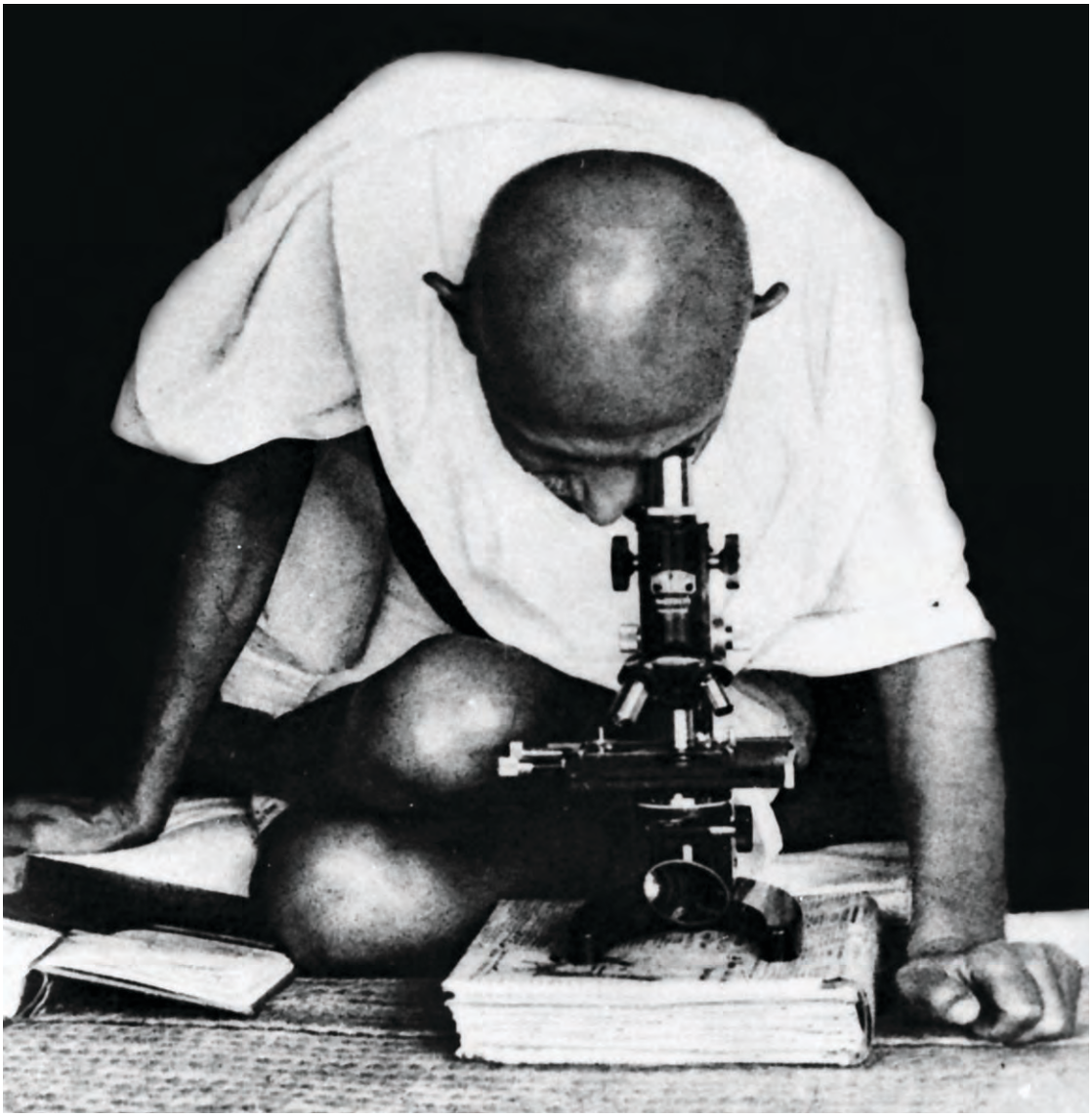
A Forensic Guide for Crime Investigators

Standard Operating Procedures



LNJN National Institute of Criminology and Forensic Science

NICFS

Restricted

A Forensic Guide for Crime Investigators

(Standard Operating Procedures)



LNJN National Institute of Criminology and Forensic Science

(Ministry of Home Affairs)

Sector-3, Outer Ring Road, Delhi – 110085.

DISCLAIMER

This publication is meant for authorized Criminal Justice Agencies. LNJN NICFS shall not be liable for any direct, consequential or incidental damages arising out of the use of the book. Reference herein to any specific product (commercial or non-commercial), processes or services by brand or trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation or favour by LNJN NICFS (MHA). The information and statements contained in this document shall not be used for the purpose of advertising or to imply the endorsement or recommendation of LNJN NICFS (MHA).

Published by

LNJN National Institute of Criminology and Forensic Science
(Ministry of Home Affairs)
Sector-3, Outer Ring Road, Delhi –110085.

Executive Editor

Rina Mitra, IPS

Co-Executive Editor

Sandeep Mittal, IPS

Credits

Copy Editor: Sadiksha Waiba
Jacket Design: Abriti Waiba
Cover photo: Gandhi Smriti and Darshan Samiti, New Delhi

Printed at

Bengal Offset Works,335, Khajoor Road, Karol Bagh, New Delhi-110005.

FOREWORD

The advances in science and technology are increasingly enhancing the role of forensic science and scientific aids in criminal investigation. This is a positive trend as it strengthens the much needed objectivity of investigation, thereby enhancing the credibility of investigation process and improving probability of bringing offenders to justice.

The LNJN National Institute of Criminology and Forensic Science has come out with a timely compilation of SOPs for collection of physical and digital evidence in a wide variety of crime scenarios. A noteworthy aspect of this forensic guide is that the legal provisions relevant to each crime situation have been well explained making it a portable vade mecum for investigators, prosecutors, defence counsels, forensic scientists, judges, students and interested laymen. The material has been well-compiled and produced in a user-friendly manner.

The compendium is going to be a valuable companion for the criminal justice community in ascertainment of truth and fixation of culpability. I complement Smt. Rina Mitra, Ex. Director, LNJN National Institute of Criminology and Forensic Science (NICFS) and Shri D.M. Mitra, the present Director for having taken keen interest in producing such a useful compendium.

(ANIL SINHA)
Director
Central Bureau of Investigation
New Delhi.

PREFACE

The scope and importance of forensic evidence has been increasing over the years. On one hand, with the expansion of technology, new types of crime such as internet based crime, computer aided crime, etc., have emerged as a major challenge to the law enforcement agencies. Consequently, forensic science has also expanded into new areas like computer forensics. On the other hand, there is increasing demand and reliance on forensic evidence by courts and opinion makers. In the recent past, courts have relied on forensic evidence over oral evidence for conviction. Therefore, investigating agencies are expected to not only collect newer types of evidences but also to strive to get relevant and convincing forensic evidence to satisfy the courts as well as other stakeholders like the press, civil society and political leadership.

Each type of forensic evidence requires relevant method for collection, handling, packing and forwarding the physical evidence for forensic examination. However, crucial a forensic evidence may be, any anomaly in the way it was collected and handled could lead to destruction of its evidentiary value. Forensic evidence can be severely damaged due to shortcoming of any of the aspects. While Investigating officers (I.Os) try to collect physical evidence for forensic examination, often they are not aware of the exact procedure and also relevant queries. Investigating Officers need to know the correct procedure for each type of forensic evidence at the time of collection and also queries that could be made for the expert's opinion.

Though there is a tendency to send specialized officers for collection of forensic evidence, it is neither necessary nor practical for the team to reach each and every place. Therefore, the I.O. himself/ herself should be capable of handling physical evidence.

However, looking at the vast range of physical evidences that need forensic examination, it is not possible for an I.O. to remember the correct procedure in detail. Therefore, it was felt that a handbook on Standard Operating Procedures (SOPs) should be available to the I.O. for their ready reference. This handbook tries to fulfill the long felt need of the investigating agencies. It will be useful not only for I.Os. but also judicial officers and prosecutors. This is a maiden attempt by NICFS intended to empower different agencies of the criminal justice system and bridge the gap between technical and non-technical officials in the criminal justice system.

PREFACE

While drafting the chapters of this voluminous work, care has been taken and chapters have not only been reviewed by the internal faculty but also vetted by external experts on the relevant subject. Effort has also been made to make the book user friendly and thus empower the I.Os. with basic understanding of the type of crime and investigation they would handle. Forensic Science is also a growing discipline.Vital suggestions received from the users, the state police or investigation agencies under the central government, trainers as well as heads of training institutions may need to be incorporated in the next edition.

This SOP may not be all inclusive. However, due to technology growing at rapid pace, the suggestions in the SOP are best examined in the context of current technology and practices prevalent in the country. Besides, each case is unique; therefore it may require action other than those described in the related chapter. Therefore, users may have to refer to the other chapters also for the appropriate forensic tool that suits them.

This handbook also provides model queries that the I.O. needs to ask the forensic experts and medico legal experts. This book on Standard Operating Procedure (SOP) is for ready reference only and doesn't claim the absolute necessity or correctness of the prescribed procedure.

D.M. MITRA, IPS
Director
LNJN NICFS
New Delhi.

ACKNOWLEDGEMENTS

A Forensic Guide for Crime Investigators: Standard Operating Procedures has been written to bridge the gap in application of Forensic Science on crime scene management and to guide the Investigating Officers. We wish to thank the chapter authors and subject experts who helped us in achieving our endeavour.

We thank all the Director General of Police of State Police especially Tamil Nadu, Arunachal Pradesh, Haryana, Director General, National Investigation Agency and Director, State Vigilance Bureau, Haryana for providing their support in the creation of this forensic guide.

We wish to acknowledge and communicate our gratitude to Shri M.L.Sharma, IPS, Former Special Director, Central Bureau of Investigation, who volunteered to edit the contents of this voluminous work and Shri R.R.Verma, IPS, then Director General, National Crime Records Bureau, New Delhi, who extended all his support to prepare chapters on finger prints and portrait building.

Our thanks to the Director General, Narcotics Control Bureau, New Delhi and Director, Wildlife Crime Control Bureau, New Delhi, for their unqualified support.

We thank our former Director Smt. Rina Mitra, IPS and Shri Sandeep Mittal, IPS, Deputy Inspector General of Police (Administration), NICFS, Delhi, for leading the team of faculties of NICFS and coordinating with other organizations for bringing in valuable inputs to this forensic guide.

We would also like to acknowledge the sincerity, hard work and innovative ideas put in by Ms Sadiksha Waiba for copy editing and enhancing the visual appeal of the voluminous work.

Lastly,we are particularly beholden to the staff of LNJN NICFS who actively participated and contributed in the publication of this volume.

Subject Authors

Lead Author

***Dr A.C. Rajvanshi*, Senior Faculty (Chemistry), NICFS, Delhi**

Contributing Authors (in alphabetical order)

***Dr A. K. Bapuly*,Director, FSL, Odisha**

***Shri N. B. Bardhan*, Principal Scientific Officer, CFSL/CBI, Delhi**

***Dr V. N. Sehgal*, Retd. Director, CFSL/CBI, Delhi**

***Dr Tanya Chauhan*, Assistant Professor (Biology), NICFS, Delhi**

Chapter 01-General Principles of Scene Investigation General

Chapter 02-Principles of Evidence Packaging

Lead Author

***Dr K. P. S. Kushwaha*, Senior Faculty (Biology), NICFS, Delhi**

Contributing Authors (in alphabetical order)

***Dr A. K. Bapuly*, Director, FSL, Odisha**

***Dr M. K. Goel*, Former Director, FSL, Haryana**

***Dr S. K. Verma*, Professor of Forensic Medicine & Toxicology, University College of Medical Science and GTB Hospital , Delhi**

***Dr V. Dhankar*, Specialist & Head, Department of Forensic Medicine, Dr. BSA Hospital, Rohini, Delhi**

Chapter 03-Forensic Biology

Chapter 04-DNA Fingerprinting

Chapter 05-Bloodstain Pattern Analysis

Lead Author

***Shri P. Sharma*, Senior Scientific Assistant (Chemistry), NICFS, Delhi**

Contributing Author (in alphabetical order)

***Shri L. K. Katyal*, Former Assistant Director, FSL, Haryana**

Chapter 06-Poisoning cases

Chapter 07-Hooch cases

Chapter 08-Narcotic Drugs and Psychotropic Substances

Lead Author

***Shri J. R. Sethi*, Assistant Professor (Chemistry), NICFS, Delhi**

Contributing Authors (in alphabetical order)

***Shri N. B. Bardhan*, Principal Scientific Officer, CFSL/CBI, Delhi**

***Shri Ram AvtarYadav*, Deputy Superintendent of Police, Anti Corruption, CBI**

***Dr V. N. Sehgal*, Former Director, CFSL/CBI, Delhi**

Chapter 09-Explosives

Chapter 10-Fire and Arson

Chapter 11-Petroleum Adulterations

Chapter 12-Trap Cases

Chapter 13-Acid Attack

Lead Authors

***Dr J. K. Modi*, Senior Faculty (Ballistics), NICFS, Delhi**

***Shri C. Nigam*, Senior Scientific Assistant (Ballistics), NICFS, Delhi**

Contributing Authors (in alphabetical order)

***Dr A. K. Bapuly*, Director, FSL, Odisha**

***Shri K. C. Varshney*, Deputy Director, FSL, Delhi**

Chapter 14-Firearms

Lead Author

***Shri J. K. Semwal*, Senior Faculty (Documents), NICFS, Delhi**

Contributing Authors (in alphabetical order)

