

**BOMB
INCIDENT
INVESTIGATION**

Aim

- To link the crime with the criminal
- To ensure the safety of people and property
- Proper documentation
- Proper collection of evidences
- Proper presentation

Summary

- Forensic Science ◀
- Forensic Evidence Management
- Evidence collection
- General Guidelines
- Special Precautions for collection of physical evidence in explosive cases

Summary Contd....

- Proper Packing
- Sealing
- Contamination Avoidance
- Sending to lab for testing
- Maintenance of Chain of Custody

Forensic Science

- *“FORENSIC” derived from Latin word “FORENSIS” means belonging to Court of justice or to public discussion and debate*
- *Forensic Science means that scientific discipline which is directed to the recognition ,identification ,individualization and evaluation of physical evidence by the application of the principles and methods of natural sciences for the administration of criminal Justice*

INTRODUCTION

Firstly asked by the Senior officers and journalists :-

- a. What kind of explosives are used in bomb?*
- b. How much explosives are used ?*
- c. What could be the triggering mechanism?*
- d. How many people are killed and injured ?*

Safety issues

- The moment there is a rush, second bomb explodes leads to massive damage.
- Secondary devices-nearby gas lines, water pipe lines, electric lines, broken glasses, biohazard materials.

INVESTIGATION TECHNIQUES

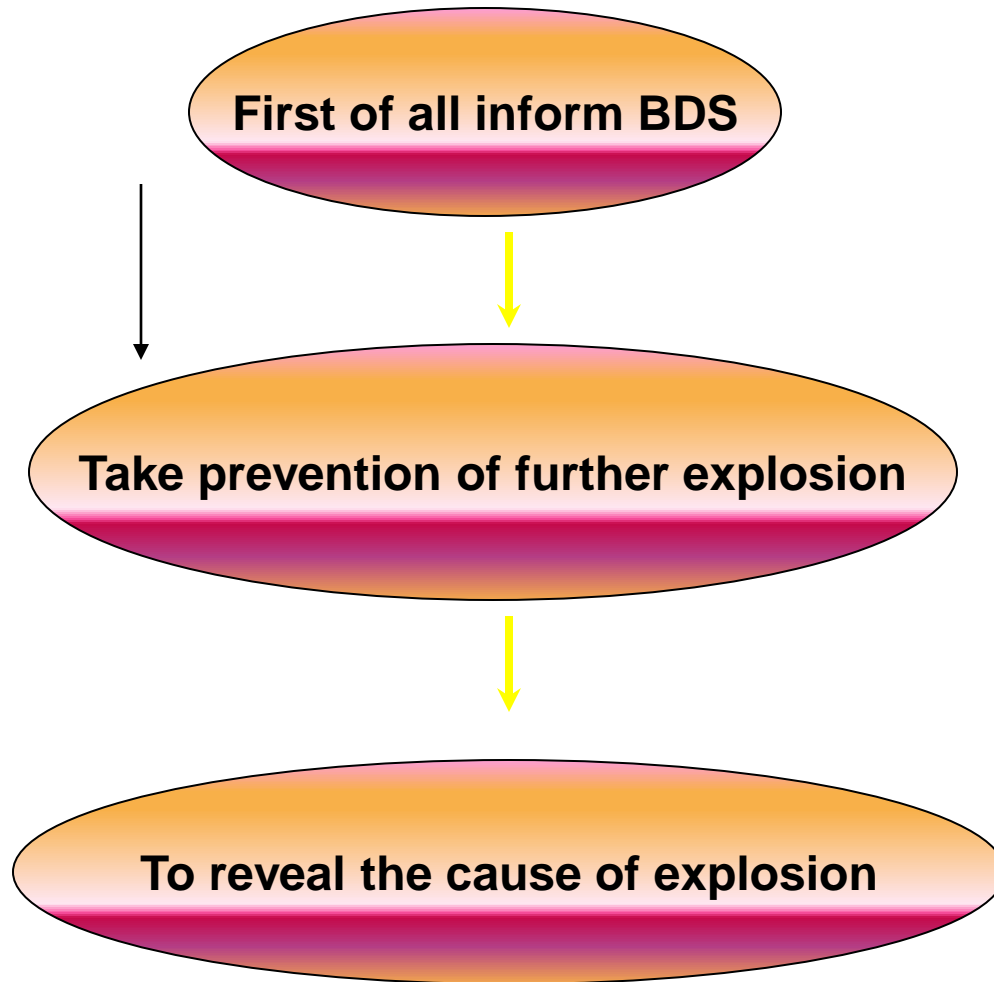
Explosive investigation is a difficult task as most of the evidences would have already been lost.

