks destroyed police cars and took control of a bulldozer to reinforce their barricade. The SQ watched the Mohawks for the rest of the day from a helicopter [7]. Mohawk Warriors at the Kahnawake reserve 29 km southwest of Montreal set up a blockade at the Mercier bridge in the morning in support of the Kanساتake Mohawks. The bridge is used by up to 60,000 commuters every day from South Shore communities to Montreal [6].	Tear gas - not effective for SQ. Gun battle - effective for Mohawks. Destroying police cars and seizing a bulldozer - effective for Mohawks. Mercier Bridge blocked - effective for Mohawks.
Jul 90	The Mohawk Warriors join the Kanساتake Mohawks at the barricades. The Quebec government orders the SQ to erect its own barricades on the roads leading to the municipality of Oka and the Kanساتake reserve [8]. The police set up roadblocks 5 km outside of Oka [6].	SQ barricades - effective for SQ.

Table A.1: Significant Incidents in the Oka Standoff (Continued)

Date	Description of Incident	Gain or Loss
Jul 90	Both sides play games of intimidation during the night. They send men into the woods. Sometimes officers or Mohawks go in silence to spy and other times they create noise to let the other side know they are watching. The police have greater resources and always have fresh crews to watch the barricade. The Warriors have limited resources and begin to suffer sleep deprivation [7].	Night intimidation - effective for SQ.
16 Jul 90	SQ stop food shipments at the roadblocks they have set up [10]. The circulation of food and medical supplies to the community of Kanesatake experience some delays. Some Mohawks, are refused access, and leave the food they had brought for their family at the barricades. The Mohawks ask for a team of observers from human rights groups across Canada to be present at the barricades, to prevent the police from violating their rights [7] and [12]. The Red Cross goes behind the barricades and identifies 200 people needing special attention. Complaints against the police are lodged with the Human Rights Commission accusing the police of harassment, making racial slurs and gestures, and detaining people. These incidents make natives afraid to cross the barricades to buy food or seek medical supplies [6]. The Mohawks are seen throwing eggs at the SQ which seems strange given the Mohawks were complaining that they were not getting enough food [9]. It is alleged that strip searches were conducted at the roadblocks [9].	Blocked food shipments - effective for SQ. Throwing eggs at SQ - not effective for Mohawks.
26 Jul 90	The police report that the bullet that killed Cpl. Lemay on 11 Jul 90 did not come from a police weapon [7] and [13].	
7 Aug 90	Many Mohawks leave Kanesatake [10]	Mohawks leave - effective for SQ
14 Aug 90	Chief of Defence Staff announces the deployment of units to Kanesatake and Kahnawake relieving SQ [5]. The Canadian Forces announce that as many as 4,400 soldiers, backed by armored personnel carriers and heavy weapons would be deployed [7].	Army coming - effective for SQ.

Table A.1: Significant Incidents in the Oka Standoff (Continued)

Date	Description of Incident	Gain or Loss
20 Aug 90	The arrival of the army. Thirty-three reconnaissance troops arrive around 0800. The army moves one of the SQ barricades 400 meters closer to the Mohawks to improve the barricades strategic value to the army. The Mohawks apparently misunderstand this as an act of aggression. The negotiations are fragile and every time the army pushes the barricades closer, the talks break off. When the SQ was in Oka, the barricades were sometimes separated by as much as 1.5 km. Now, at some points the barricades are as close as 5 meters from each other [7]	Barricades moved closer - effective for Army.
24 Aug 90	Four smoke bombs are set off by the Canadian Forces in the morning [6].	
1 Sep 90	“At 1:00 pm some soldiers climbed over the north, east, and west perimeter and made their way into the pines. This was a very tense time. Warriors were trying to provoke the soldiers into firing the first shot. It was only strict discipline that prevented this situation from ending in a bloodbath. The Warriors would not retreat. They were ready to stand their ground. It was finally decided that they would retreat into the treatment center. The night remained tense. The Warriors took turns guarding the entrance of the treatment center. The area was illuminated with high-powered searchlights from across the road. A cacophony of eerie war whoops amplified through Mohawk loud speakers, helicopters hovered above, flares going off only increased the tension on both sides” [7].	Warriors retreat into Treatment Center - effective for Army.
2 Sep 90	Barricades are brought down at Kanesatake [5].	Barricades brought down - effective for Army
6 Sep 90	Mercier Bridge is re-opened by the Army after 62 days of Mohawk occupation. The Army completely surrounds the Mohawks at the Treatment Center in Kanesatake using razor wire [5].	Mercier Bridge re-opened - effective for Army. Razor wire surround Mohawks in Treatment Center - effective for Army.
8 Sep 90	An incident occurred when four soldiers crossed the razor wire scouting a Mohawk in the forest. They stumbled upon a warrior asleep in a trench. A battle erupted and two soldiers are wounded. The warrior is overwhelmed and beaten [7].	Beating of Mohawk - effective for Army.