***Dr A. K. Bapuly*, Director, FSL, Odisha**

***Shri A. K. Gupta*, Former Director, FSL, Delhi**

***Shri Sanjeev Kumar*, Senior Scientific Assistant (Documents), NICFS, Delhi**

Chapter 15-Forged Documents

Chapter 16-Security Documents

Chapter 17-Torn Documents

Chapter 18-Charred Documents

Lead Author

***Shri Anil Chawla*, Director In-charge, Central Finger Print Bureau, NCRB, Delhi**

Chapter 19-Fingerprints

Lead Authors

***Shri Sandeep Mittal*, Deputy Inspector General of Police (Administration), NICFS, Delhi**

***Shri Sanjeev Kumar*, Senior Scientific Assistant (Documents), NICFS, Delhi**

Contributing Authors (in alphabetical order)

***Shri A. K. Dohare*, Additional Director General of Police, Bhopal**

***Shri G. Deepak Raj Rao*, Assistant Professor (Computer Forensics), NICFS, Delhi**

***Shri Om Veer Singh*, Additional Director, CERT-IN, Delhi**

Chapter 20-Digital Evidence

Lead Author

***Dr S. R. Singh*, Senior Faculty (Physics), NICFS, Delhi**

Contributing Authors (in alphabetical order)

***Dr A. C. Rajvanshi*, Senior Faculty (Chemistry), NICFS, Delhi**

***Dr C. P. Singh*, Assistant Director (Physics), FSL, Delhi**

Chapter 21-Image Analysis – CCTV Footage

Lead Author

***Dr S. R. Singh*, Senior Faculty (Physics), NICFS, Delhi**

Contributing Author (in alphabetical order)

***Dr C. P. Singh*, Assistant Director (Physics), FSL, Delhi**

Chapter 22-Road Accident

Chapter 23-Theft and Burglary

Chapter 24-Speaker Identification

Lead Author

***Ms. Surekha Soni*, National Crime Record Bureau, New Delhi**

Chapter 25-Portrait Building System

Lead Author

***Dr A. K. Bapuly*, Professional Director, FSL, Bhubaneswar**

Chapter 26-Polygraph Test

Lead Author

***Smt. Rina Mitra*, Director, LNJN NICFS, Delhi**

Chapter 27-Wildlife

Chapter 28-Digital Signature of Wildlife Products in International Trade

Detailed Table of Content

	PREFACE		**i-ii**
	ACKNOWLEDGEMENTS		**iii**
1.	**GENERAL PRINCIPLES OF CRIME SCENE INVESTIGATION**		**01-15**
	1.1	Investigation Defined	02
	1.2	Forensic Science and Crime Scene Investigation	02
	1.2.1	Significance of Physical Evidence and 'Chain of Custody'	03
	1.2.2	Legal and Human Considerations During Investigation	05
	1.2.3	Health and Safety Considerations	05
	1.3	Crime Scene Investigation Process	06
	1.3.1	Planning	06
	1.3.2	Organization and Coordination	08
	1.3.3	Preservation of the Scene and its Evidence	09
	1.3.4	Documentation of the Scene and its Evidence	10
	1.3.5	Recognition and Recovery of Physical Evidence	11
	1.3.6	Transportation, Storage and Forwarding of Evidence to the Laboratory	14
2.	**GENERAL PRINCIPLES OF PACKAGING OF EXHIBITS**		**16-31**
	2.1	Sources of the Exhibit	16
	2.2	Goals of Evidence Packaging	16
	2.2.1	Protection of IO from possible hazards associated with evidences like	16
	2.2.2	Protection of evidence against	16
	2.3	Elements of Packaging Evidence	17
	2.3.1	Packing Material	17
	2.3.2	Size of Packing Material	18
	2.3.3	Sealing of Evidence	18
	2.4	Precautions to be Taken	20
	2.5	General Directions	20
	2.6	Directions for Specific type of Exhibits	21
	2.6.1	Weapons and Tools	21
	2.6.2	Hair and Fibres	22
	2.6.3	Blood and Bloodstains	23
	2.6.4	Semen	25

2.6.5	Saliva	25
2.6.6	Dust or Soil	26
2.6.7	Arson Cases and Cases of Burning	26
2.6.8	Tool Marks	27
2.6.9	Exhibits for Ballistics Examination	27
2.6.10	Glass	29
2.6.11	Paint	29
2.6.12	Questioned Documents	30
2.6.13	Latent Fingerprints	30
2.6.14	Drug Samples	31

3. FORENSIC BIOLOGY 32-91

3.1	Pre-Search Planning and Preparation	32
3.2	List of Equipments Required	32
3.3	Constituting the Team for Handling the Crime Scene	36
3.4	Crime Scene Investigation	36
3.4.1	Protection of Crime Scene	36
3.4.2	Photography of the Crime Scene	37
3.4.3	Sketching of Crime Scene	38
3.4.4	Crime Scene Search	39
3.5	Death (due to weapons other than firearms)	39
3.5.1	Crime Scene Investigation	40
3.5.2	Evidence Material Likely to be Found at Crime Scene	42
3.5.3	Collection and Packaging of Evidence Material	43
3.5.4	Forwarding of Evidence Material	44
3.5.5	Likely Queries to be Raised (may vary from case to case)	44
3.6	Death Due to Fall from Height	45
3.6.1	Observation at the Crime Scene	46
3.6.2	Observation on the Body of Deceased	47
3.6.3	Evidence Material Likely to be Found	48
3.6.4	Collection and Packaging of Evidence Materials	48
3.6.5	Forwarding of Evidence Materials	49
3.6.6	Likely Queries to be Raised (may vary from case to case)	49
3.7	Death Due To Burning	50
3.7.1	Crime Scene Investigation	51
3.7.2	Observations at the Scene of Death	51

3.7.3	Observation on the Body of Deceased	53
3.7.4	Evidence Material Likely to be Found in Burning Cases	54
3.7.5	Collection and Packaging of Evidence Material	55
3.7.6	Forwarding of Evidence Materials	56
3.7.7	Likely Queries to be Raised (may vary from case to case)	56
3.8	Sexual Offences	58
3.8.1	Crime Scene Investigation	59
3.8.2	Evidence Materials Likely to be found at Crime Scene	64
3.8.3	Collection and Packaging of Evidence Materials	65
3.8.4	Forwarding of Evidence Materials	66
3.8.5	Likely Queries to be Raised (may vary from case to case):	67
3.9	Hanging	70
3.9.1	Types of Hanging	70
3.9.2	Crime Scene Investigation	72
3.9.3	Observations of the Body	73
3.9.4	Local External Findings	74
3.10	Periligature Injuries	76
3.10.1	Evidence Material Likely to be Found at Crime Scene	76
3.10.2	Collection and Packaging of Evidence Material	77
3.10.3	Forwarding of Evidence Material	77
3.10.4	Likely Queries to be Raised (may vary from case to case):	78
3.11	Strangulation	81
3.11.1	Crime Scene Investigation	82
3.11.2	Observations on the Body	82
3.11.3	Evidence Materials Likely to be found at Crime Scene	83
3.11.4	Collection and Packaging of Evidence Materials	83
3.11.5	Forwarding of Evidence Materials	84
3.11.6	Likely Queries to be Raised (may vary from case to case):	84
3.12	Drowning	86
3.12.1	Types of Drowning	86
3.12.2	Crime Scene Investigation	87
3.12.3	Observations on the Body	87
3.12.4	Evidence Material Likely to be found fat Crime Scene	88
3.12.5	Collection and Packaging of Evidence Materials	88
3.12.6	Forwarding of Evidence Materials	89
3.12.7	Likely Queries to be Raised (may vary from case to case):	89

4.	**DNA PROFILING**		**92-101**
	4.1	Overview of the DNA Testing Process	94
	4.2	Application of DNA in Forensics	96
	4.3	Documentation, collection, preservation, packaging and forwarding of evidence materials for DNA profiling:	96
5.	**BLOODSTAIN PATTERN**		**102-111**
	5.1	Bloodstain Pattern Analysis:	102
	5.2	Basics of Formation of Bloodstain Pattern	105
	5.2.1	Information Revealed by Bloodstain Pattern Analysis	108
	5.2.2	Types of Bloodstain Patterns:	109
	5.2.3	Classification of Bloodstain Spatter by Velocity	109
	5.2.4	Determination of the Direction	110
	5.2.5	Determination of the Point or Area of Convergence or the Point or Area of Origin	110
6.	**POISONING**		**112-159**
	6.1	Sections of Law	112
	6.2	List of Equipments Required	114
	6.3	Constituting the Team for Handling the Crime Scene	115
	6.4	Crime Scene Investigation	116
	6.4.1	Protection of Crime Scene	116
	6.4.2	Photography of the Crime Scene	117
	6.4.3	Sketching of Crime Scene	117
	6.4.4	Crime Scene Search	117
	6.5	Classification of Poisons	117
	6.6	Information to be Obtained while Investigating a Case of Poisoning	119
	6.7	Factors Affecting the Effect of Poisons	120
	6.8	Examination of the Body of the Victim	120
	6.9	Forwarding of Evidences to FSL	126
	6.10	Guidelines for Preservation of Exhibits	126
	6.11	Checklist on Investigation of Death due to Poisoning	128
	6.12	Do’s and Don’ts for the Investigating Officers	128
	6.13	Alcohol	129
	6.13.1	Fatal Dose	129
	6.13.2	Fatal Period	130
	6.13.3	Evidence in Cases of Alcohol Intoxication	130

6.13.4	Location and Collection of Liquor/Illicit Liquor	130
6.13.5	Collection of Samples	130
6.13.6	Breath Analyzer	131
6.13.7	Likely queries to be asked from Forensic Expert:	132
6.14	Pesticides	133
6.14.1	Organophosphorus Pesticides	133
6.14.2	Organochloro Pesticides	136
6.14.3	Carbamates	137
6.14.4	Pyrethroids	138
6.15	Fumigants	139
6.15.1	Aluminium Phosphide	139
6.15.2	Zinc Phosphide	141
6.16	Poisonous Gases	142
6.16.1	Carbon Monoxide	143
6.17	Plant Poisons	145
6.17.1	Rati (Abrus precatorious)	146
6.17.2	Dhatura (*Datura Fastuasa*)	147
6.17.3	Oleander (Kaner)	149
6.18	Animal Poisons	150
6.19	Dog Bite Cases	153
6.20	Food Poisoning	156
6.21	Seizure List	158
6.22	End of Search	158
6.23	Scrutiny of Evidence Collected From Crime Scene	158
6.24	Likely Queries to be Raised	159

7. HOOCH POISONING **160-166**

7.1	Reasons for Death of ‘Hooch’ Victims	161
7.1.1	Investigation of ‘Hooch’ Tragedy Episode	162
7.1.2	Symptoms Exhibited by the Victims	162
7.1.3	Evidence Materials Likely to be found at the Site of Occurrence	163
7.1.4	Samples to Be Collected In Case the Victim Is Alive	163
7.1.5	Samples to be collected in Case the Victim is dead	164
7.1.6	Treatment Regime of ‘Hooch’ Victim (by Doctors only) may include	164
7.1.7	Forwarding of Evidence Material	165
7.1.8	Likely Queries to be raised by the IO	165

8. NARCOTICS DRUGS AND PSYCHOTROPHIC SUBSTANCES 167-210

8.1 Definitions According to NDPS Act (Section 2) 168
8.2 Procedures under NDPS Act 172
8.3 Types of Evidences in NDPS Cases 181
8.4 Collection of Evidences 182
8.5 Number of Samples to be Drawn in Each Seizure Case 183
8.6 Small and Commercial Quantity of Important Drugs 184
8.7 Packaging Procedure of Evidences 187
8.8 Labeling and Sealing of Evidences 188
8.9 Forwarding of Evidences 189
8.10 Narcotic Drug Detection Kit 189
8.11 Precursor Detection Kit 194
8.12 Precursor Chemicals 195
8.13 Checklist for Investigation of Drug Related Offences 196
8.14 Details of Seizure of Drugs for the Years 2011, 2012, 2013 and 2014 201
8.15 Do's: Search, Field Testing and Seizure 201
8.16 Chain of Custody of Seized Drugs and Precursors 203
8.16.1 Laboratories to which samples may be sent: 204
8.16.2 The addresses of state forensic science laboratories are given below: 205
8.16.3 Follow Up 206
8.17 Common Reasons for Acquittal 206
8.18 Seizure List 207
8.19 End of Search 207
8.20 Scrutiny of Evidence Collected From Crime Scene 207
8.21 Questionnaire 208

9. EXPLOSIVE SUBSTANCES 211-236

9.1 Pre-Search Planning and Preparation by IO 216
9.2 Team required for Handling Crime Scene 222
9.3 Crime Scene Investigation 223
9.4 Search for Evidences 227
9.5 Collection of Evidences 229
9.6 Packaging and Forwarding of Evidence 232
9.7 Seizure List and Forwarding Memo Preparation 233
9.8 Dealing with Law and Order at Crime Scene 233
9.9 End of Search 234