PROCESS OF INVESTIGATION

1. INITIAL RESPONSE TO INFORMATION

- A. Date and Time.
- B. Brief details of damage
- C. Number of people killed and injured
- D. Whether anyone was seen carrying a bomb
- E. Type of bag / vehicle , motorcycle , scooter
- F. Address and name of the building , P.S. , owner of the building

2. APPROACH TO THE SCENE



A. ACCIDENTAL EXPLOSION

- ☞ During preparing or plantation of bomb
- ☞ During storage, transport, inspection or demolition of explosion

B. SABOTAGE

- ☞ By terrorists
- ☞ Disgruntled workers or employees

C. CRIMINAL ACT

- ☞ Vendetta / extortion of money
- ☞ Home made bomb used / crude bomb
- ☞ Don't access to large quantity of Low or High Explosive

D. TERRORIST ACTIVITIES

- ☞ They have access to large quantity of Low or High Explosive
- ☞ The masterminds of the explosion is never seen near the target

ACTION ON ARRIVAL AT SCENE OF EXPLOSION

DETAIL ADDRESS AND TELEPHONE NO. OF THE FOLLOWING :-

- ➡ Owner of the premises
- ➡ Police Officer in Charge
- ➡ Fire Officers
- ➡ The officer in charge of **Bomb Detection & Disposal Units**
- ➡ Persons injured and killed
- ➡ Maintenance Engineer at the site
- ➡ Hospital & Medical Officers who initially treated the injured

SECURE THE GENERAL AREA

- Vacate the place if it multistoried building
- Cordoning of the area. Generally 300 meters radius from the site of explosion
- Classify the explosion - Major / Minor
Accidental / Terrorists Activities
- Take Photographs / Video - Seat of Explosion
Location of fragments
Crater size
Injuries of victims
Dead bodies