Table A.1: Significant Incidents in the Oka Standoff (Continued)

Date	Description of Incident	Gain or Loss
13 Sep 90	The phone lines are cut. The only line the Warriors had was the Hot Line to the negotiation office of the Army. Light towers are set up to see the Mohawk side of the razor wire at night [7]. Warriors put up blankets in the woods so the Army cannot see what they are doing [7]. Soldiers shine powerful lights into the detox center from 110-foot towers. The army steadily pushes its side of the barriers forward, tightening their circle of control; they jam the cellular phones of journalists inside. The Warriors direct loudspeakers at the troops, the music alternating between traditional native songs and the Rolling Stones: “Wild horses couldn’t drag me away ...” [11] and [7]. Later the Warriors find a place where cellular phones are not effected by the blackout and call it the ‘Phone Booth’ [7]	Phone lines cut and light towers used - not effective for Army.
Sep 90	One night a Warrior reached over the razor wire with a long hook and yanked on the army’s tripwires, setting off flares. The soldiers thought a mass breakout was starting. The army was not about to see this situation get any worse. They hooked up a fire hose to a water main and shot water into the woods. The Warriors thought this was funny and started throwing water filled condoms back. A water fight erupted and laughter was heard on both sides of the razor wire. An officer then gave an order to “lock and load” and shortly after a shot was fired in the air [7]	Set off tripwires - effective for Mohawks. Water fight - not effective for either side. Army locks and loads - effective for Army
26 Sep 90	At the local detox center in Kanasatake, the twenty Warriors and their families who had been making a last stand, lay down their arms and turn themselves in [11]. The last barricades are taken down [8]. The Mohawk Warriors burn two fires when they surrender [7].	Mohawks surrender - effective for Mohawks and Army.

Annex B

The Main Incidents that Occurred During the APEC Summit Protest

Table B.1: Significant Incidents in the APEC Summit Protest

Date	Description of Incident	Gain or Loss
Week of 17 Nov 97	Students begin 'laying siege' for the summit by building a tent city outside the student union building. Named 'Democracy Village', it becomes part of the security zone for the summit [4]. The eleven students, who set up a tent city, write slogans on windows and rearrange rocks to spell out a message. The students are warned that if they do not leave they will be arrested. Seven students leave and the remaining four are charged and arrested [14].	Arrests - effective for RCMP.
21 Nov 97	The graduate students' union at UBC raises the Tibetan national flag, a symbolic image of independence, atop its student centre and hangs two anti-APEC banners. The RCMP removes the flag on the morning of 25 Nov 97 [4] and [15].	Flags raised - effective for protesters.
24 Nov 97	A protester, Law student Craig Jones, places paper signs reading 'Free Speech', 'Democracy', and 'Human Rights' on fences surrounding Green College. At midnight, police remove the signs [15].	Signs raised - effective for protesters.
25 Nov 97	At 0750, Craig Jones displays signs that say 'Free Speech', 'Democracy', and 'Human Rights' on the sidewalk on two coat racks in view of the motorcade route that will be transporting the APEC delegates to UBC [15]. An RCMP officer immediately orders the protester to move the signs off the sidewalk and onto the grass 12 feet behind the security fence. The protester complies. After approximately 10 minutes, the same officer informs the protester that the signs cannot remain but he can. The protester doesn't remove the signs and the signs are grabbed from him. He is handcuffed and arrested [14]. At approximately 0830, Mike Thoms, a doctoral student in history, briefly displays a textile banner. Police tell him he can't do this and the police seize the banner [15]. Police tell other individuals wishing to display signs on the Green College side of the security fences that they are not allowed [15].	Signs and banner removed - effective for RCMP. Craig Jones arrested - effective for RCMP.

Table B.1: Significant Incidents in the APEC Summit Protest
(Continued)

Date	Description of Incident	Gain or Loss
25 Nov 97	<p>A massive rally on campus at 1230 is broken up in a melee of pepper spray and arrests [4]. It is alleged that individuals carrying cellular telephones or amplifying equipment were arrested and that women, but not men were strip searched by RCMP officers [15] and [16]. At 1240, protesters reached the 12-foot fence separating them from the wide secure zone around the museum. Several protesters grabbed the chain link and tore a section down. The falling fence caught a group of activists and media underneath before waiting police moved in with pepper spray and police bikes, beating back the protesters. Shortly after the security fence is repaired, a group of about 40 activists risk arrest by forming ranks of four and walking slowly into the police line. The police douse the first rank with pepper spray and they spray the substance over protesters heads and into the crowd. Police then threw two-dozen empty bottles back over the fence. The confrontation ended after about a one-hour standoff [4].</p>	<p>Rally - effective for Protesters. Pepper spray and arrests - effective for RCMP. Bringing down part of chain link fence - effective for Protesters.</p>
25 Nov 97	<p>Activists moved on to block the three routes leading away from the UBC museum. With little warning, the police break up one of the roadblocks by pepper spraying the 50 activists, as well as onlookers and the media, forcing the crowd about 100 meters from site of the motorcade route. Along the same route the APEC motorcade had taken in the morning, some 30 protesters sat on the pavement. Another 200 protesters and onlookers stood on the median in the road, offering support. By days end, 49 people are arrested. Police also search and release four men with Indonesian accreditation who were photographing protesters. [4].</p>	<p>Roadblocks - effective for Protesters. Pepper spray - effective for RCMP. Arrests - effective for RCMP.</p>