9.10	Queries	234
9.11	Case Studies	235
10.	**FIRE AND ARSON**	**237-255**
10.1	Relevant IPC Sections	238
10.2	Pre-search Planning and Preparation	240
10.3	List of Equipments Required	240
10.4	Team Required for Handling a Crime Scene	242
10.5	Crime Scene Investigation	242
10.5.1	General Guidelines for Searching a Fire Scene	245
10.5.2	Exterior Search	246
10.5.3	Interior Search	246
10.6	Search for Evidences	247
10.6.1	Different fire cases could be:	247
10.6.2	Indicators of Arson	248
10.6.3	The IO should observe and collect the following evidences	248
10.6.4	Evidences to be looked for in case of a vehicular arson/fire:	249
10.6.5	Evidences to be looked for in case of an electrical short circuit	249
10.6.6	Point of Origin of Fire:	250
10.7	Collection of Evidences	250
10.8	Packaging and Forwarding of Evidences	251
10.9	Seizure List	252
10.10	Dealing with Law and Order at Crime Scene	252
10.11	End of Search	252
10.12	Queries	253
10.13	Case Studies	254
11.	**PETROLEUM AND ADULTERATION**	**256-274**
11.1	List of Equipments required	261
11.2	Drawl of Samples	265
11.3	Packaging and Forwarding of Samples	267
11.4	Queries	271
11.5	Case Studies	272
12.	**TRAP CASES**	**275-287**
12.1	Pre-trap Preparation	277
12.2	Trap Kit	279

12.3	Team Required for Handling a Crime Scene	279
12.4	Actual Trap/Post Trap *Panchnama*/Memorandum	280
12.5	Search for Evidences	281
12.6	Collection of Evidence	282
12.7	Packaging and Forwarding of Evidences	283
12.8	Seizure List	284
12.9	Queries from Forensic Laboratory	284
12.10	Do's and Don'ts	285
12.11	Information Revealed After Forensic Examination	286
12.12	Case Study	287
13.	**ACID ATTACK CASES**	**288-302**
13.1	Indian Penal Code Sections	290
13.2	List of Reagents and Kits Required	292
13.3	Team required for Handling the Scene	295
13.4	Crime Scene Investigation	295
13.5	Search for Evidences	297
13.6	Collection of Evidences	298
13.7	Packaging and Forwarding of Evidences	299
13.8	Seizure List	299
13.9	End of Search	300
13.10	Queries	300
13.11	Case Study	301
14.	**FIREARMS**	**303-383**
14.1	Safe Handling of Firearms at Scene of Crime (SOC)	303
14.2	Sections	304
14.3	Police as First Responder at Scene of Crime-Duties and Responsibilities	306
14.3.1	Ensure Safety at the Scene of Crime	307
14.3.2	Arrange for Medical Assistance	307
14.3.3	Apprehend any Suspects	307
14.3.4	Secure the Scene of Crime	307
14.3.5	Identify Victim/Victims	308
14.3.6	Call for Specialized Forensic Crime Team	308
14.4	Crime Scene Management	309

14.4.1	Crime Scene Assessment	309
14.4.2	Crime Scene Photography	311
14.4.3	Crime Scene Sketching	312
14.4.4	Crime Scene Search	314
14.4.5	Kit	316
14.4.6	Lists of Exhibits Likely to be Found at Scene of Crime	317
14.5	Various Clues Likely to be Found in Crime Involving Firearms, Their Recovery, Collection, Labeling, Packaging, Sealing and Transportation	333
14.5.1	Firearms	333
14.6	Fired Cartridge Cases, Percussion Caps	339
14.7	Projectiles-Bullets, Bullet Fragments, Pellets, Wads	340
14.8	Live Ammunition (Cartridges or Black Powder/Shots/Wads in Case of Muzzle Loading Firearms	345
14.9	Home-Made Ammunition	346
14.10	Clothes of Victims	346
14.11	Clothes of Suspects	348
14.12	Gun-Shot Residue (GSR)	348
14.13	Gun-Shot Injuries	353
14.14	Firing Through Glasses	359
14.15	Bullet Holes/Marks/Ricochet Marks on Inanimate Targets	362
14.16	Whether a Hole in Human Body is A Gun-Shot Hole or Not?	365
14.17	Shot-Gun Patterns	366
14.18	Chain of Possession	366
14.19	Differentiation between Homicide, Suicide and Accidental Firing	367
14.20	Case Studies	368
14.21	Unusual Practices Followed by Criminals in Committing Crimes	371

15. FORGED DOCUMENTS **384-403**

15.1	Relevant Sections under the IPC	384
15.1.1	Pre-Search Planning and Preparation to Examine Scene of Offence**:**	388
15.1.2	General Guidelines for Carrying Out Search at Scene of Crime:	388
15.1.3	Constituting Teams Required for Handling the Crime Scene	389
15.1.4	Additional Guidelines	389
15.2	Basic Integrated Kit for Document Related Cases:	389
15.3	Crime Scene Investigation	390

15.3.1	Protection and Security of a SOC**:**	390
15.3.2	Search for Evidence:	390
15.3.3	Documentary Evidence:	391
15.3.4	Material Evidence	391
15.3.5	Crime Scene Photography (Document Photography)	392
15.4	Procedure for Preservation of Questioned and Standard Documents and Collection of Standard Document for Comparison:	392
15.4.1	Marking of Documents	395
15.4.2	Questionnaire for Genuine Signatures: Some of the sample queries	396
15.4.3	Forgery	396
15.4.4	Questionnaire: Some of the Sample Queries:	397
15.4.5	Basic Equipment for Examination of Genuine of Forged Writing/Signatures:	398
15.4.6	Wax Sealing of Documents:	400
15.5	Seizure List:	400
15.6	End of Search	400
15.7	Scrutiny of Evidence Collected from the SOC:	401
15.7.1	Accused	401
15.7.2	Crime	401
15.8	Confiscation of Proceeds of Crime:	401
15.9	Submission of Charge Sheet/Complaint	401
15.10	Case Studies:	402

16. SECURITY DOCUMENTS **404-440**

16.1	Applicable IPC Sections:	404
16.2	Crime Scene Investigation (CSI)	406
16.2.1	Basic Guidelines for CSI	406
16.2.2	Pre-Search Planning and Preparation to Examine Scene of Offence:	406
16.3	Basic Integrated Kit Meant for Forged Document May be Used	406
16.4	General Guidelines for Carrying out Search at Scene of Crime	407
16.4.1	Constituting following Teams Required for Handling the Crime Scene:	407
16.4.2	Role of Team Members:	407
16.4.3	Briefing Team Members	407
16.4.4	Protection and Security of a SOC	407
16.4.5	Search for Evidence	408
16.5	Procedure for Collection/Preservation of Security Documents	409

16.6	Suspected Counterfeit Currency/Bank Notes (FICN):	409
16.7	Forged Passport	418
16.7.1	Forgery in Passport	420
16.8	Indian Visa	423
16.9	Judicial/Non-Judicial Stamp Papers:	426
16.9.1	Fake Judicial/Non-Judicial Stamp Papers:	427
16.10	Driving License	429
16.11	Registration Certificate	430
16.11.1	High Security License Plate	430
16.12	Plastic Cards-Master Cards	431
16.13	ATM Card	433
16.14	Identity Card	434
16.15	Aadhar Card	434
16.16	Handling of Security Documents	435
16.17	Do'S and Don'ts	435
16.18	Seizure List	436
16.19	Sealing of Security Documents	436
16.20	End of Search	436
16.21	Scrutiny of Evidence Collected from SOC	437
16.21.1	Accused	437
16.21.2	Crime	437
16.22	Plan of Investigation	437
16.23	Submission of Charge Sheet/Complaint	437
16.24	Case Studies on Passports and Visa	438

17. TORN DOCUMENTS **441-451**

17.1	Sections of the IPC	441
17.2	Crime Scene Investigation (CSI) in Case of Torn Documents	442
17.2.1	Basic Guidelines for Search at Scene of Crime (SOC)	442
17.2.2	Pre-search Planning and Preparation to Examine Scene of Crime	443
17.3	Crime Scene Kit	443
17.4	General Guidelines for Carrying out Search at Scene of Crime	443
17.4.1	Constituting Team Required for Handling the Crime Scene:	443
17.4.2	Composition of Team Members and their Role	443
17.4.3	Briefing Team Members	444
17.4.4	Protection and Security of a SOC	444

17.4.5	Documentation of the Crime Scene	444
17.4.6	Photography of the Crime Scene	444
17.4.7	Search for Evidence	444
17.4.8	Photography of the Torn Documents	445
17.5	Collection, Handling and Packaging of Torn Documents	446
17.6	Transportation of Torn Documents	446
17.7	Examination of Torn Documents	446
17.8	Seizure List	447
17.9	End of Search	447
17.10	Scrutiny of Evidence Collected from SOC	448
17.10.1	Accused	448
17.10.2	Crime	448
17.11	Plan of Investigation	448
17.12	Submission of Charge Sheet/Complaint	448
17.13	Likely Queries to be raised	449
17.14	Precautions	449
17.15	Case Studies	450

18. CHARRED DOCUMENTS 452-464

18.1	Crime Scene Investigation in Case of Charred Documents	453
18.1.1	Crime Scene:	453
18.1.2	Crime Scene Investigation:	453
18.1.3	Basic Guidelines for Carrying out Search at Scene of Crime	453
18.1.4	Pre-Search/Planning and Preparation to Examine Scene of Offence	453
18.2	Crime Scene Kit for Collection of Evidence	454
18.3	General guidelines for Carrying out Search at Scene of Crime	455
18.3.1	Constituting Team Required for Handling the Crime Scene	455
18.3.2	Composition of Team Members and their Role	455
18.3.3	Briefing Team Members	455
18.3.4	Protection and Security of SOC	455
18.3.5	Documentation of the Crime Scene	456
18.3.6	Photography of the Crime Scene	456
18.3.7	Medical Assistance	456
18.3.8	Search for Evidence	456
18.3.9	Documentary Evidence	456
18.3.10	Material Evidence	457

18.4	Procedure for Handling and Transportation of Charred Documents at the Scene of Crime	457
18.4.1	Collection and Packaging of Charred Documents	458
18.4.2	Handling and Preservation of Charred Documents	458
18.4.3	Transportation of Charred Documents	459
18.5	Seizure List	460
18.6	End of Search	460
18.7	Scrutiny of Evidence Collected from SOC	460
18.7.1	Accused	460
18.7.2	Crime	460
18.8	Re-Visit the Crime Scene if Required	460
18.9	Flaws by IO	461
18.10	Plan of Investigation	461
18.11	Submission of Charge Sheet/Complaint	461
18.12	Few Cases of Charred Document	461
18.13	Likely Queries to be Raised (may vary from case to case)	462
18.14	Relevant Sections	462
18.15	Case Studies	463

19. FINGERPRINTS **465-467**

19.1	Procedure for attending scene of crime	465
19.2	Packing of Article	467

20. DIGITAL EVIDENCE **468-506**

20.1	Types of Computer Frauds and Cyber Crimes	468
20.1.1	Computer as Target	468
20.1.2	Computer as Repository of Evidence	468
20.1.3	Computer as the Tool	468
20.1.4	Crimes Due to the Use of Computers	469
20.2	The Information Technology Act, 2000 (As Amended in 2008)	470
20.3	Search Logistics	472
20.3.1	Considerations at Crime Scene	472
20.4	Pre-Search Considerations	473
20.4.1	Classification of Digital Evidences:	473
20.5	Aim of Analysis of Digital Evidence	473
20.6	Important Steps at Cyber Crime Scene	473

20.7	Crime Scene Kit	474
20.8	How to Begin Search by First Responder	476
20.9	Identification	476
20.9.1	Types of Exhibits	476
20.9.2	Potential Digital Evidences (Storage Media)	477
20.10	Documentation	481
20.10.1	Computer System Data Recording Form	482
20.10.2	Seizure Note	483
20.11	Document the Chain of Custody	484
20.11.1	Authenticity of the Digital Evidence	484
20.11.2	Security of Digital Evidence:	484
20.12	Seizure of Digital Evidence	484
20.12.1	How digital evidence is to be handled by IO from SOC to FSL	485
20.12.2	Seizure of a Powered 'ON' Computer	487
20.12.3	Seizure of a Powered 'Off' Computer	487
20.12.4	Also Seize in Addition to Digital Evidence	487
20.13	Collection of Digital Evidence	488
20.14	Photography at Crime Scene: (Especially Collection of Evidence)	492
20.15	Decision Making Tables	493
20.16	What should be seized?	496
20.16.1	The Aim of Seizure is:	496
20.16.2	What should be taken?	497
20.17	Some of the Sample Queries	497
20.18	Packaging of Digital Evidence	498
20.19	Transport and Preservation of IT Equipment	500
20.20	Precautions	500
20.21	Some Cases in India related to Digital Evidence Analysis	501

21. IMAGE ANALYSIS **507-513**

21.1	Relevant Sections of Various Legislative Acts	507
21.2	Types of Digital Video Recording System (DVRs)	508
21.3	Equipments Required	508
21.4	Police as First Responder at the Crime Scene	509
21.5	Documentation: Pre-Evidence Collection	509
21.5.1	Retrieving of the CCTV Images Data	510
21.5.2	Handling of Evidence	511

21.6	End of Search and Collection	511
21.7	Forwarding of Evidence Material	511
21.8	Queries	512
21.9	Special Considerations	512

22. ROAD ACCIDENTS **514-539**

22.1	The Indian Penal Codes Sections Relating to Road Accidents	515
22.1.1	Road Accident: Collision	515
22.2	Police as First Responder at the Accident Scene-Duties and Responsibilities	515
22.3	Evidence Collection Kits and Packing Materials	516
22.4	Search Method for Physical Evidences from the Scene	517
22.5	Photograph Accident as Evidence	517
22.5.1	Photographing the Road	517
22.5.2	Photograph the Vehicle	518
22.6	Sketch Site and Measurements of Evidence Position	519
22.7	Examination and Evidence Collection	521
22.7.1	Road	521
22.7.2	Vehicle	522
22.7.3	Drivers	523
22.7.4	Special Considerations	523
22.8	Packaging and Forwarding the Case	524
22.9	Likely Queries to be Raised	524
22.10	Modified Claims Tribunal Agreed (MCTA) Procedure	524
22.11	Check List	525
Appendix 1		526