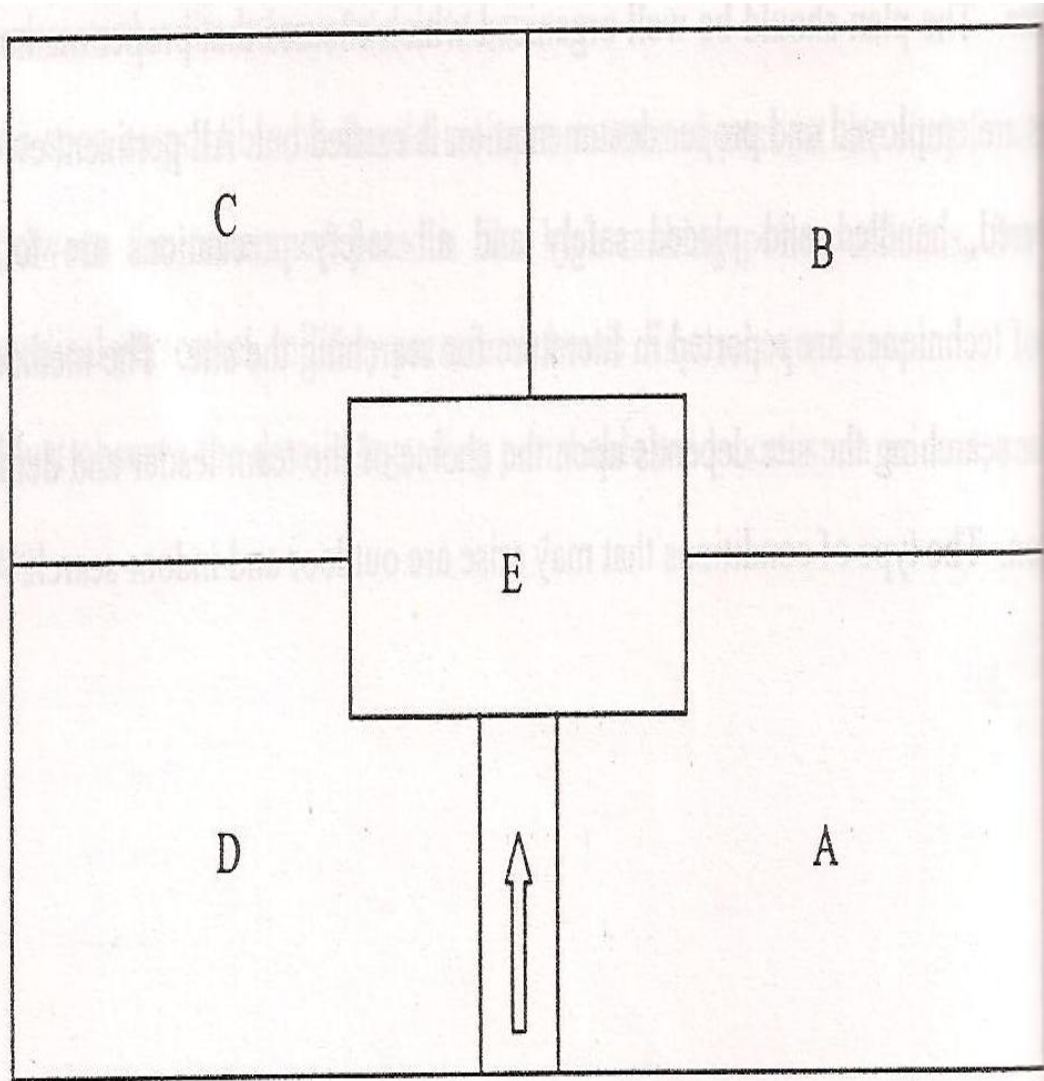
SEARCH OF EVIDENCE

- BDS
- Area should be divided into four parts
- Used gloves
- In the room
 - i. Up to waist level
 - ii. Up to eye level
 - iii. Up to ceiling

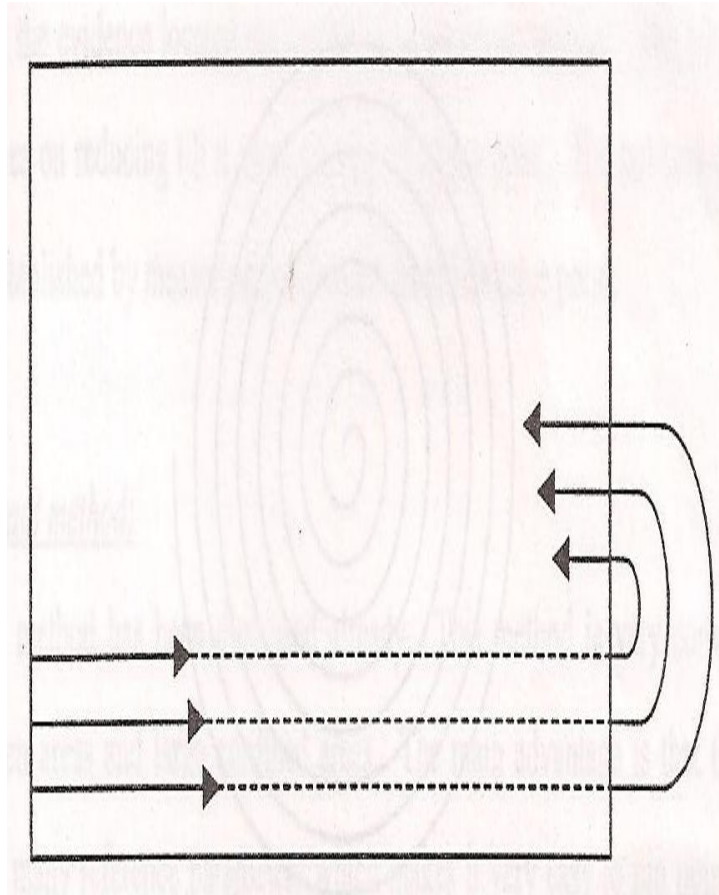
Search Methods (Out Door)

- Quadrant zone method
- Strip Method
- Grid Method
- Spiral Method
- Wheel Method

