

Original Articles

Forensic Investigation of Explosion Cases in the Restive South

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Abstract: *Terrorist activities are frequent in 4 provinces: Pattani, Narathiwat, Yala and Songkhla. The terrorists apparently aimed to kill police officers and Buddhists in various manners but mostly by using explosive devices. From the record kept by the Command Center of the Royal Thai Police (Forward Post), terrorist activities using explosives increased constantly (2004-2006). The types of bomb are not specific and are called "Improvised Explosive Device (IED)". The evidence collected from post blast scenes are hard to identified. Attempts to identify the person or group of terrorists who committed the crimes by DNA collection failed because these are hard to detect or collected from the debris and burned evidence. The local police could not find any connection to the local people because of lack of information. In this study, the obtained data include 727 cases of explosion incidents collected by the Command Center of the Royal Thai Police (Forward Post) between January, 2004 and December, 2006 in Songkhla, Pattani, Yala and Narathiwat. A total of 14 variables were used in the classification of evidence to analyze the data through bomber signature to find association between terrorist groups in each province. The results gave a partial signature of bombers but most of the association between the bomber signature in each province could not be identified because most of the evidence from post blast scenes could not be completely collected for analysis for fear of secondary bombs and subsequent terrorist attack. Thus, there was a limitation on the safety of the investigator.*

Key Words: • Improvised Explosive Device (IED) • Bomber signature

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Introduction

The terrorist activities are frequent in the 4 southern provinces: Pattani, Narathiwat, Yala and Songkhla. The terrorists apparently aim to kill police officers and

Buddhists in various manners but mostly by using explosive devices. From the record kept by the Command Center of the Royal Thai Police (Forward Post), terrorist activities using explosives increase constantly (2004-2006). The types of bomb are not specific and are called "Improvised Explosive Devices (IED)". The evidence collected from post blast scenes are hard to

ได้รับต้นฉบับเมื่อ 27 พฤศจิกายน 2550 ได้ให้ตีพิมพ์เมื่อ 29 พฤศจิกายน 2550
ต้องการสำเนาต้นฉบับติดต่อ จ๊อบ บุญปัญญา มหาวิทยาลัยมหิดล

identify. Attempts to identify the person or group of terrorists who committed the crimes by DNA collection failed because these are hard to detect or collected from the debris and burned evidence. The local police could not find any connection to the local people because of lack of information. The Bomb Data Center, on the other hand, have all the data on the explosion cases, including the bomber's signatures and may be able to solve this problem. The available data may help to link the evidence to terrorist groups by using the signatures of bomber.

Objectives

The main objectives of this study are

1. To observe and collect data from post blast scene investigated.
2. To analyze the data explosion cases.

Materials and Methods

The research was a retrospective study of data on explosion cases collected by the Command Center of the Royal Thai Police (Forward Post) between January, 2004 and December, 2007. There were 727 cases in Songkla, Pattani, Yala and Narathiwat.

Categorization of data

The data from the post blast scenes can be classified using 14 variables as shown in Table 1

Data Analysis

The statistical methods were used to analyze data as follows.

1. Descriptive statistics were used to analyze variable including frequency and percentage.
2. The Chi-square (Pearson χ^2) test was performed to find the association between the categorical variables such as time of incident, intended target, explo-

sive used package of explosive, fuzing system and component of explosive.

All data were analyzed by using the statistical package SPSS for Windows. The statistical significance was tested at p-value < 0.01.

Results and Discussion

The results are divided into 2 sections: the distribution of improvised explosive components and bomber behavior.

The distribution of improvised explosive components

Explosive component

Table 2 shows that ANFO (ammonium nitrate/fuel oil) was the most frequently (85.0%) used as the explosive main charge probably because ANFO materials are cheap and easy to buy. In the southern part, ammonium nitrate and urea are used as fertilizers in agriculture. A kilogram of ANFO can destroy a truck and driver/passenger.

Distribution of the type of booster is shown in Table 3 which indicates that the most frequently used booster was dynamite, accounting for 265 cases (90.8%) from 292 bombing incidents.

Dynamite was most frequently used as the booster. Dynamite is commonly used in mines which are common in Southern Thailand and it can easily be stolen or taken from mines.

Non electrical component

The distribution of the explosive containers is presented in Table 4 Metal boxes were used most frequently in explosion cases in each province, accounting for 123 cases (42.0%). The containers of the main charge and explosive were mostly unknown because they had been shattered into tiny pieces and could not be identified.