23. THEFT AND BURGLARY **540-546**

23.1	List of Equipments required	541
23.1.1	Photography and Evidence Search kit	541
23.1.2	Finger Prints Development Kits	541
23.1.3	Footprint/Shoe Prints Collection Kits	541
23.1.4	Tool Marks Lifting Kit	541
23.2	Police as First Responder at Place of Occurrence	541
23.3	Evidence Likely to be found at the Place of Occurrence	542
23.3.1	Material Left at the Crime Scene	542

23.3.2	Materials which may get transferred to the criminal during commission of crime	543
23.3.3	From Suspect and his Environment	543
23.4	Collection and Preservation of Evidence Material	543
23.4.1	Fingerprints	543
23.4.2	Glass Fragments	544
23.4.3	Tools and Tool Marks Evidences	544
23.4.4	Foot/Shoeprints/Tyre Impression	543
23.4.5	CCTV Recording	545
23.5	Forwarding the Exhibits for Forensic Examination	546
23.6	Queries to be Raised	546
24.	**SPEAKER IDENTIFICATION**	**547-560**
24.1	Crime Category wise Possible Audio Evidence Devices	547
24.2	Tools and Materials for Collecting Evidence	548
24.3	Police as First Responder at the Scene	548
24.3.1	Search	548
24.3.2	Documentation of Scene	549
24.3.3	Collection Criteria for Audio Evidence	549
24.3.4	Recording of Questioned Conversation with Suspect(s)	550
24.3.5	Authentication of Electronic Records	550
24.3.6	Preparation of an Accurate Transcription(s)	551
24.3.7	Recording of Specimen Samples of Suspect/Complainant	551
24.3.8	Recording of Specimen Speech Sample from the Facilities in FSLs	552
24.3.9	Packaging, Sealing and Transportation and Storage of Audio Evidence	553
24.4	Reference to FSL	554
24.4.1	Forwarding of Exhibits to the Forensic Science Laboratory	554
24.4.2	Queries to be Asked to the Forensic Laboratory	554
24.5	Check List	554
24.6	Legal Status of Electronic Records	554
24.6.1	Relevant Sections of Various Legislative Acts	555
25.	**PORTRAIT BUILDING SYSTEM**	**561-600**
25.1	Applicability and Purpose:	561
25.2	Why PBS:	561
25.3	Brief History of PBS:	563

25.3.1 Manual Kit for Preparation of Portrait 563
25.3.2 Drawbacks of the Manual Portrait Making Kit: 563
25.3.3 Computerization of Portrait Preparation 563
25.3.4 Salient Features 564
25.3.5 Handling of Witness/Victim for Making Portrait 564
25.3.6 Constraints in Making Portraits 565
25.3.7 Questions Asked to the Victim/Witness for Making the Portrait: 566
25.4 Some of the Major Cases in which PBS was Used Successfully: 568
25.5 User Manual of Portrait Building System 569
25.6 User Manual 572
25.7 Operation Manual of PBS Edit 588

26. POLYGRAPH TEST 601-610
26.1 Legal Requirement 603
26.2 General Requirements 604
26.3 Sample Format for Intimation to I.O.S regarding Fixation of dates of Polygraph Test 606

27. WILDLIFE 611-683
27.1 Introduction 611
27.2 List of Indian wildlife species that are commonly found in illegal trade 613
27.3 Features for identification of the species 616
27.3.1 Blackbuck 616
27.3.2 Bear 617
27.3.3 Pangolins 620
27.3.4 Indian Elephant 621
27.3.5 Indian Lion 624
27.3.6 Leopards 625
27.3.7 Loris and Slow Loris 626
27.3.8 Civets 627
27.3.9 Musk Deer 631
27.3.10 Rhinoceros 631
27.3.11 Otter 633
27.3.12 Tiger 635
27.3.13 Tibetan Antelope 656
27.3.14 Monitor lizard 658
27.3.15 Turtles and Terrapins 658
27.3.16 Pythons, King Cobra and other Snakes 661
27.3.17 Spiny tailed lizard 665

27.3.18 Mongoose 665
27.3.19 Sambar 667
27.3.20 Chital 668
27.3.21 Wild Pig 670
27.3.22 Sand Boa 670
27.3.23 Kuth 671
27.3.24 Tokey Gecko 672
27.3.25 Birds 672
27.3.26 Shells (Mollusca) 674
27.3.27 Corals (Coelenterates) 678
27.3.28 Sea Horses 679
27.3.29 Sea Cucumber 681
27.3.30 Red Sanders (Pterocarpus santalinus) 681

28. DIGITAL SIGNATURE OF WILDLIFE PRODUCTS IN INTERNATIONAL TRADE **687-721**

28.1 Tiger Skin 684
28.2 Lion Skin 685
28.3 Leopard Skin 686
28.4 Indian Elephant Ivory 687
28.5 Indian Elephant Ivory 688
28.6 Walrus Tusk 689
28.7 Pangolin Skin 690
28.8 Rhino Horn 691
28.9 Wild Boar Tusk 692
28.10 Deer Antler of Sambhar & Chital 693
28.11 Pallas's Gull 694
28.12 White Cockatoo/Umbrella Cockatoo 695
28.13 Crocodile Bags 696
28.14 Crocodile Shoes 697
28.15 Star Tortoise 698
28.16 Turtle Carapace 699
28.17 Sea Horse 700
28.18 Horned Helmet 701
28.19 Trumpet Triton 702
28.20 Helmet Shell 703
28.21 Chambered Nautilus 704
28.22 Elongate Giant Clam 705
28.23 Trapezium Conch 706
28.24 Chiragra Spider Conch 707
28.25 Truncate Spider Conch 708
28.26 Great Green Turban 709

28.27	Mole Cowrie	710
28.28	Spiral Tudicla	711
28.29	Sibbald's Conch/Pigeon Conch	712
28.30	Commercial Trochas / Top shell	713
28.31	Capiz Shell	714
28.32	Sclerarctinian Coral	715
28.33	Sclerarctinian Coral Acropora	716
28.34	Organ Pipe Coral	717
28.35	Antipatharia (Black Coral)	718
28.36	Sea Fan (Gorgonea)	719
28.37	Sea Cucumber	720
28.38	Red Sanders	721

1 GENERAL PRINCIPLES OF CRIME SCENE INVESTIGATION

This Standard Operating Procedure (SOP) aims to lay down specific action steps for the systematic investigation of a case under reference. It has been drafted in accordance with the Criminal Procedure Code of India, the procedure prescribed in other relevant laws and common provisions of the police regulations in use across the country. This chapter has been divided into two sections:

(i) Section I comprises of an introduction to the type of crime occurred with details of critical concept and information.

(ii) Section II discusses the operational action steps right from receipt of information at the police station till the time when the necessary reports from the Forensic Science Laboratories (FSL) are available on the crime exhibits.

Crime scene investigation is an integral part of scientific investigation and is a very crucial step for collection of evidence for a case. The plan of investigation consists of the following steps:

(i) Re-construction of Scene of Crime (SOC)

(ii) Developing understanding about the sequence of events in connection with the commission of crime or the modus operandi.

(iii) Collection of relevant evidence in a systematic manner.

The action steps for investigation are detailed in a certain sequence including utilisation of high-tech scientific aids. However, depending on the facts and circumstances of a case, some of the action steps may be executed in a different sequence as per specific requirement of the case.

1.1 Investigation Defined

1.1.1 The word 'investigation' has been defined in Section 2(h) of the Criminal Procedure Code as:

All the proceedings under the Code for the collection of evidence by a police officer or by any other person (other than a Magistrate) who is authorized by the Magistrate in this behalf.

1.1.2 Investigation is basically an art of unearthing the truth for the purpose of successful detection and prosecution. In the words of the Supreme Court (in H.N. Rishbud v/s State of Delhi: AIR 1955 SC 196: 1955 SCJ 283,) the investigation generally consists of the following steps:

(i) Proceeding to the spot

(ii) Ascertainment of the facts and circumstances of the case

(iii) Discovery and arrest of the suspected offender

(iv) Collection of evidence relating to the commission of the offence which may consist of:

  (a) Examination of various persons (including accused) and the reduction of their statements into writing, if the officer thinks fit;

  (b) Search of places and seizure of things considered necessary for the investigation and to be produced at the trial; and

(v) Formation of the opinion as to whether on the materials collected, there is a case to place the accused before a Magistrate for trial and, if so, taking the necessary steps for the same for the filing of a charge sheet u/s 173 Cr.P.C.

1.2 Forensic Science and Crime Scene Investigation

The investigation begins at the crime scene with the recognition and recovery of physical evidence. It proceeds with its analysis, evaluation of the results and presentation of the findings to the court of law. From the first responders to the end-users of the information, all personnel involved should have an adequate understanding of the forensic process, the scientific disciplines and the specialized services provided by forensic laboratories. Crime scene investigation is a process that aims at recording the scene as it is first encountered and

recognizing and collecting all the physical evidences potentially relevant to the solution of the case.

The first responder, usually a police officer, plays a critical role in the entire crime scene investigation process.

(i) The initial responsibility of the police officer is to preserve the integrity of the scene and the evidence.

(ii) The police officer is also responsible for the early documentation of crime scene and all its evidences.

In most of the cases, since the first responders are non-forensic personnel, adequate training on handling of evidence at SOC is crucial to successfully carry out these activities. The first responder (who is normally not expected to further process the scene) needs to carry out some basic recovery procedures before the arrival of the crime scene investigators, if there is a risk of the evidence being destroyed, lost or contaminated. In situations where there is no prospect for the crime scene to be processed by crime scene investigators, the responsibilities of the first responder might have to be extended beyond preservation and documentation.

1.2.1 Significance of Physical Evidence and 'Chain of Custody'

1.2.1.1 Physical Evidence

Physical evidence can range from massive objects to microscopic items, resulting from a crime and recovered at the crime scene or related locations. Considering all sources of information available in investigations (e.g. confessions, testimonies, video surveillance), physical evidence plays a vital role. Physical evidence, when recognized and properly handled, offers the best prospect for providing objective and reliable information regarding the incident under investigation. However, the value of even the most carefully recovered and preserved evidence can be lost if the chain-of-custody is not properly maintained. 'Chain of custody' refers to the chronological and careful documentation of evidence to establish its connection to an alleged crime**.** Throughout the forensic process, it is crucial to demonstrate each step undertaken to ensure the following two characteristics of the evidences retained from the crime scene to the courtroom:

(i) Traceability

(ii) Continuity

1.2.1.2 Chain of Custody

The chain of custody is established whenever an investigator takes custody of the evidence at a crime scene. The chain is maintained when the evidence is received from another officer.

(i) The chain-of-custody record for all items collected from the scene must be documented. Each evidence collected should be tagged and must include the following details:

(a) Case reference number FIR…, dated…., Police Station.

(b) Exhibit number.

(c) Date and time of collection.

(d) Item description.

(e) Identity of the person who collected the evidence.

(f) Location where the item was found.

(g) Name and signature of the person who collected the evidence.

(ii) In case of digital evidence, the hash value of each digital evidence must be computed and recorded individually on every transfer in order to maintain the authenticity and integrity of digital evidence records. Individuals assuming custody of such digital evidence must sign a chain-of-custody document mentioning the respective hash values.

(iii) A clear, well-documented chain of custody should be established through the following:

(a) Notes, including information recorded in aforementioned clause (i) and any unusual markings on or alterations to the item.

(b) Markings and packaging of the evidence.

(c) Seals of the evidence.

(iv) All the processes during transfer of evidence should be recorded faithfully in the case diary to establish the chain of custody.

(v) When evidence is submitted to the Police Station 'Malkhana' or to a forensic laboratory, a receipt documenting the transfer is obtained. The evidence should be sent to the Forensic Science Laboratory with duly filled prescribed forwarding form under proper acknowledgement.

1.2.2 Legal and Human Considerations During Investigation

1.2.2.1 Legal Considerations

While there are general principles related to crime scene investigation, local laws, rules and regulations govern many activities of the crime scene investigation and forensic process. They relate to issues such as how:

(i) to obtain authority to enter the scene,

(ii) to conduct the investigation,

(iii) to handle evidence (e.g. the type of sealing procedure required),

(iv) to submit physical evidence to the forensic science laboratory.

These legal considerations ultimately determine the admissibility of the evidence collected at the crime scene. Failure to comply with existing laws, rules and regulations can result in a situation where the evidence cannot be used in the court. Hence, it is a matter of importance for personnel working at the crime scene to be aware of, and to ensure proper compliance with these rules.

1.2.2.2 Human Considerations

Regardless of local rules and regulations, codes of professional conduct outline moral obligations of personnel working at crime scenes. Such codes typically stress on the importance of acting with care and professionalism (due diligence), objectivity (treat evidence for what it shows *not* what you think it shows), open-mind and impartiality. If there is a conflict between preservation of evidence and the possibility of saving a human life, priority is always given to emergency medical care.

1.2.3 Health and Safety Considerations

Personnel working at crime scenes may be exposed to various health and safety hazards. Not all hazards are immediately obvious and some may come up as the investigation unfolds. Potential health and safety hazards may arise from a number of sources:

(i) Chemicals (either present at the crime scene such as in the case of clandestine laboratories, or used as part of the investigation).