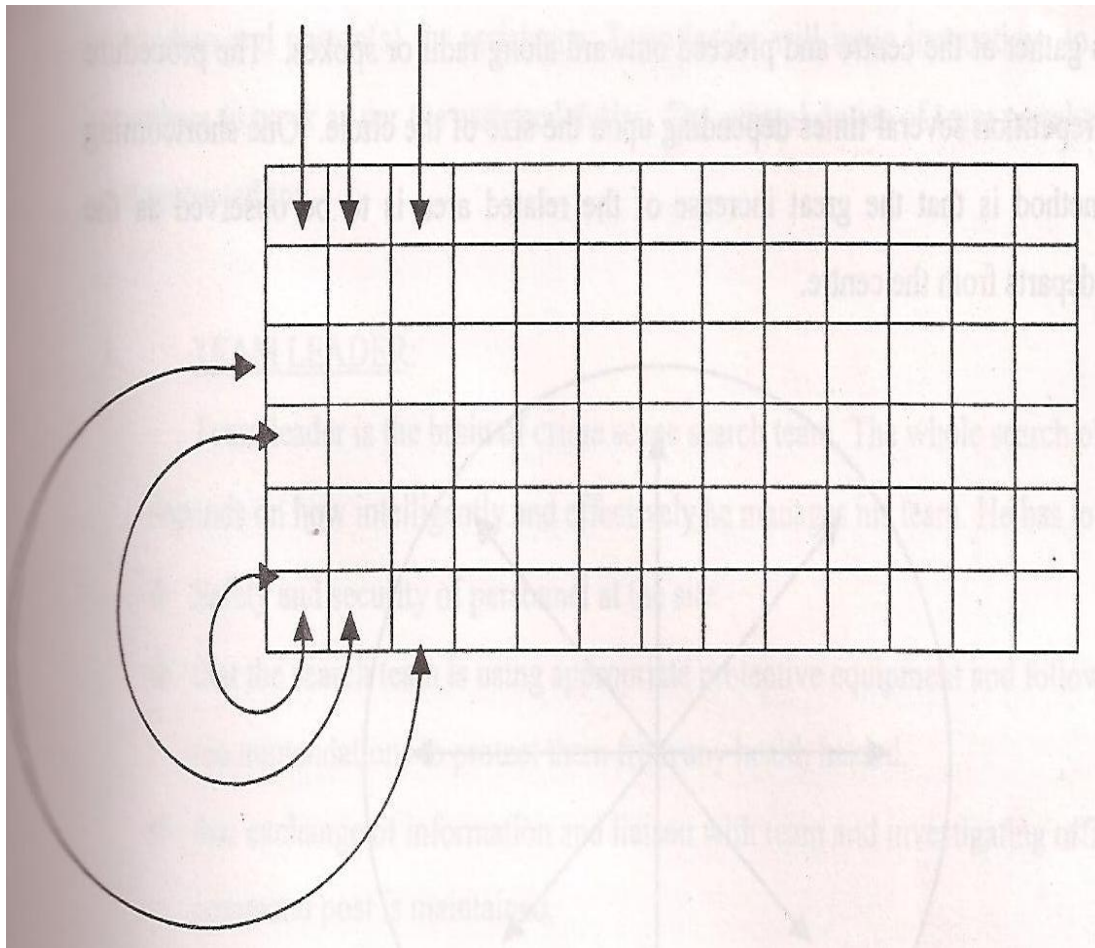
Quadrant Method



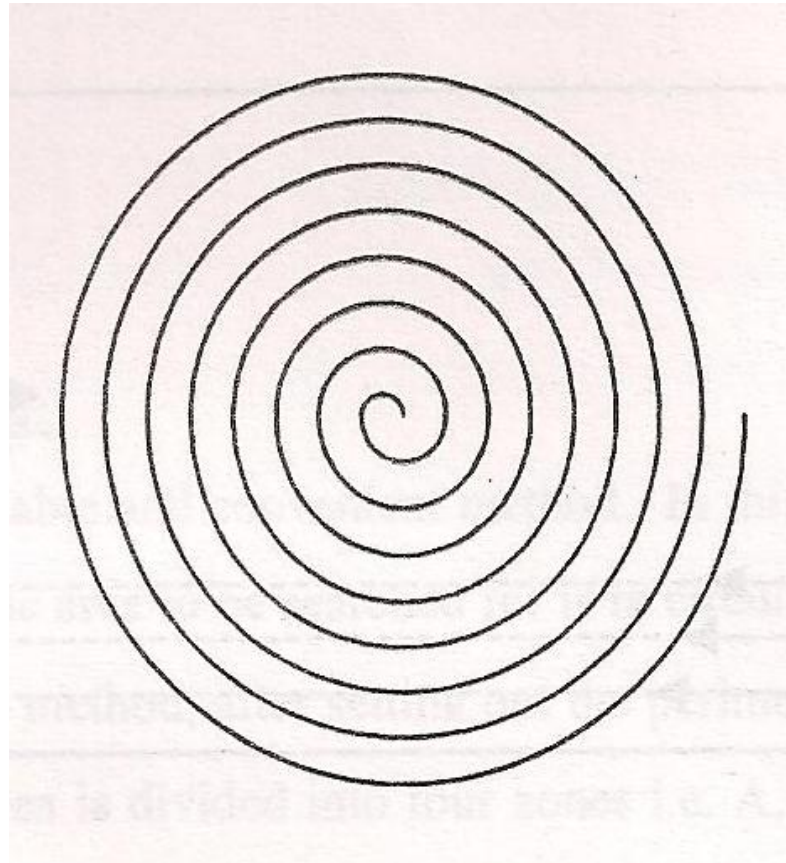
Strip Method



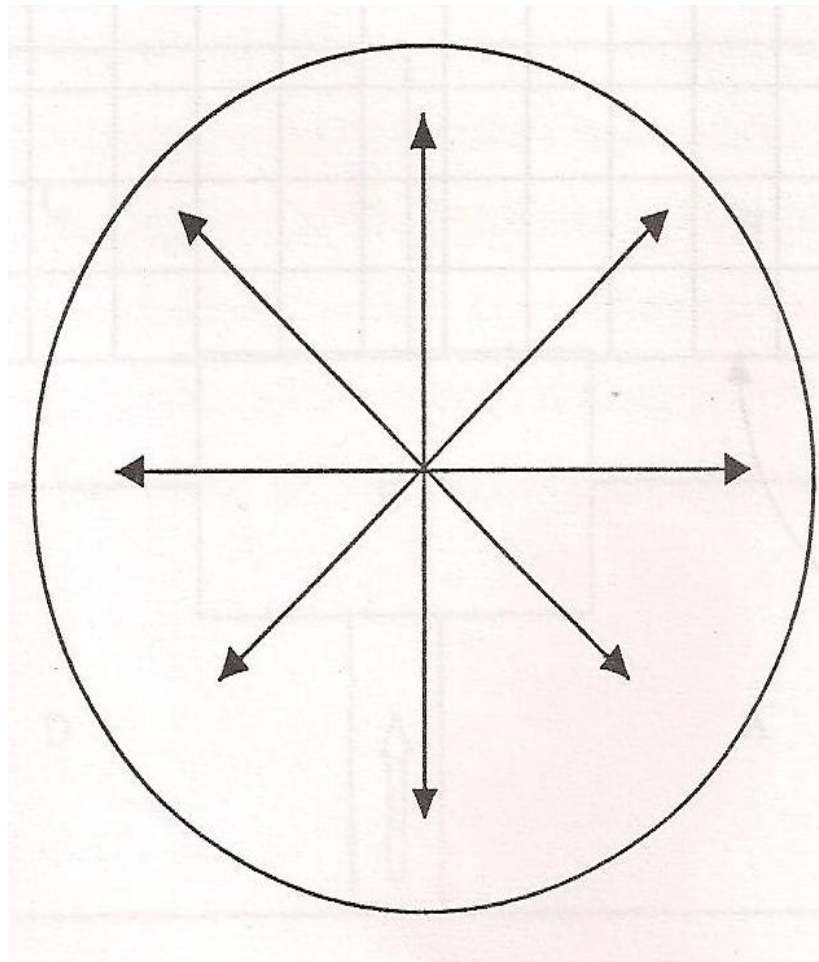
Grid (Double Strip) Method



Spiral Method



Wheel Method



Search Methods (In-Door)

- Reference Point Method
- Quadrant Method

EXPLOSION SIGNATURE

- A. Maximum damage found at the seat of explosion
- B. High explosives undergo chemical reaction at a velocity of 25000 km/h., pressure 40,00,000 psi., temperature 3000-4000 degree centigrade
- C. Fragment at the speed of 6000 km/h., lifting and throwing effect

ACTUAL DAMAGED CAUSED BY EXPLOSION

Explosion signatures are grouped into two:

- A. Primary** – Damaged direct result of bomb explosion i.e, blast, fragments, heat or flame.

- B. Secondary** – By action of bomb explosion on surrounding media / object.

EFFECTS OF BOMB EXPLOSION

- A. Blast Effects :- High pressure generated
Create blast wave 8.4 km / sec.
It moves like a sword cutting anything coming in its path
Pressure create - 40,00,000 psi
- B. Fragmentation :- Explosive in metallic container with nails form fragments.
Fragments are expected to travel to a speed of 6000km / hr.
- C. Thermal Effects :- Temperature up to 3000 – 4000 degree centigrade.
The hot fragments flying away and falling in any flammable material, e.g., fuel, gas line may cause a secondary fire.