List of symbols/abbreviations/acronyms/initialisms

APEC	Asian-Pacific Economic Cooperation
CORA	Centre for Operational Research and Analysis
CORT	Central Operational Research Team
DND	Department of National Defence
DRDC	Defence Research and Development Canada
OR	Operational Research
RCMP	Royal Canadian Mounted Police
SQ	Sûreté du Québec
TIF	Technology Investment Fund
UBC	University of British Columbia

DOCUMENT CONTROL DATA

(Security classification of title, body of abstract and indexing annotation must be entered when document is classified)

1. ORIGINATOR (the name and address of the organization preparing the document. Organizations for whom the document was prepared, e.g. Centre sponsoring a contractor's report, or tasking agency, are entered in section 8.) DRDC – Centre for Operational Research and Analysis NDHQ, 101 Col By Drive, Ottawa ON K1A 0K2		2. SECURITY CLASSIFICATION (overall security classification of the document including special warning terms if applicable). UNCLASSIFIED	
3. TITLE (the complete document title as indicated on the title page. Its classification should be indicated by the appropriate abbreviation (S,C,R or U) in parentheses after the title). Two Crowd Control Case Studies			
4. AUTHORS (Last name, first name, middle initial. If military, show rank, e.g. Doe, Maj. John E.) Desai, Soni ; Taylor, Ivan			
5. DATE OF PUBLICATION (month and year of publication of document) August 2007		6a. NO. OF PAGES (total containing information. Include Annexes, Appendices, etc). 18	6b. NO. OF REFS (total cited in document) 16
7. DESCRIPTIVE NOTES (the category of the document, e.g. technical report, technical note or memorandum. If appropriate, enter the type of report, e.g. interim, progress, summary, annual or final. Give the inclusive dates when a specific reporting period is covered). Technical Note			
8. SPONSORING ACTIVITY (the name of the department project office or laboratory sponsoring the research and development. Include address). DRDC – Centre for Operational Research and Analysis NDHQ, 101 Col By Drive, Ottawa ON K1A 0K2			
9a. PROJECT OR GRANT NO. (if appropriate, the applicable research and development project or grant number under which the document was written. Specify whether project or grant). N/A		9b. CONTRACT NO. (if appropriate, the applicable number under which the document was written).	
10a. ORIGINATOR'S DOCUMENT NUMBER (the official document number by which the document is identified by the originating activity. This number must be unique.) DRDC CORA TN 2007–10		10b. OTHER DOCUMENT NOS. (Any other numbers which may be assigned this document either by the originator or by the sponsor.)	
11. DOCUMENT AVAILABILITY (any limitations on further dissemination of the document, other than those imposed by security classification) <input checked="" type="checkbox"/> Unlimited distribution <input type="checkbox"/> Defence departments and defence contractors; further distribution only as approved <input type="checkbox"/> Defence departments and Canadian defence contractors; further distribution only as approved <input type="checkbox"/> Government departments and agencies; further distribution only as approved <input type="checkbox"/> Defence departments; further distribution only as approved <input type="checkbox"/> Other (please specify):			
12. DOCUMENT ANNOUNCEMENT (any limitation to the bibliographic announcement of this document. This will normally correspond to the Document Availability (11). However, where further distribution beyond the audience specified in (11) is possible, a wider announcement audience may be selected).			

13. **ABSTRACT** (a brief and factual summary of the document. It may also appear elsewhere in the body of the document itself. It is highly desirable that the abstract of classified documents be unclassified. Each paragraph of the abstract shall begin with an indication of the security classification of the information in the paragraph (unless the document itself is unclassified) represented as (S), (C), (R), or (U). It is not necessary to include here abstracts in both official languages unless the text is bilingual).

The Operational Research (OR) Team in Defence Research Development Canada (DRDC) Valcartier has begun work on a research project on modeling and simulating of crowd behaviour. This technical note reports on two crowd behaviour case studies. The intent of this report is twofold: the data collected on these two case studies will be utilized by the researchers to validate a crowd behavior/control model; and, the lessons learned from gathering and extracting data can be utilized by researchers at a later date when other crowd behaviour case studies are completed.

14. **KEYWORDS, DESCRIPTORS or IDENTIFIERS** (technically meaningful terms or short phrases that characterize a document and could be helpful in cataloguing the document. They should be selected so that no security classification is required. Identifiers, such as equipment model designation, trade name, military project code name, geographic location may also be included. If possible keywords should be selected from a published thesaurus. e.g. Thesaurus of Engineering and Scientific Terms (TEST) and that thesaurus-identified. If it not possible to select indexing terms which are Unclassified, the classification of each should be indicated as with the title).

Crowd Behaviour
Crowd Control
Non-Lethal Weapons
Case Studies



www.drdc-rddc.gc.ca