(ii) Biological materials (e.g. blood and body fluids may be a source of risk of HIV/ AIDS and other infections).

(iii) Unexploded explosives (e.g. booby traps) and firearms.

(iv) Environmental factors (e.g. excessive heat or cold).

(v) Unsafe structures (especially when collecting evidence at fire and bombing scenes).

(vi) Insecure environment (e.g. offender still present at the scene).

(vii) Other risks include sharp objects, radiological, nuclear and electrical risks, gases, etc.

It might be necessary to suppress or remove health and safety hazards before starting the investigation. Apart from the hazards encountered at the scene itself, police personnel may be exposed to hazards when receiving items collected at the scene. The personnel working at the crime scene play an important role in minimizing hazard risks to others who handle collected evidence later in the forensic process. These procedures may include:

(i) The provision of first aid kits.

(ii) Appropriate protective clothing, worn throughout the investigation such as helmet, latex gloves, paper shoes and even a face mask.

(iii) Adequate equipment and interventions of the fire brigade in case of fire.

1.3 Crime Scene Investigation Process

The planning, organization and coordination of the work at the crime scene aims at deploying resources commensurate to the case being investigated and using these resources efficiently and effectively.

1.3.1 Planning

Good planning is essential to execute work at the crime scene. Planning may include gathering the most of readily available information by considering questions such as:

(i) What is believed to have taken place?

(ii) What is the magnitude of the problem?

(iii) Is any specialized expertise/medical assistance required?

(iv) Are there any particular dangers at the scene?

(v) What other assistance might be required?

(vi) Is it an indoor/outdoor scene?

(vii) Is it a remote location?

(viii) What local resources would be available?

(ix) If anybody else needs to be informed?

(x) What are the weather (hot/cold climate) conditions?

(xi) What equipment is required?

Following are the examples of basic equipments (available in the form of kits) required for processing the scene of crime.

(i) General crime scene investigation kit

(ii) Crime scene protection kit

(iii) Digital camera

(iv) Forensic light source

(v) Crime scene illumination kit

(vi) Photo documentation kit

(vii) Adhesive ID marker

(viii) Evidence marker

(ix) Gas mask

(x) Explosive detection kit

(xi) Narcotic detection kit

(xii) Gunshot residue collection kit

(xiii) Semen detection kit

(xiv) Blood detection kit

(xv) Impression evidence: Tyre and foot print investigation kit

(xvi) Tool mark investigation kit

(xvii) Arson investigation kit

(xviii) Digital Evidence Collection tool kit

(xix) Laptop

(xx) Finger print lifting kit



Figure 1.1: Different types of field kits required at the crime scene

1.3.2 Organization and Coordination

Organization and coordination are very important and should continue throughout the investigation and include decisions on:

(i) What needs to be done, i.e. the sequence of actions and priorities

(ii) Accessibility to the crime scene i.e., the access is limited to personnel playing an essential role in the crime scene investigation and in the medical care (such as doctors and nursing staff) of victims present at the scene.

(iii) Assignment of tasks (e.g. designation of a leader, definition of roles and responsibilities, need for specialized expertise).

(iv) How required actions will be undertaken (e.g. applicable procedures, need for specialized equipment and tools, and required communication channels).

Each crime scene is unique. Hence, planning and organization require adaptation and flexibility from one case to another. In addition, during the course of an investigation, the requirements may change as new elements are recognized and the personnel working at the scene may have to adapt to the organization of the work accordingly. The equipment required for crime scene work should be available to the personnel working at the crime scene, readily put together in a box/kit and replenished regularly, to enable rapid response. Some cases may also require specialized equipment.

1.3.3 Preservation of the Scene and its Evidence

Crime scene preservation starts soon after the incident is discovered and reported to the police station. Concerns for scene protection end only when scene investigation process is completed and the scene is released.

(i) Demarcation of the area to be protected is a complex activity and the boundaries of the scene may change as the investigation unfolds. What appears to be obvious at the outset may change and need to be re-evaluated.

(ii) Once demarcated, the area is clearly cordoned off using any kind of physical barrier. Any non-essential people who entered the scene before the cordon was established, are removed (and this information is recorded) and any non-essential people are prevented from entering the scene during the entire scene investigation.

(iii) From the beginning to the end of the crime scene investigation, strict anti-contamination measures are important. They include:

(a) Wearing protective clothing, gloves and shoe covers (as shown in Figure 1.2.)

(b) Using a single path when entering the scene (this is also valid for medical personnel providing care to victims).

(c) Keeping away from using any facilities available at the scene (e.g. toilet, water, towel, and telephone), eating, drinking or smoking.

(d) Avoiding moving anything/anybody, unless it is of absolute necessity (if something or somebody is moved, the initial location should be carefully documented).

(e) When selecting protective and anti-contamination measures, respect for the victim's privacy and human rights is important. If required, the use of screens, curtains, tents should be considered.

(f) If, during the course of the investigation, a second or a third, related crime scene is discovered, each scene is treated separately (i.e. separate teams working on different scenes).

1.3.4 Documentation of the Scene and its Evidence

Documentation aims at producing a permanent, objective record of the scene, the physical evidence and any changes that take place. Documentation at the scene is also the starting point for the chain-of-custody.

(i) Documentation starts with the arrival of the first person at the scene. Using appropriate means (e.g. notes, photography, video, sketches and measurements), the scene as it is first encountered is recorded along with other things:

(a) Arrival time

(b) Condition of doors, windows and shades

(c) Odours

(d) Signs of activities

(e) Weather/light conditions

(f) Air conditioning systems (central or localized)

Any person present while entering or leaving the scene and any changes that take place as a result of activity undertaken or observed are recorded as well.

(ii) Once physical evidence is recognized, detailed documentation is made before it is moved or recovered.

(iii) Each recovered item is labelled individually.



Figure 1.2: Gloves used as an anti-contamination measure

The requirement for documentation continues throughout the crime scene investigation process and beyond until the result of the laboratory examination is available. It constitutes the chain-of-custody. When a person working at the scene leaves the investigation, all information (e.g. photographs, records, notes, etc.) is turned over to the personnel coming in.

1.3.5 Recognition and Recovery of Physical Evidence

Recognition and recovery of physical evidence aims at locating and identifying a maximum number of potentially relevant evidences, and selecting appropriate recovery methods.

1.3.5.1 Recognition of Physical Evidence

There are a number of search patterns that may be followed in case of outdoor crime scenes. Some of them are as follows:

Strip method: The whole area is to be searched, and divided into a convenient number of strips. Each strip is examined carefully (as shown in Figure 1.3). Whenever any item or physical evidence is found, it is properly collected and preserved. The process is continued till the entire area has been searched.

Spiral method: Here the search is started from one end of the crime scene, carried out in spirals till the focal point of the crime scene.

Zone method: The scene is divided into small zones and each zone is examined in turn.

Grid Method: In the grid search method, the IO begins like a strip search. After completing the search by horizontal lanes, he searches back at right angles to the original strip (as shown

in Figure 1.3). This search from two different angles helps in the recovery of evidence which may be missed in simple strip method.

Pie or Wheel method: It is a search pattern in which the area is divided into pie slices or sections of a wheel, usually six in number. Crime scene searchers start from a critical point, such as body, and travel outwards along straight lines or rays.

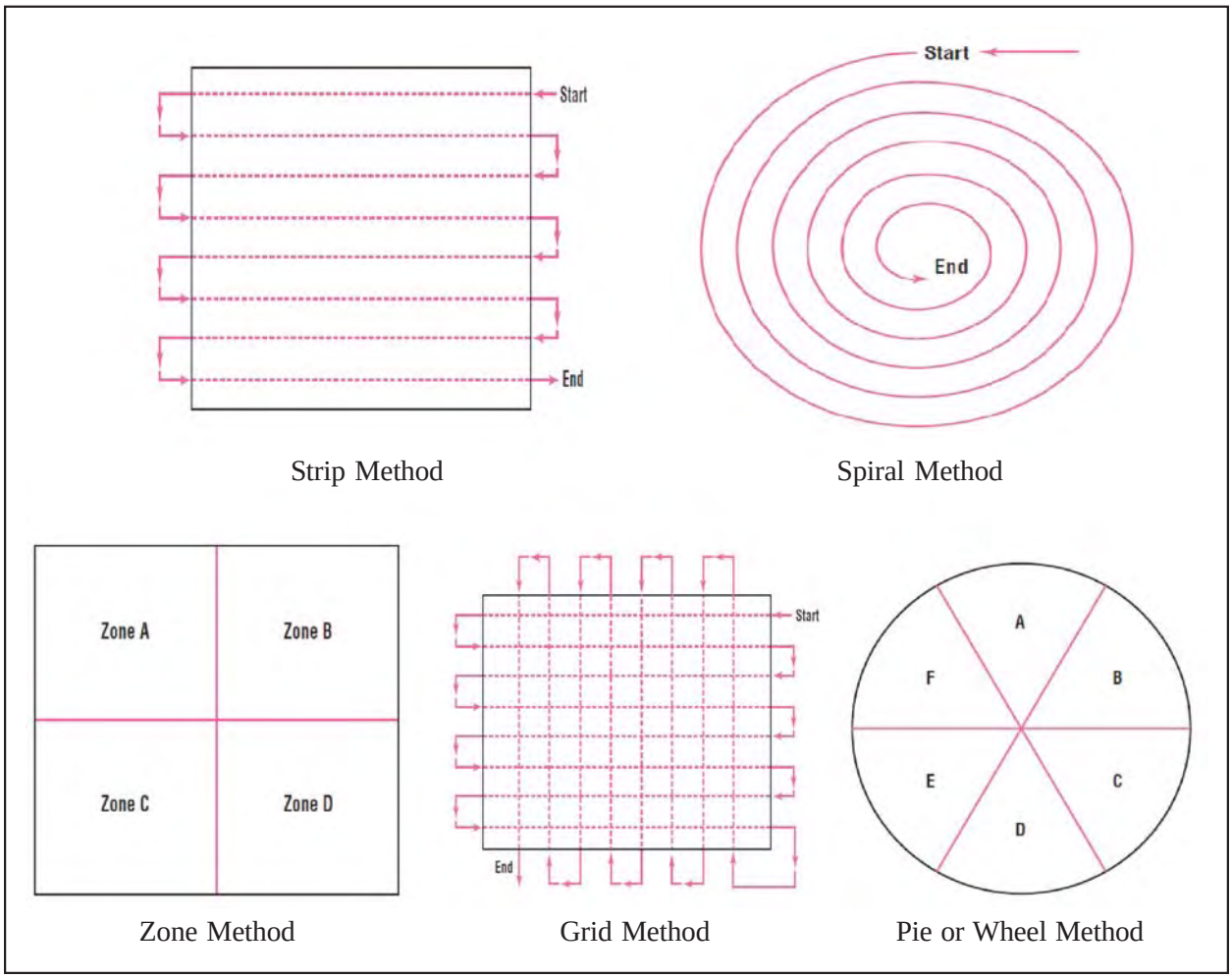


Figure 1.3: Crime scene search methods

After the collection of evidence, appropriate packaging is required to preserve the evidence integrity. The most relevant and important evidence may not be obvious or directly visible to the naked eye. Typically, the recognition of physical evidence starts with the observation of the scene like:

(i) Searching for evidences with the naked eye and magnifiers and also using various hand-held light sources.

(ii) Basic testing procedures might have to be carried out to detect physical evidence, e.g. use of powders and iodine fuming gun (as shown in Figure 1.4) to locate and enhance fingerprints at crime scene or the use of chemicals to visualize traces of blood at the SOC.

1.3.5.2 Recovery of Physical Evidence

(i) Once the evidence is recognized, appropriate recovery methods (e.g. adhesive tape, tweezers, cotton tips as shown in Figure 1.5) and adequate packaging (e.g. collection bags/boxes, containers for sharp objects) are used. Each piece of evidence is labelled and sealed following requirements as per law. Priorities in evidence recovery might have to be decided to avoid unnecessary loss or degradation of evidence.



Figure 1.4: Use of Iodine fuming gun to locate latent fingerprints



Figure 1.5: Adhesive tape and laminated paper

(ii) Under difficult conditions, it might be preferable to recover and collect more evidence at a later stage of the investigation.

(iii) As a part of the recovery process, in many instances, sample in question and control samples are necessary, e.g. when collecting fire debris. In situations where the evidence is in traces and is difficult to be collected by manual methods, vacuum pumps with special attachments (as shown in Figure 1.6) are used to collect the trace evidence and in a situation where the evidence is in very large quantity, a representative sub-sample in duplicate is usually collected, e.g. from bulky drug seizures.



Figure 1.6: Vacuum pump with special attachment used to collect trace evidence

1.3.6 Transportation, Storage and Forwarding of Evidence to the Laboratory

The last phase of the crime scene investigation process aims at selecting the means of transportation and storage that are appropriate for the particular type of physical evidence to ensure the integrity of evidence to be forwarded to the laboratory.

(i) Once physical evidence is recovered, items more likely to provide information that will assist the investigation receive priority for submission to the forensic laboratory.

(ii) Material evidence is generally taken to police station malkhana. From there, it is sent to FSL under the covering letter of SP or a designated officer. Adequate conditions, e.g. a cool and dry place, and secured and controlled access are essential characteristics of transport and storage conditions. Also the costs, distance, time and means of transportation are aspects to be considered while choosing how to relocate and store the evidence.

(iii) The relocation of some of the physical evidences, e.g. drugs and firearms, may need special considerations.

(iv) Documentation of transportation, storage and forwarding to the laboratory is important. A written receipt is usually obtained for all the evidence received by the laboratory.