- D. **Vacuum effect:-** A vacuum or suction effect is created behind the moving blast wave.
Vacuum effect is longer than blast effect.
Air rushing into this vacuum which create forces.
- E. **Translation effect:-** Lifting and throwing effect.
- E. **Incidental effect:-** Blast or fragments may cause fire rupture-caused damage to property and loss of life.

SEAT OF EXPLOSION

Determination of seat of explosion is very important for explosion investigation

- A. Easy:- Small explosion, letter bomb explosion
- B. Not easy:- Vehicle bomb, under basement of multistoried building.
- C. Observation:- Tiny pieces of the seat of explosion recovered with vacuum cleaner or strong magnet.
Parts of watch, wire, detonator, battery.

CRATER

Quantity of explosives used:- $D^3 = 16W$
(D - Diameter of crater
W- Weight of explosive used in kilogram)

GAS EXPLOSION

A mixture of 2-7% fuel to air is an explosive mixture.
Victim of gas explosion get burnt all over the bodies.

DIFFERENCE BETWEEN LOW AND HIGH EXPLOSIVE

LOW	HIGH
<ul style="list-style-type: none">1.LESS SHATTERING EFFECT2.WIDE DIAMETER CRATER3.GRADUAL SLOPING4.BIGGER FRAGMENTS5.INTENSE HEAT EFFECT, LITTLE OR MODERATE BLAST EFFECT6.DEPENDENT ON CONFINEMENT7.BENDING EFFECT	<ul style="list-style-type: none">1.MORE SHATTERING EFFECT2.SMALL DIAMETER BUT DEEPER3.SLOPE VERY STEEP4.SMALLER FRAGMENTS5.SEVERE BLAST EFFECT 6.INDEPENDENT OF CONFINEMENT7.CUTTING EFFECT

Do's and Don'ts if an IED found

Don'ts

1. Do not touch or remove packet unless duty bound.
2. Do not open the package with hands.
3. Do not puncture the package. .
4. Do not submerge the package In water.
5. Do not pullout the strings or wire.
6. Do not pass the metallic object over the package.
7. Handle the package alone.
8. Do not accept the identification marks on the package on the face value.
9. Do not bring a bomb or suspected object in a station house or inhabited building.
- 10 Do not use radio in the vicinity of bomb

11. Evacuate the people to safe distance. Always evacuate the people and NOT the BOMB.
12. Do not direct a flash light on the bomb.
13. Remove all inflammable items.
14. Open windows and doors to minimise the blast effects.
15. Place sand bag around the object. Do not cover the object.
16. Do not permit re-entry of people until objects are removed.
17. Do not be a DEAD HERO. You can construct a building or house but you can not make dead man alive.

Dos

Actions before bomb call

1. Selection/nomination of persons
2. Training
3. Equip them
4. Prepare contingency plan
5. Prepare search plan
6. Prepare evacuation plan
7. Educate officers and staff on telephone threats
8. Rehearsals

Action on receipt of call

- 1.** Inform Police/NSG/ Any BD Unit
2. Inform Superior Officers & IB
3. Inform Fire Station
4. Inform neighbouring premises
5. Detail Guides
6. Evacuate if need be
7. Assist Police and Bomb Squad
8. Start search as per plan
9. Keep Telephone free for incoming calls and man it.

Actions on locating the bomb

- 1.** Isolate the bomb
2. Remove essential/important items
3. Inform Bomb Squad
4. Inform Superior Officers
5. Protective Works like use of sand bags/bomb blanket
6. Evacuate if not done earlier
7. Inform police/'Fire Service/Hospital
8. Post Guides
9. Assist Police / BD Squad

COLLECTION

- ❖ **Most important step in the detection and analysis of explosive residues is the proper collection of appropriate samples from the explosion scene. Invariably undetonated residues or portion of the explosive remains at the site of explosion. Forensic Laboratory analysis of these samples depends upon the I.O.'s ability and skill to recognise those samples and collection.**
- ❖ **The entire area must be systematically searched with great care, safety will be a major area of concern.**
- ❖ **The scene of explosion is very unsafe, unexploded devices may still be in the area, the structure of a building where a bomb has exploded may be seriously weakened and can collapse.**
- ❖ **There may be additional hazards such as broken gas, mains and downed electrical lines etc. If an unexploded bomb is found, it is necessary to call a bomb technician to render the device safe.**

- ❖ **Most obvious characteristics of a high explosive is the presence of a crater at the origin of the blast. Once the crater has been located, all loose soil and other debris must immediately be removed from the crater and preserved for lab analysis.**
- ❖ **Other good sources of explosive residues and objects located near the origin of detonation.**
- ❖ **In pipe bomb explosion , particles of the explosive are frequently found adhering to the pipe or to the pipe threads.**

Evidence Collection- F A Qs

- Why ?
- How to identify ?
- What to be Collected ?
- How to collect ?
- How to pack ?
- How to seal ?
- What container to be used ?
- What precautions are to be taken ?