The distribution of the type of booster containers

Table 1 Present variables and classification

Variables	Classification
1. Province	Songkhla, Pattani, Yala and Narathiwat
2. District	Mueang Songkhla, Sathing Phra, Chana (Chenok), Na Thawi, Thepha (Tiba), Saba Yoi (Sebayu), Ranot (Renut), Krasae Sin, Rattaphum, Sadao, Hat Yai , Na Mom, Khuan Niang, Bang Klam, Singhanakhon, Khlong Hoi Khong, Mueang Pattani, Khok Pho, Nong Chik, Panare, Mayo, Thung Yang Daeng, Sai Buri, Mai Kaen, Yaring, Yarang, Mae Lan , Kapho, Mueang Yala, Betong, Bannang Sata, Than To, Yaha , Raman, Kabang, Krong Pinang, Mueang Narathiwat, Tak Bai, Bacho, Yingo, Rangae, Rueso, Si Sakhon, Waeng , Sukhirin, Sungai Golok, Sungai Padi, Chanae and Choairong
3. Intended target	None, Police, Solider/Field army/Ranger, Local Administration, Teacher, Monk, People, Not Specific, Police /Solider/Field army/Ranger and Unknown
4. Type of main charge	None, Ammonium Nitrate / Fuel Oil, Black Powder, C-4, Urea / Fuel oil, Dynamite, Power Gel, T.N.T., Emulsion explosive and Unknown
5. Explosive container	None, Tupper wear, Water Pipe (PVC), Metal Box (Home made), Metal cookie box, Metal Rubber grinding, Fire extinguisher, Gas tank, Bike Fuel tank, Gallon of Fuel oil, Ice Box, Plastic Box, Paint can, Milk Can, Local Muslim Pot, Thermos bottle, Paint plastic can, Plastic bottle, hand made Can, metal water pipe, Aluminum package, Cartridge cases, Plastic bag, Plastic can, Powder can, Paper luggage, Glass bottle, Deodorant bottle, lighter fuel can , Auto lube Can, Green plastic military tube, Sardine fish 's can, Plastic Cup and Unknown
6. Type of booster	None, Dynamite, Power Gel Emulsion explosive and Unknown
7. Booster container	None, Deodorant Spray, PVC pipes, Rubber Tube, White board Pen, Plastic bottle, Cylinder Plastic Box, Glass bottle, Mouth Spray, Milk Can, Fire work ball (black powder), Aluminum tube, Paper and Unknown
8. Brand of booster container	None, Exit, Mistine Fresh, A.R.C No.999, AXE, Pilot, Unknown
9. Type of Shrapnel	None, Nail, Piece of Steel bar, Head of nails, Lead Pellet, Ball Bearing, Bike's chain, Hexagonal Nut, Pieces of metal, Steel bar, Pieces of nail, Chain saw, Tetragonal Nut, Sliding cut metal pipe, Bended nails, Other and Unknown
10.Fuzing system	None, Command wire, Cell phone, Timer, Remote Control, Improvise Switch (Jaw switch), Electronic circuit Time Delay, Match and Unknown
11.Brand of Fuzing system	None, Nokia, Casio ,Other and Unknown
12.Model of Fuzing system	None, 3310 Battery type BLC-2, 3315 Battery type BLC-2, F-200, F-201, 8230 Battery type BLD-3 and Unknown
13.Type of power Source	None, Dry cell 9 V, Dry cell 1.5V, Car Battery, Motorcycle Battery, Watch battery, CX-3 and Unknown
14.Brand of power Source	None, Panasonic/ National, Eveready, MAG 12V. 2.5AH/MAG 12V. 3AH, Guanqiu, Magnum YTX-3, FB-FB3L-B 12V-AN, Zhanli, Spa, Energizer, CX-3, Superwell, Power plus, YTZ, YOKOTA, Colorful, Unknown Variables Classification

Table 2 Distribution of explosive main charge.

Explosive main charge	Provinces				Number (%)
	Songkhla	Pattani	Yala	Narathiwat	
ANFO	4	44	107	168	323 (85.0)
Black powder	0	3	3	11	17 (4.5)
Urea	1	2	5	16	24 (6.3)
Dynamite	0	0	0	3	3 (.8)
Power gel	0	1	2	4	7 (1.8)
T.N.T.	0	0	0	2	2 (.5)
Emulsion explosive	0	2	0	2	4 (1.1)
Total	5	52	117	206	380 (100)
χ^2 test is invalid.					