(v) While sending the evidence to the forensic science laboratory, checks on the following points are invariably made.

(a) Whether the Forwarding Form accompanying exhibits is duly filled in and is completed and signed by the competent authority?

(b) Whether the queries are specific, clear and relevant to the exhibits forwarded to the laboratory?

(c) Whether the exhibits in containers/ parcels have been sealed with tamper proof seals and the seals are intact?

(d) Whether case reference, exhibit details have been mentioned/ tagged on each container of exhibit/parcel and signed by the IO?

(e) Whether the specimen seal impressions have been forwarded to the laboratory along with evidence forwarding proforma?

(f) Whether the road certificate/movement orders for exhibits and personnel carrying exhibits to the laboratory are complete in continuity and valid in all respect?

References

1. http://www.unodc.org/document/scientific/crime_scene_awareness_Ebook.pdf (date of access 16 December 2014).

2. Justice V.S. Malimath, *Committee on Reforms of Criminal Justice System:A Report*, vol. I, Ministry of Home Affairs Government of India, Bangalore, 2003.

2 GENERAL PRINCIPLES OF PACKAGING OF EXHIBITS

2.1 Sources of the Exhibit

There are three main sources from which crime exhibits can be obtained:

1. The scene of the crime
2. The victim
3. The suspect and his environment

It is necessary to search for the above three sources thoroughly in order to collect all the materials in sufficient quantity and send them to the laboratory. The microscopic fragments, debris and other inconspicuous materials can contribute to the final solution of the crime. The collection of such materials is a specialized task; an investigating officer must have a very deep sense of observation.

2.2 Goals of Evidence Packaging

2.2.1 Protection of IO from possible hazards associated with evidences like

(i) Accidental firearm discharge

(ii) Bio-hazards

(iii) Sharp objects

(iv) Health hazards associated with exposure to bacterial/viral toxic infections

2.2.2 Protection of evidence against

(i) Loss

(ii) Contamination

(iii) Cross-transfer

1. Suspect to victim
2. Victim to suspect
3. Scene to scene
4. Item to item

(iv) Deterioration

2.3 Elements of Packaging Evidence

2.3.1 Packing Material

(i) Plastic Container/Polythene pouch: In some cases plastic containers/polythene pouches (as shown in Figure 2.1) are optimal and can be used for drugs, documents and digital evidences.



Figure 2.1: Airtight polythene pouches

(ii) Paper: Paper bags/envelopes (as shown in Figure 2.2) are optimal and may prevent the deterioration of a biological sample if it is not completely dry when packaged.



Figure 2.2: Paper envelopes

2.3.2 Size of Packing Material

(i) Size of a container is important

(ii) Too small packaging (as shown in Figure 2.3) is likely to be inadequate



Figure 2.3: Too small envelope for the evidence

(iii) Too big packing would disperse the evidence throughout the container and could be difficult to recover (as shown in Figure 2.4).

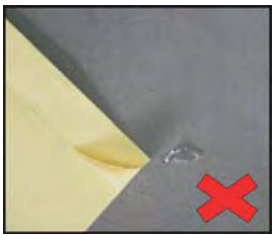


Figure 2.4: Small glass fragments packed in large envelope

(iv) Ideally, small fragments would be packaged into a paper, i.e. coin envelope or a hold down device.

2.3.3 Sealing of Evidence

Sealing an evidence properly is the most important issue. An evidence can be sealed in the following three ways

(i) Heat seal

(ii) Tape seal/paper seal

(iii) Lock seal

- Tape seal should completely seal envelope flap.



- Tape seal should completely seal bag flap.



- Staples are not an appropriate evidence 'seal'.



- Tape seal should be across entire flap of envelope.



Figure 2.5: Tape sealing the evidence

- All seals must be initiated by the person, sealing the evidence and dated to indicate when the evidence was sealed.

2.4 Precautions to be Taken

(i) Protect the scene of offence immediately after the receipt of information about the offence.

(ii) While picking and packing the material for dispatch to the laboratory, care should be taken to see that no article is inadvertently contaminated with extraneous material. Obtain photographs of the scene from a number of angles so as to later establish the exact position of the object, the body (if any), the weapons, etc.

(iii) Investigating officer should handle the articles with care.

(iv) Look for unusual foreign matter like pieces of hair, fiber, paper, clothes, glass, wood, metal, etc., and collect the sweepings from the floor without disturbing other things like blood, saliva, semen-stains, etc.

(v) Make a rough sketch of the position of objects and note the relationship of various pieces of evidence to the surrounding.

(vi) While investigating cases of murder or suicide, a medical officer should accompany the police to the scene of crime whenever possible and inspect the body and its surroundings before they are disturbed.

2.5 General Directions

(i) Each article should be separately packed and labelled indicating the serial number of an item.

(ii) Never pack more than one type of item together.

(iii) The labels should be numbered consecutively and should bear the signature of the forwarding officer.

(iv) All the packets belonging to one case should be enclosed in one box or an outer covering.

(v) Articles belonging to different cases should never be forwarded under the same cover.

(vi) All parcels should be carefully sealed by the dispatching officer and packed in such a manner that they cannot be opened without destroying the seals.

(vii) The seal should be the same throughout.



Figure 2.6: The correct way of sealing of an envelope of crime exhibit

(viii) In all cases, the specimen seal impression should be sent.

2.6 Directions for Specific type of Exhibits

2.6.1 Weapons and Tools

(i) Iron metal parts stained with blood should be preserved from getting rusty as far as practicable and should be sent for examination to the laboratory as early as possible, after proper drying of blood stain/fluid.

(ii) Although paper is good packaging for bloodstained evidence, but it can easily endanger anyone who handles this evidence and blood sample sticking on the evidence can be lost.



Figure 2.7: Incorrect packing of blood stained knife in an envelope

(iii) Knives, guns, tools and other weapons need to be immobilized first and then should be secured to board by means of strings.

(iv) It should be then placed in a box of suitable size (as shown in Figure 2.8).

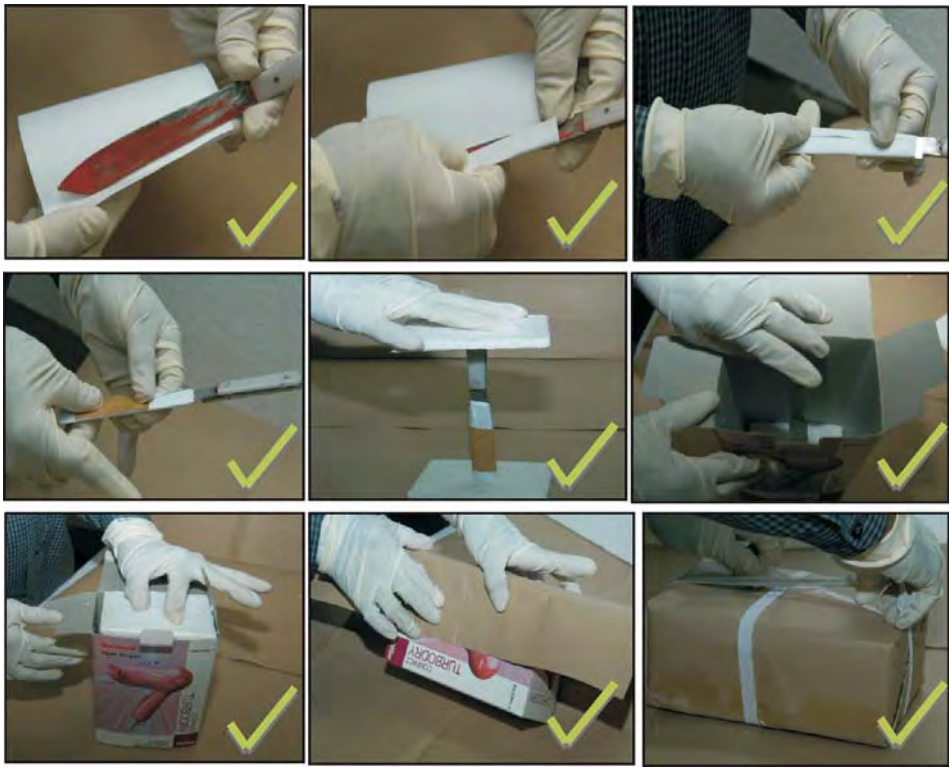


Figure 2.8: Packaging of knife with suspected blood stain at scene of crime

2.6.2 Hair and Fibres

(i) If hair and fibres are found adhering to some objects with blood, clot, the whole object with the hair or fibre adhering should be sent to the laboratory.

(ii) In order to prevent contamination, any foreign matter adhering to the hair or fibres should be picked up with forceps.

(iii) They should be placed in glazed surface, cellophane, filter or blotting paper, which should be carefully folded along the length of the exhibit and enclosed in a suitable container.

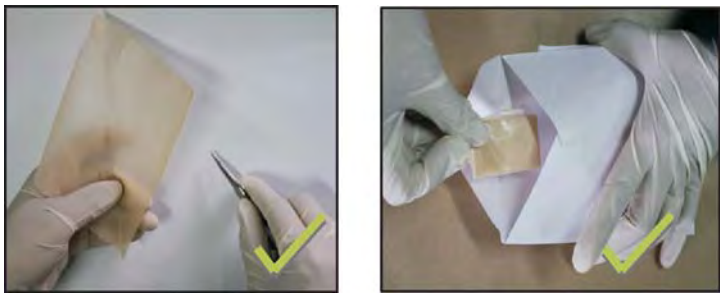


Figure 2.9: Packaging of hair sample at the scene of crime

(iv) Hair from the persons or animals should be obtained by combing or clipping from several points, cutting them close to the skin.

(v) Pubic hair should be taken from rape victims. This should be clipped close to the skin. This is useful for comparison with the hair found on the person clothing or handkerchief of the suspect.

2.6.3 Blood and Bloodstains

(i) Ensure that anything that comes in contact with the biological samples during collection should not contaminate it. Work on clean surfaces and wear gloves if necessary to avoid contamination.

Do not use any preservative unless specified.

(ii) Blood that is in liquid pools should be picked up on a gauze pad or other clean sterile cotton cloth and allowed to air dry thoroughly at room temperature. Pack gauze pad or sterile cotton cloth after drying between clean white paper and send it in paper envelope.

Do not dry stained material by heating or in bright sunlight. Hang clothing and similar articles in a room where there is adequate ventilation.

(iii) For fresh moist stains on clothing, sheets, blankets, etc., allow the stain to *dry at room temperature*. Insert the stained clothing between clean white paper and send in paper envelope after sealing it properly.



Figure 2.10: Packaging of bloodstained clothing at the crime scene

(iv) For fresh moist stains on solid objects such as weapons, wood, plaster, automobile, etc., collect the blood stain on filter paper or gauze pad and allow the stain to *dry in shade at room temperature* and send in any envelope. Blood may be soaked on filter paper or gauze pad and allow to *dry in shade at room temperature* and send in any envelope.

(v) Dried stains on clothing, sheets, and blankets: Send the entire clothing to the laboratory, protecting the stain with clean white paper and send in any paper envelope.

(vi) Dried stains on small solid objects: Send the whole stained object to the laboratory after labelling and packaging.

(vii) Dried stains on large solid objects that cannot be delivered to the laboratory: Scrape the stain onto a clean piece of paper, which can be folded and place in an envelope. Do not scrape directly onto the evidence. Scrape blood from objects using a freshly washed and dried knife or similar tool. Wash and dry the tool before each stain is scraped off. Seal and mark the envelope.

(viii) Do not mix dried stains. Place each stain in a separate envelope.

(ix) Never attempt to wipe dried stains from an object using a moistened cloth or paper.

(x) If the blood is found on earth, or earthy material, scrapping should be made deep enough (1 inch) to collect the soaked blood.

(xi) *Do not use any packaging device that limits air exchange because biological samples get deteriorated.*



Figure 2.11: Blood samples packed in tube (air tight), pouch (air tight) and paper envelope

(xii) If blood stains are suspected to be present in the nails, it should be clipped and the clippings be packed in a glazed paper and sent in any envelope to the laboratory. While clipping nails, care should be taken to avoid cutting of the skin or flesh.

Control samples:

(a) In cases where it is not possible to send the entire object to the laboratory, a portion of the unstained area immediately surrounding the stain should always be forwarded for control tests, and the location on the clothing from where the control sample has been taken must be marked with red pencil and the investigating officer should sign the marking.

(b) If stain is on soil, plaster, furniture, etc., a portion (1 inch) of the unstained area should be scraped to the same depth as the stained area and sent as control.

(c) In the case of weapons, it is very desirable that the whole object is sent to the laboratory with suspected blood stain so that the control sample is also prepared by taking swab from unstained surface of the weapon.

To minimize the chance of cross transfer of adhering evidence; different clothing items should *not* be packaged in the same container.

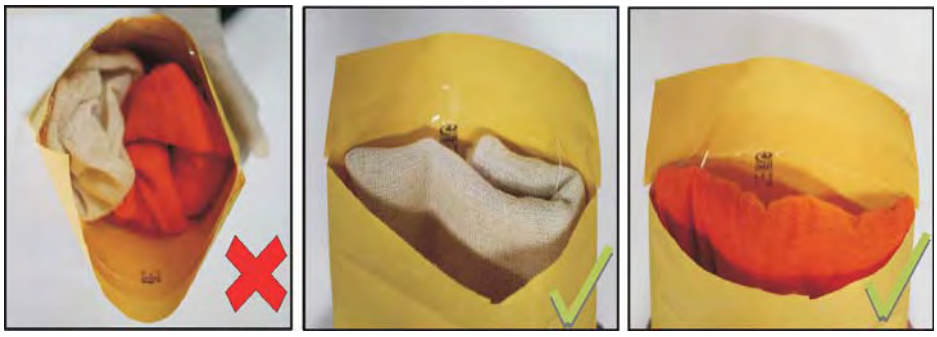


Figure 2.12: Different clothing items packaged in the same and different container

2.6.4 Semen

Seminal stains are often found on clothing, blankets and sheets. Allow these stains to get dried at *room temperature* before packaging. Wrap these clothing with suspected stain of semen in paper and pack the evidence in paper bags after marking the stains with red pencil.