GENERAL PRECAUTIONS FOR CONTAMINATION AVOIDANCE

- ALL CONTACT BETWEEN CONTROL MATERIALS AND CLOTHING FROM INDIVIDUALS TO BE AVOIDED.
- AVOID SITUATIONS WHERE SAME OFFICER TAKES POSSESSION OF CLOTHING FROM A SUSPECT AND VICTIM IN THE SAME CASE.

GENERAL PRECAUTIONS FOR CONTAMINATION

AVOIDANCE Contd...

- ENSURE THAT ANYONE WHO HAS ATTENDED THE SCENE OR BEEN INVOLVED WITH THE PACKAGING OF CONTROL SAMPLES HAS NO CONTACT WITH THE SUSPECT OR THEIR CLOTHING.
- MULTIPLE SUSPECTS, THE VICTIM AND THEIR CLOTHING TO BE KEPT APART

GENERAL PRECAUTIONS FOR CONTAMINATION AVOIDANCE

Contd.....

- THE SAME OFFICER SHOULD NOT SEARCH A PROPERTY AND THEN DEAL WITH PERSONS OR OBJECTS TO BE LINKED TO THE PROPERTY.
- ALL EXHIBITS SHOULD BE PACKED AND SEALED AS SOON AS THEY ARE TAKEN.

GENERAL PRECAUTIONS FOR CONTAMINATION AVOIDANCE

Contd...

- DO NOT PACK THE CONTROL SAMPLES IN THE SAME OUTER COVER. USE SEPARATE COVERS FOR CONTROL SAMPLES, MULTIPLE SUSPECTS AND VICTIM'S CLOTHING.
- EXTREME CARE SHOULD BE TAKEN WHILE COLLECTING SAMPLES, PARTICULARLY WHICH REQUIRES DNA TECHNIQUE. WEAR FACE MASK INVARIABLY IF YOU SUFFER FROM COLD, COUGH, FLUE ETC.

GENERAL PRECAUTIONS FOR CONTAMINATION AVOIDANCE

Contd...

- ALL CONTAINERS USED FOR TRANSPORTATION MUST BE THOROUGHLY CLEANED.
- HANDLE ITEMS AS CAREFULLY AND AS LITTLE AS POSSIBLE.
- DO NOT RE -OPEN ITEMS.
- ALWAYS HANDLE ONE ITEM AT A TIME.

GENERAL PRECAUTIONS FOR CONTAMINATION AVOIDANCE

Contd.....

- AS FAR AS POSSIBLE TAKE CONTAINER TO THE EVIDENCE AND NOT EVIDENCE TO CONTAINER.
- USE BAGS/CONTAINERS OF SUITABLE SIZE/SHAPE.
- SEAL ALL PACKAGES SECURELY, ADHESIVE TAPES ON ALL EDGES.
- NEVER USE STAPLES TO SEAL.
- SEALS SHOULD BE LEGIBLE. COIN SEALS NOT ALLOWED.
- DO NOT RE USE PACKAGING.

Collection of Physical Evidence in Explosive Cases

Direct Evidences

TYPE OF SAMPLES

- SMALL QUANTITY (5 g.APPROX.) OF HIGH EXPLSOIVE, LOW EXPLOSIVE AND PYROTECHNIQUE COMPOSITIONS.
- PARTS OF DEVICES LIKE BATTERIES, WIRES, TIMERS, TAPES PRINTED CIRCUITS, SAFETY FUSE, DETONATING CORDS (PRIMA CORDS), WRAPPERS, PIECES OF CONTAINERS ETC. CAN BE SENT TO THE LABORATORY.
- IMPLEMENTS SUCH AS MORTARS, SPOONS, SPATULAS, WHICH ARE SUSPECTED TO BE USED FOR MAKING EXPLOSIVE OR HANDLIGN EXPLOSIVES.

- GARMENTS, HAND SWABS, FINGER NAILS OF SUSPECTS.
- PROJECTILES, MUD ETC. COLLECTED FROM THE SEAT OF EXPLOSION .
- POST-BLAST RESIDUES COLLECTED FROM CRATER AND SITE OF EXPLOSION.