Table 3 Distribution of booster in 4 provinces.

Booster	Provinces				Number (%)
	Songkhla	Pattani	Yala	Narathiwat	
Dynamite	1	31	83	150	265 (90.8)
Power gel	0	7	3	12	22 (7.5)
Black powder	0	0	5	0	5 (1.7)
Total	1	38	91	162	292 (100)
χ^2 test is invalid.					

Table 4 Distribution of package of explosive in 4 provinces.

Container of explosive	Provinces				Number (%)
	Songkhla	Pattani	Yala	Narathiwat	
Tupper wear	1	0	10	1	12 (4.1)
water pipe (PVC)	1	2	20	4	27 (9.2)
Metal Box	0	2	51	70	123 (42.0)
Fire extinguisher	2	7	18	13	40 (13.7)
Bike Fuel tank	1	1	3	6	11 (3.8)
Local pot	1	3	0	22	26 (8.6)
Other	0	15	16	23	54 (18.4)
Total	6	30	118	139	293 (100)
χ^2 test is invalid.					

is shown in Table 5. Deodorant spray cans were most frequently used accounting for 239 cases (86.9%). White board markers were also used as booster container in Yala and Narathiwat, accounting for 11 cases (4.0%).

The distribution of the brand on booster container is shown in Table 6. Exit was used in the highest frequency accounting for 236 cases (94.8%). This is probably due to the popularity of the brand and /or the availability of the discarded cans.

Shrapnels are metal fragments which increase damage to the target when a bomb explodes. Sometimes the bomb container may act as shrapnel such as in hand grenades. The distribution of the type of shrapnel is shown in Table 7 Pieces of steel bar was used in the highest frequency accounting for 386 cases (76.6%). Shrapnels are the major clue used to track down bombers along with tool marks.

Electrical component

From Table 8 Nokia hand phones was used in the highest frequency as fuzing systems, accounting for 221 cases (77.0%).

From Table 9, Nokia 3310/3315 was most frequently used model of the fuzing system, accounting for 199 cases (76.2%). They have similar circuit boards and are in widespread use. However, Casio brand was also found in high frequency in the form of digital watches.

From Table 10, 9V dry cells were the most frequently used as the power source, accounting for 301 cases (88.0%). Power source is a source of electrical power to the electrical fuzing system. In this study data on cell phone batteries were discarded because other parts of the cell phone could be identified. In most cases, the power source could not be found probably because the bombers kept them for future use.

Table 5 Distribution of container of booster in 4 provinces.

Container of explosive	Provinces			Number (%)
	Pattani	Yala	Narathiwat	
Deodorant Spray can	35	62	142	239 (86.9)
White board marker	0	4	7	11 (4.0)
Other	1	14	10	25 (9.1)
Total	36	80	159	275 (100)
χ^2 test is invalid.				

Table 6 Distribution of the brand on the booster containers in 4 provinces.

Brand of booster container	Provinces			Number (%)
	Pattani	Yala	Narathiwat	
Exit	35	61	140	236 (94.8)
Pilot	0	4	5	9 (3.6)
Other	0	1	3	4 (1.6)
Total	35	66	148	249 (100)
χ^2 test is invalid.				

Table 7 Distribution of type of Shrapnel in 4 provinces.

Type of Shrapnel	Provinces				Number (%)
	Songkhla	Pattani	Yala	Narathiwat	
Nails	2	2	2	49	70 (13.9)
Piece of Steel bar	9	61	61	234	386 (76.6)
Head of nails	0	2	2	6	11 (2.2)
pieces of metal	0	0	0	10	11 (2.2)
Other	0	2	2	13	26 (5.2)
Total	11	67	67	312	504 (100)

χ^2 test is invalid.

Table 8 Distribution of brand of fuzing system.

Brand of fuzing system	Provinces				Number (%)
	Songkhla	Pattani	Yala	Narathiwat	
Nokia	4	40	52	125	221 (77.0)
Casio	1	5	19	39	64 (22.3)
Other	0	0	0	2	2 (.7)
Total	5	45	71	166	287 (100)

χ^2 test is invalid.

Table 9 Distribution of model of fuzing system.