Precautions:

- Do *not* use plastic bags because it will deteriorate the sample.
- The garment or fabric may be folded taking care that the stained areas are not folded.

2.6.5 Saliva

(i) If saliva is suspected to be present on any object, the entire object should be sent to the laboratory.

(ii) Control samples of saliva from the victim and the suspected persons should be collected and sent immediately in small sterile plastic/glass tube with an advice to be kept in the freezer.

Note: If the persons are dead, swabs from the mouths of both the victim and suspect should be sent.

2.6.6 Dust or Soil

(i) Dust or soil should be placed in a filter paper and then enclosed in a suitable container.

(ii) If the dust is found on any article of furniture, it can be collected directly in a filter paper with the help of a vacuum cleaner.

(iii) Soil may be collected with a spatula or spoon.

(iv) If the dust is found on an object which can be readily transported such as shoe or clothing, the whole object should be sent to the laboratory keeping the dust or soil intact on the material.

(v) Metal filing, glass fragments, finger nail scrapings, paint chips, wood chips, plaster and similar samples should be placed in filter paper and enclosed in suitable containers.

Precautions:

- For all the above purposes, cellophane paper or any other paper preferably with a glazed surface can be used instead of filter paper.
- Liquids and greases should be sent in glass containers with non-leaking ground glass stoppers.

2.6.7 Arson Cases and Cases of Burning

(i) In arson cases, traces of flammable fluid may be found in cans, mattresses, rugs, furniture, wallboard, and other objects at the scene. The traces of the same flammable fluid may spread to the areas where no burning has occurred or where there is a partial burn.

(ii) The traces of these flammable fluids from the material such as soil, wood, cloth, paper, etc., if suspected, can be preserved in a heat sealed plastic bags and then packed in an airtight appropriate size leak proof plastic/metal container. The investigating officer should ensure that the traces of flammable liquid do not get evaporated by the time the samples reach the laboratory.

(iii) If volatile liquids are found in open containers, pour a small amount of material into a clean bottle with an airtight seal so that no loss occurs.

Do *not* use any rubber-lined lids or plastic containers.

(iv) Large pieces of wood, furniture, wallboard, and similar exhibits which will not fit in cans should be placed in heat-sealed plastic bags.

Note: In all cases, the package or container should be marked as inflammable.

2.6.8 Tool Marks

(i) Tool marks should be protected by covering with soft paper. It should then be placed in strong wrapping papers. The whole thing should be in a strong box and packed after fixing the evidence in the box by thread so that the tool marks on the evidence are not damaged during transportation.

(ii) Submit the whole evidence containing tool marks to the laboratory instead of just removing the area containing the marks. If this is not possible, carefully photograph and sketch the area containing the marks.

(iii) Casts of tool marks can be made by an experienced person.

Attempts should never be made to fit tools into questioned marks or to make test marks prior to laboratory examination because the questioned mark or tool marks may be altered. In addition, traces of transferred paint or other stains on the tool may be lost or additional material may be transferred to the tool.

2.6.9 Exhibits for Ballistics Examination

2.6.9.1 Firearms

(i) Photograph the firearm with ammunition.

(ii) Inspect for live ammunitions, if any, remove them. *Never* submit a loaded gun to the laboratory.

(iii) The investigating officer should not try the mechanism or the working of the firearms. It should be brought in-original condition of the seizure.

(iv) Never clean the bore, chamber, or cylinder before submitting a firearm, and never attempt to fire the gun before it is examined in the laboratory.

(v) Record serial number, make, model, manufacture details and caliber of the weapon.

(vi) Enclose the firearm in a cellophane sheet and pack in cloth cover and seal properly (as shown in Figure 2.13).

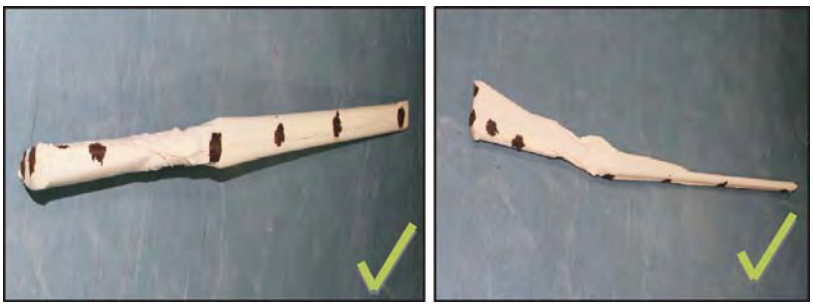


Figure 2.13: Firearm packed and sealed in a cloth

(vii) Handguns may be sealed in a box. Give cotton padding so that the firearm does not move inside the box and seal properly.

2.6.9.2 Cartridge Cases

(i) Place recovered cartridge cases in plastic envelopes separately and then packed collectively in a suitable box preferably cardboard, plastic or wooden box. The box should be packed in a clean cloth and sealed properly.

If an examination is required to determine whether a bullet or cartridge case was fired by a specific weapon, submit the weapon and all recovered unfired ammunition to the laboratory.

2.6.9.3 Bullets

(i) Note caliber of bullet.

(ii) Never mark bullets on its outer surface with a metallic marker.

(iii) Wrap each recovered bullet in a piece of paper and then pack in a suitable box with sufficient padding of cotton. Then pack the box in a cotton cloth and seal properly (as shown in Figure 2.14).

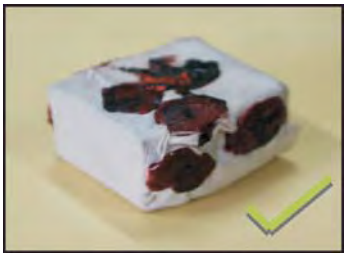


Figure 2.14: Bullet packed and sealed in a box

(iv) Submit all evidence including bullets recovered to the laboratory. Do not attempt to clean recovered bullets before sending them to the laboratory. Bullets recovered from a body should be air dried and wrapped in paper.

2.6.9.4 Ammunition

(i) Always attempt to recover unused ammunition for comparison purposes from the locations such as cars, clothing, houses, or other locations.

(ii) Do not put any details/marks on the cartridge.

(iii) Enclose the cartridge in a plastic envelope and seal in a box giving sufficient padding of cotton between two cartridges to avoid the cartridges from colliding with each other.

Each article should be packed, labelled and sealed separately before sending to the laboratory. (For detailed procedure for packaging of firearm and ammunition please refer to Chapter 14 of this SOP).

2.6.10 Glass

(i) Shoes and clothing of suspects or other objects contaminated with glass should be wrapped in paper and send to the laboratory for examination.

(ii) Place small glass fragments in a coin envelope and then in bigger envelopes, which can be marked and sealed (as shown in Figure 2.15).

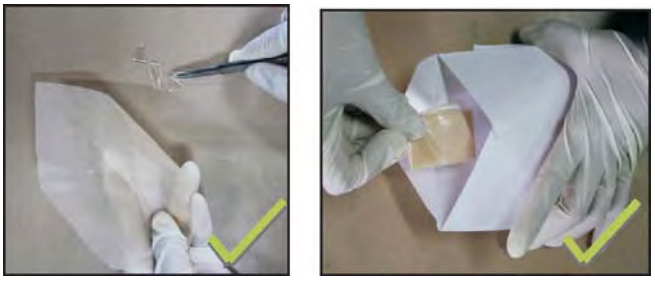


Figure 2.15: Packaging of glass fragments

(iii) Place large glass fragments in boxes with sufficient cotton padding to prevent any breakage or damage during shipment. Seal and mark the box properly.

2.6.11 Paint

(i) Keep all samples collected in separate containers. Small paper can be used to collect and hold many paint samples. It can be placed in an envelope, which can be marked and sealed.

Never place paint directly into envelopes unless large pieces are enclosed.

2.6.12 Questioned Documents

(i) All original questioned documents such as handwriting, typewriting, or other evidences involved in a particular investigation should be sent to the laboratory for examination.

(ii) Known specimens are also required with the questioned document for investigation.

(iii) All documents should be packed in polythene or plastic envelopes and then in a paper envelope. The sealing should be complete so that there is no chance of tampering the sealed document.

Precautions:

- Questioned document and the specimens should not be defaced, or altered in any circumstances. Do not fold or punch holes or use pins on a document.
- Personal marks for identification purposes should be made as small as possible on the back or other area of the document where no handwriting or typewriting is present.
- If document is already damaged, do *not* try to repair the document.
- Where examination of charred paper is involved, extra care must be taken to prevent any additional crumbling or breaking of the burned material. It should be placed on top of the loose cotton in a box and should be delivered in person to the laboratory.

2.6.13 Latent Fingerprints

(i) Most fingerprints sent to the laboratory should be on paper, glass, metal, or other smooth surfaced objects. Articles containing latent fingerprints must be picked up and not be touched.

(ii) Lifted, developed latent fingerprints should be marked and sealed in marked envelopes.

(iii) Papers and documents containing latent prints should be placed individually in a paper envelope.

(iv) Containers, bottles or glasses can be sandwiched between two sheets of stiff cardboard, wrapped, and placed in a box to send it to the laboratory.

Precautions:

- The investigating officer should wear gloves while handling any article having fingerprints so that his fingerprints do not contaminate the object.
- The investigating officer should also take care that the area of the object where fingerprints are likely to be present are not touched by him.
- Once the fingerprints are visualized, these should be immediately developed and photographed.
- Fingerprints on bigger objects such as doors, iron boxes, tables, chairs, etc., which cannot be transported to the laboratory, should be developed and lifted using adhesive tapes.

2.6.14 Drug Samples

(i) Appropriate packaging materials for drug evidence are heat sealed like plastic pouches or air tight pouches (as shown in Figure 2.16). Sealed pouches can safely contain potent drug evidence and protect personnel against unnecessary exposure.



Figure 2.16: White coloured powder suspected to be heroin packed in airtight pouch

(ii) Choose an appropriate sized plastic pouch for the packaging of drug evidence.

Note: *A paper envelope and paper is not appropriate packaging for drug evidence.*

References

1. A.K. Bapulay, Forensic Science: Its Application in Crime Scene Investigation, 1st edn, India, 2006, p. 264.
2. http://www.mppolice.gov.in/PHQImages/GOPEnglish/gop_1-62.pdf

3 FORENSIC BIOLOGY

Earlier crime scene investigation was dependent on the ability of crime investigators to obtain information from witnesses, suspects and use of informants. If these elements failed to provide the requisite information the case used to remain unsolved. The developments in science and technology have strengthened the scope of crime scene investigation in a systematic and scientific manner. Use of general guidelines by the IOs in processing the crime scene plays a pivotal role in successful crime scene investigation.

3.1 Pre-Search Planning and Preparation

(i) Make a clear assessment about the place of occurrence (house, shop, factory, open area, etc.) where search is to be conducted.

(ii) Make detailed planning and preparation as per circumstances of the case.

(iii) Collect all possible, relevant and authentic information for planning and preparation.

(iv) Constitute teams required for carrying out search at the crime scene.

3.2 List of Equipments Required

A. Items for crime scene measurement, sketching and photography

(i) Clipboards

(ii) Crime scene cards

(iii) Plan papers, graph papers

(iv) Pencils, erasers

(v) Straight-edge ruler

(vi) Measuring tape (30 m.)

(vii) Steel tape (5 m.)

(viii) Magnetic compass

(ix) Camera (digital with spare battery and memory card)

(x) Light source

(xi) Laboratory thermometer (25 cm. long with temperature range from 0^0 to 50^0C) for rectal temperature

B. Items/reagents for blood testing

(i) Whatman filter paper clippings (6×6 cm.)

(ii) Benzidine/phenolphthalein reagent

(iii) Hydrogen peroxide solution

(iv) Luminol reagent

(v) Sprayer

(vi) Droppers

(vii) UV-light source

(viii) Forceps

(ix) Cotton wool

(x) Gloves

(xi) Beaker

(xii) Paper bags (for disposal of used filter paper clippings)

C. Items/reagents for semen testing

(i) Whatman filter paper clippings (6×6 cm.)

(ii) Acid-phosphatase reagent

(iii) Droppers

(iv) UV-light source

(v) Forceps

(vi) Cotton wool

(vii) Gloves

(viii) Beaker

(ix) Paper bags (for disposal of used filter paper clippings)

D. Fingerprint kit

(i) Fingerprint powders (black, grey, anthracene, magnetic, fluorescent)

(ii) Brushes: camel hair, ostrich hair and magnetic

(iii) Light source

(iv) Adhesive tape

(v) Fingerprint lifting cards

(vi) Gloves

E. Footprint kit

(i) Footprint lifters

(ii) Electrostatic footprint lifting device

(iii) Plaster of Paris

(iv) Machine oil

(v) Talcum powder

(vi) Spirit

(vii) Shellac solution

(viii) Wire mesh

(ix) Frame for preparing plaster cast

(x) Magnetic compass

(xi) Glass sheet (35×20 cm.)

(xii) Transparency sheet (35×20 cm.)