GUIDELINES FOR COLLECTION AND PACKING OF PHYSICAL EVIDENCES FOR EXAMINATION.

- NO LIVE BOMB OR DETONATOR IS ACCEPTED BY THE LABORATORY.
- POST BLAST RESIDUES CONTAINING SOIL AND OTHER LOOSE MATERIALS TO BE STORED IN METAL CONTAINERS OR PLASTIC BAGS. CONTROL SOIL HAS TO BE COLLECTED, LABELED, PACKED AND SENT SEPARATELY TO AVOID CROSS CONTAMINATION. CONTROL SAMPLES IN CASE OF POST-BLAST CASES ARE TO BE COLLECTED BY ROUGHLY MEASURING THE DISTANCE FROM THE SEAT OF EXPLSION TO THE FARTHEST MISSILE AND ADDING 50% OF THE DISTANCE TO IT.

- SHARP EDGED OBJECTS SHOULD NOT BE ALLOWED TO PIERCE THE SIDES OF PLASTIC BAGS. IT IS BEST TO PLACE THESE TYPES OF ITEMS IN METAL CONTAINERS.
- SEND ONLY 5 GMS OF BULK EXPLOSIVES, THE REMAINING MATERIAL MAY BE DESTROYED WITH PROPER AUTHORITY.

- COTTON SWABS USING WATER, ALCOHOL, AND ACETONE MAY BE COLLECTED FROM STATIONERY AND HUGE OBJECTS AVAILABLE NEAR THE EXPLOSIVE SITE. SUCH SWABS TO BE PACKED, MARKED PROPERLY, SEALED AND SENT TO THE LABORATORY. CONTROL SOLVENTS ARE ALSO TO BE SENT IN DIFERENT CONTAINER WITH PROPER MARKING.
- THE EXHIBITS ARE TO BE PACKED CAREFULLY TO AVOID ANY JERK, IMPACT, FRICTION ETC.

INDIRECT EVIDENCES

- Tyre Marks indicating direction from which the culprits came and left the site
- Foot prints/ shoe prints
- Any item left at the site by the culprits like match box, cigarette buds, handkerchief, any cloth piece, wrist watch, vehicle ,Hi-tech Tools, Remote control devices etc
- Fingerprints

PRESERVATION

- **All materials collected for examination by the forensic lab. Must be placed in sealed containers and labelled with all pertinent information.**
- **Soil and other stiff loose materials are best stored in metal containers or plastic bag. Debris and articles collected from different areas are to be packed in separate containers.**
- **If the evidence is packaged in plastic bags, do not place these bags in close proximity to each other avoided contaminations.**
- **Sharp edged objects should not be allowed to pierce the sides of a plastic bag. It is best to place these types of items in metal containers.**
- **Pack the initiating device or the detonators separately from other explosives. One or two detonators are sufficient, if possible the explosive or the device should be enclosed in liquid nitrogen for the safest storage and transport.**

Sealing

- All parcels should be carefully sealed by the despatching officers and packed in such a manner that they cannot be opened without destroying the seals.
- In one case, the same seal should be used throughout.
- The specimen seal should be the same with the seals of the packets.







Forwarding

- A letter of advice should be separately forwarded to the examiner concerned.
- Forwarding letter should contain the following particulars:
 - a) report number
 - b) case reference
 - c) brief history of the case
 - d) description of articles in each packet
 - e) Nature of examination required
 - f) forwarding note of the officer through whom the articles are forwarded
 - g) name of the investigating officer
 - h) specimen seal used on the parcel
 - i) certificate of authority to examine

Chain of custody

- The continuity or chain of custody of the exhibits must be insured in order to maintain its integrity.
- there should be record of the names of the persons through whom the exhibits passed and to whom they were delivered together with the time and date

DESPATCH

-  **Only by special messenger all sealed materials should be sent to forensic laboratory with proper specimen seal, authority letter etc.**
-  **Don't send materials by post or by goods train.**
-  **In case of unexploded explosive materials explosive and detonator should be packed separately.**
-  **Send only representative sample of the explosive and not the whole amount.**
-  **Inform the station master that the explosives are being carried in the train.**
-  **Don't send any live bomb.**

QUERIES

- A. Whether exhibits contain any explosive substance or not. If so, nature of explosive substances ?
- B. Whether it comes under the purview of E.S. Act ?
- C. Whether it is IED or part of IED, splinter ?
- D. What is triggering mechanism ?