Model of fuzing system	Provinces				Number (%)
	Songkhla	Pattani	Yala	Narathiwat	
3310/3315 (Nokia)	3	36	50	110	199 (76.2)
8230 (Nokia)	0	0	0	1	1 (.4)
F 200 (Casio)	0	0	17	31	48 (18.4)
F 201 (Casio)	0	3	2	8	13 (5.0)
Total	3	39	69	150	261 (100)

χ^2 test is invalid.

Table 10 Distribution of the types of power source.

Type of power source	Provinces				Number (%)
	Songkhla	Pattani	Yala	Narathiwat	
9 V dry cell	9	51	84	157	301 (87.8)
1.5 V dry cell	0	3	14	14	31 (9.0)
Other	1	3	5	2	11 (3.2)
Total	10	57	103	173	343 (100)

χ^2 test is invalid.

Table 11 Distribution of brand of power source in 4 provinces.

Brand of power source	Provinces				Number (%)
	Songkhla	Pattani	Yala	Narathiwat	
National/panasonic	7	34	78	98	217 (73.8)
Eveready	0	0	6	46	52 (17.7)
Other	1	11	6	7	25 (8.5)
Total	8	45	90	151	294 (100)

χ^2 test is invalid.

Table 12 Distribution of explosion incidents by district and year.

District	Year			Number (%)
	2004	2005	2006	
Mueang Songkhla	0	1	0	11 (.1)
Chana	1	2	2	5 (.7)
Thepha	0	1	4	5 (.7)
Saba Yoi	0	2	1	3 (.4)
Mueang Pattani	1	10	11	22 (3.1)
Khok pho	2	3	10	15 (2.1)
Nong Chik	0	9	7	16 (2.2)
Panare	0	1	7	8 (1.1)
Mayo	0	0	2	2 (.3)
Thung Yang Daeng	0	0	3	3 (.4)
Sai Buri	0	0	11	11 (1.5)
Mai Kaen	0	0	3	3 (.4)
Yaring	0	6	6	12 (1.7)
Mueang Yala	6	32	45	83 (11.5)
Betong	2	4	16	22 (3.1)
Bannang Sata	3	10	13	26 (3.6)
Than To	7	6	9	22 (3.1)
Yaha	0	6	15	21 (2.9)
Raman	3	9	15	27 (3.8)
Kabang	0	0	1	1 (.1)
Krong Pinang	1	2	2	5 (.7)
Mueang Narathiwat	7	29	11	47 (6.5)
Tak Bai	4	12	15	31 (4.3)
Bacho	3	3	11	17 (2.4)
Yi-ngo	3	3	4	10 (1.4)
Ra-ngae	5	19	32	56 (7.8)
Rueso	2	11	16	29 (4.0)
Si Sakhon	1	4	7	12 (1.7)
Waeng	2	5	6	13 (1.8)
Sukhirin	3	3	3	9 (1.3)
Sadao	0	0	3	3 (.4)
Hat Yai	0	2	6	8 (1.1)
Khlong Hoi Khong	0	1	1	2 (.3)
Yarang	0	5	6	11 (1.5)
Mae Lan	0	1	1	2 (.3)
Sungai Golok	6	15	14	35 (4.9)
Sungai Padi	0	24	30	54 (7.5)
Chanae	3	12	9	24 (3.3)
Cho-airong	0	18	25	43 (6.0)
Total	65	271	383	719 (100)

The distribution of power source's brand is presented in Table 11 National/Panasonic was used in the highest frequency, accounting for 217 cases (73.8%).

Bomber behavior

Table 12 shows the distribution of explosion incidents classified by district of the 4 provinces in each year. Meuang Yala had the highest frequency of bombing incidents, accounting for 83 cases (11.5%). However, Narathiwat province suffered the largest number of explosions. Possibly Meuang Yala is the center of the Government administration and terrorists probably have more members and cooperation in Narathiwat than in other provinces.

From Table 13, the intended bombing targets were mostly not specific (45.4%). But the police and military personnel were together highly targeted indicating that the terrorists wanted to create disturbances and to scare the local people.

Conclusions

ANFO was most commonly used as the explosive main charge of the IEDs (85%). Dynamite was most frequently used as the booster (90.8%). For the non-electrical components of the IED's, metal boxes were most frequently used to contain the explosives (42.0%) and the main charge (34.3%). Booster containers were mostly deodorant spray cans (86.9%) except in Songkhla.

'Exit' deodorant spray cans were most popular (94.8%). Pieces of steel bar were most commonly found (76.6%) as shrapnels. For the electrical components of the IEDs, most bombers used cell phones to control bomb ignition (57.9%). Nokia brand seemed to be most popular (77.0%). Nokia 3310 and 3315 models were most usually found (76.2%). In most cases, 9-V power sources (87.8%) of the National/Panasonic brand (73.8%) were used. Although Narathiwat had the highest number of bomb incidents, Muang Yala district in Yala province had the highest number of explosions in all districts of the 4 southern provinces (11.5%). The terrorists wanted to create disturbances and to scare the local people so the intended targets were not specific in most cases (45.4%).

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Table 13 Distribution of explosive cases in each month in 4 provinces.

Intended target	Provinces				Number (%)
	Songkhla	Pattani	Yala	Narathiwat	
Police	6	19	34	70	129 (21.4)
Soldier/Ranger	1	18	23	89	131 (21.7)
Local Administer	0	0	5	7	12 (2.0)
People	0	3	9	24	36 (6.0)
Not specific	13	44	94	123	274 (45.4)
Others	0	3	7	12	22 (3.6)
Total	20	87	172	325	604 (100)

χ^2 test is invalid.

นิพนธ์ต้นฉบับ

การสืบสวนทางนิติวิทยาศาสตร์ในเหตุระเบิด 4 จังหวัดชายแดนภาคใต้

จ๊อบ บุญปัญญา, นกตล ไชยคำ, ประพัฒน์ คนตรง, ประพิน วิไลรัตน์ และ มนต์ทิพย์ เทียนสุวรรณ

มหาวิทยาลัยมหิดล

บทคัดย่อ: ขบวนการก่อการร้ายใน 4 จังหวัดชายแดนภาคใต้ มุ่งที่จะทำร้ายประชาชนและเจ้าหน้าที่เพื่อก่อความไม่สงบ จากการเก็บข้อมูลของศูนย์บัญชาการตำรวจส่วนหน้าผู้ก่อการร้ายได้มีการใช้วัตถุระเบิดมากขึ้นอย่างต่อเนื่องในการก่อเหตุ (2547-2549) และส่วนใหญ่เป็นระเบิดแสวงเครื่อง ซึ่งหลักฐานที่เกิดเหตุระเบิดนั้นยากที่จะวินิจฉัยและการที่สืบหาคนร้ายโดยใช้ดีเอ็นเอนั้นไม่ประสบผลสำเร็จเนื่องจากหลักฐานถูกทำลายโดยการเผาไหม้ ดังนั้นตำรวจท้องที่จึงขาดข้อมูลที่จะเชื่อมโยงผู้ต้องสงสัยกับเหตุระเบิด การศึกษาข้อมูลเหตุระเบิดจากศูนย์บัญชาการตำรวจส่วนหน้าจำนวน 727 คดี ระหว่าง เดือนมกราคม 2547 ถึง ธันวาคม 2549 ใน 4 จังหวัด ได้แก่ สงขลา ปัตตานี ยะลา และ นราธิวาส โดยจำแนกเป็น 14 ตัวแปร เพื่อวิเคราะห์ข้อมูลของเหตุระเบิดผ่านทางลักษณะเฉพาะของผู้ทำระเบิดในแต่ละจังหวัด จากผลการศึกษพบว่าลักษณะเฉพาะของผู้ทำระเบิดในภาคใต้แต่ส่วนใหญ่ไม่พบความสัมพันธ์กับกลุ่มผู้ก่อการร้ายในแต่ละจังหวัดเนื่องจากการเก็บข้อมูลที่เกิดเหตุส่วนใหญ่ไม่สมบูรณ์เพราะในที่เกิดเหตุมักมีระเบิดลูกที่สองและผู้ก่อการร้ายหลบซ่อนอยู่เพื่อที่จะลอบยิงผู้ตรวจที่เกิดเหตุดังนั้นผู้ตรวจที่เกิดเหตุจึงมีข้อจำกัดในการทำงานเพื่อรักษาชีวิตของผู้ร่วมปฏิบัติหน้าที่

Key Words: • ระเบิดแสวงเครื่อง • ลักษณะเฉพาะของผู้ทำระเบิด

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