(xiii) Tracing paper

(xiv) Fine tip permanent marker

F. Evidence collection kit

(i) Cotton gauze cloth

(ii) Forceps

(iii) Gloves

(iv) Paper envelopes (6×6 cm., 15×10 cm.)

(v) FTA card

(vi) Saline solution

(vii) Beakers

(viii) Glass sheet (20×20 cm.)

(ix) Butter paper clippings (6×6 cm.)

(x) Scalpels

(xi) Scissors

(xii) Evidence tag

(xiii) Cotton cloth bag

(xiv) Sealing wax bars

(xv) Candles

(xvi) Matchbox

(xvii) Metallic seal of IO

3.3 Constituting the Team for Handling the Crime Scene

Make list of persons to be detailed for:

(i) Protection of scene

(ii) Searching the scene

(iii) Identification and collection of evidence (fingerprint expert, forensic expert)

(iv) Measuring and sketching of crime scene

(v) Photography of crime scene

(vi) Information gathering

(vii) Evidence custodian

3.4 Crime Scene Investigation

Steps for effective crime scene investigation:

3.4.1 Protection of Crime Scene

The crime scene must be protected from entry by unauthorized persons so that physical evidence materials are not altered, moved, destroyed, lost or contaminated. Investigator should adopt the following steps for the protection of crime scene:

(i) Safeguard the location as quickly and as effectively as possible.

(ii) If injured body shows any sign of life, provide immediate medical help and rush the person to the hospital.

(iii) All unauthorized persons (relatives, friends, onlookers, photographers, etc.) should be excluded from the scene.

(iv) Officer-in-charge of the case should determine when, why and who should enter the scene.

(v) Police officer should not leave the scene unguarded.

(vi) The witnesses, suspects and informant should be detained for further details.

(vii) To ensure that the crime scene is not altered, it should be barricaded, enclosing a larger area than a smaller one so that no clues are left out.

(viii) Officer should not introduce any material, like chewing gums, cigarette ends/ash, foot or footwear marks, fingerprints, etc.

(ix) During examination, the original condition of doors, windows, stair-case, lighting, routes of entry/exit should be preserved.

(x) Officer should not use bathroom, wash basin, lavatory, towels, telephone, etc. at the scene.

(xi) Nothing should be picked up, touched, changed or altered until it has been described in a notebook, its location shown in a sketch and photographs taken.

(xii) Scene should not be cleaned until thoroughly examined.

3.4.2 Photography of the Crime Scene

The crime scene should be properly photographed as the photographs of the crime scene are extremely important. Proper photographs of the scene brings the scene in the court room as it is rare for judges, lawyers, etc., to visit the crime scene. Sometimes, eyes may not observe certain facts which the camera will photograph and make permanent record of them and these are available to the IO at later stages also.

The following principles should be adopted:

(i) At least four photographs should be taken for the general view, four for the dead body and at least two for each of the items of evidence discovered at the crime scene.

(ii) Close-up photographs should be taken along with a scale to indicate dimensions of the item photographed.

(iii) Keep the record of the exposures, items covered, positions of the camera and type of illumination used.

The following photographs should be taken:

(i) Photos of the entire crime scene.

(ii) Route of approach of criminal.

(iii) Points of entry and exit.

(iv) The location of dead body.

(v) Evidence on the deceased (injuries, hair and fiber in hands/fist, weapons, etc.).

(vi) Evidence left by criminal at the crime scene (weapons, cigarette butts, bullets, cartridge cases, fingerprints, foot/footwear marks, etc.).

(vii) Bloodstain pattern, disturbed furniture, etc.

(viii) If possible videography and 3D scanning of the crime scene should be done.

3.4.3 Sketching of Crime Scene

It is important to draw sketches of the crime scene by the expert as sketches are helpful in depicting the scene of occurrence, provide an ideal presentation of scene in combination with photographs as they indicate relative distances between relevant objects and also indicate relevant evidence.

The following principles should be adopted for crime scene sketching:

(i) The sketch of the crime scene should be prepared at the site only.

(ii) Distance should be measured with tape.

(iii) A suitable scale should be used and mentioned on the sketch.

(iv) The directions should be indicated on the sketch.

(v) Use symbols, letters or digits and a legend to avoid crowding.

(vi) Make simple line drawing of the crime scene (in investigative notebook or on a separate sheet). The following information should be included:

- Measurements and distances.
- Title block consisting of name and title of sketcher, date and time the sketch was made, case number, names of persons assisting in taking measurements, address of location sketched and directions using magnetic compass.
- 3D crime scene scanner is a useful tool for reconstruction of scene of crime at a later stage.

3.4.4 Crime Scene Search

The crime scene should be searched thoroughly and carefully. Search techniques and planning varies from one scene to another. The most practical method is to begin the search at the point where the body is first discovered and extend the search in an outward direction until entire room or location has been covered. Search should begin with locating the latent fingerprints before any item is touched or moved. The investigator should direct the fingerprint expert indicating the areas to be examined. All visible details should be observed and described before dusting anything for latent fingerprint. During initial search, each possible item of evidence should be measured from fixed location.

(i) First establish the perimeters of the scene and it should be properly documented with the help of photographs and sketches.

(ii) Ascertain legal basis for the search prior to any seizure of evidence.

(iii) Establish method of search based on investigative theory, size of area to be searched, and other factors. The following search methods are common:

(a) Zonal method: Area to be searched is divided into squares/sectors. An officer is assigned to each zone.

(b) Spiral method: Also called circle method it is effective in a small area. Searcher can begin from the center or the perimeter and moves in a circular path.

(c) Wheel method: The searcher gathers at the center of the scene and moves radially outwards. Drawback is the possibility of spoiling evidence when gathering at the center and ever increasing distance between searchers as the investigation move outwards.

(d) Grid method: This is the best procedure for large area. Searcher moves parallel to one another and covers same area twice.

(e) Cross-hatch method: The search for the evidence is carried out two dimensionally. First scene is covered length wise and then width wise.

3.5 Death (due to weapons other than firearms)

Several weapons like *lathis*, swords, knives, shoes, bricks, rods, stones, or any other implements which are easily available, can be used to cause wounds or hurt a human being, which sometimes leads to death.

According to National Crime Records Bureau (**NCRB**) data, **33201** incidence of murder (**u/s 302 IPC**) were reported during the year 2013 in India.



Figure 3.1: Cases of homicide

3.5.1 Crime Scene Investigation

On reaching the crime scene, the investigator should

(i) Take photographs of the deceased and place of occurrence from different angles and distances as per requirements to record the details of the scene including the body.

(ii) Prepare crime scene sketch showing the dead body and other items depicting their correlative positions including distances between them.

(iii) Find out whether the death is due to natural or unnatural cause. If death is unnatural, probable cause, manner and time of death should be determined.

(iv) Rule out any possibility of staging the crime scene (alterations made to mislead the investigation) by the suspect.

(v) Team of forensic experts and medico-legal experts should be called for scientific evaluation of the scene.

In homicide cases, the IO should make and document the following observations:

(i) Sex, appearance, age, built, colour of hair of the deceased.

(ii) Description of the deceased's clothing.

(iii) Details of injury/injuries and apparent cause of death.

(iv) Condition of the body (lividity, rigor, etc.).

(v) Rectal temperature (at the scene of crime to determine time since death).

(vi) Colour of the blood (bright red or brown). Whether wet or dry?

(vii) Weapon, hair strands or any other evidence material in the fist.

(viii) Position of body in relation to objects of significance at the location.

(ix) Position and condition of clothes (buttons, tears, damages, cuts, holes, etc.).

(x) Position, direction and quantity or number of stains of blood, saliva, vomit, soil, vegetation, semen, sputum, urine or feces, etc., on the clothes, body and surrounding.

(xi) Details of jewellery (rings, watches, bangles, anklets, chains, etc.), if any.

(xii) Details of immediate surroundings and condition of doors, windows, furniture, etc.

(xiii) Presence of drugs, medicines, bottles, or glasses (in suspected poisoning cases).

Observe the body from vertex (top of head) to toe for which position of the body may be changed and observations are made as under:

Head: Eyes open or closed, mouth open or closed, position of the head in relation to body, colour of the skin (lividity, etc.), description of blood if present, description of wound if present, foreign material (soil, mud, paint, grease, etc.) on the head, condition of the hair, saliva, vomit, sputum if present.

Trunk: Position of trunk (twisted, on side, back or bent over), description of injury if present, description of any stain (blood, semen, saliva, etc.) if present, foreign material (grease, soil, paint, etc.), hair or fiber if present. Presence of any injury or ligature mark on the neck.

Arms and legs: Position of each arm and leg, description of any injury, description of any stain, foreign material, and presence of any type of defense/self-inflicted wound.

Note:

(i) Hands of the deceased should be covered with paper bags to preserve any trace of evidence under the finger nails to be collected later during autopsy. Do not use plastic bag.

(ii) In case of unidentified body intact long bone (preferably femur) should be collected during post-mortem and sent to forensic science laboratory for DNA profiling. Order of preference for sending intact bones should be: femur, tibia, humerus, teeth (molar), and ribs.

3.5.2 Evidence Material Likely to be Found at Crime Scene

(i) Footprints/shoe prints/tyre marks.

(ii) Finger/palm prints.

(iii) Bloodstains and bloodstain pattern.

(iv) Hair strands, *bidi*/cigarette butts, torn pieces of clothes, torn off buttons, broken pieces of glass bangles, any other belongings of victim/suspect.

(v) Botanical evidences (fibers, leaves, flowers, diatoms, pollen grains, wood splinters, seeds, and plant fragments).

(vi) Soil samples from place of occurrence and that present on the clothes of victim or accused.

(vii) Weapon of offence (other than firearms).

(viii) Entomological evidences (insects, maggots, eggs).

(ix) Samples like blood, tissues, bones, teeth should also be collected in case of unidentified bodies for the DNA profiling for the purpose of identification.

(x) CCTV camera footage.

3.5.3 Collection and Packaging of Evidence Material

(i) Liquid blood can be collected on cotton gauze cloth piece, air dried in shade and packed in paper envelopes or a few drops of blood can be collected on FTA card.

(ii) Bloodstains can be scraped/chipped off and placed in paper envelope or can be collected on cotton gauze cloth by swabbing. Material from representative unstained areas should be collected and sent as control.

(iii) Blood soaked soil, hair, grass, etc., should be thoroughly dried in air and kept in paper envelopes. Similarly, unstained soil should also be collected and sent as control.

(iv) Bloodstained portion of the knife, axe, bullet, sticks, or any other weapon should be wrapped with a clean paper and packed in cloth bag or paper envelope depending on the size of the weapon.

(v) Bloodstained garment/clothing should be thoroughly dried in air (in shade) and each garment should be wrapped in a clean paper sheet taking care that stained areas do not contaminate unstained area of the garment and packed in thick paper envelope or cotton cloth bag.

(vi) Post-mortem blood sample should be taken on cotton gauze pad, dried (in shade) and packed in paper envelope or a few drops of blood can be collected on FTA card.

(vii) Soft organs or tissues if taken during post-mortem autopsy should be preserved in Dimethylsulphoxide (DMSO) or normal saline and not in formalin which affects DNA profiling result.

(viii) Clean and wash the bones/teeth to remove any debris. Allow it to dry completely in air. Roll/pack in brown paper envelope and seal in cotton cloth

(ix) Hair strands if recovered from the clothes of victim/suspect should be collected using forceps with plastic covering on the tip and placed in paper fold and packed in paper envelope.

(x) Control samples of hair from victim/suspect should be collected by combing and method of collection and site of collection should be mentioned in the forwarding letter.

(xi) Fingerprints developed from the suspected places should be photographed, lifted and preserved using adhesive tape.

(xii) If the latent prints cannot be developed due to any reason at the place of occurrence, the article may be packed in strong cardboard or wooden boxes so that the prints are not destroyed during transit to finger print laboratory.

(xiii) Foot/footwear prints or impression should be photographed placing scale along with it and collected using appropriate method (electrostatic lifting, tracing, making castes).

Note*: All evidence material collected from crime scene should be properly sealed and labelled including name and number of exhibits, FIR no., u/s, name of police station, case no., date and place from where exhibits are collected, name and signature of the IO.*

3.5.4 Forwarding of Evidence Material

(i) Forwarding memo should be filled up giving brief history of the case, details of the parcels and their contents, nature of examination required (see Chapter 2 for details).

(ii) Certificate authorizing the Director, Forensic Science Laboratory, for examination of the exhibits.

(iii) Specimen of the seal impression in wax on a piece of cloth duly attested by the concerned official should also be sent along with forwarding memo.

(iv) Copy of inquest or *panchnama* should also be sent along with the forwarding memo.

3.5.5 Likely Queries to be Raised (may vary from case to case)

From Medico-legal examiner:

(i) Cause, manner and mode of death.

(ii) Nature and cause of injuries.

(iii) Time since death.

(iv) Age and other identifying features of the deceased.

From Forensic expert:

(i) Whether blood is present on the exhibits. If yes, its species of origin and grouping.

(ii) Whether fingerprints lifted from scene match with the suspect's fingerprints?

(iii) Whether foot/footwear marks lifted from scene match with suspect's foot/footwear marks?

(iv) Identification and comparison of hair, fibre and botanical evidence for connecting the victim, suspect and crime scene or suspected vehicle with each other.

(v) Whether DNA profiling of the deceased matches with the reference samples for establishing identity of the deceased.

(vi) Whether the torn button, piece of cloth match with the garments recovered from suspect.

(vii) Whether the cut mark/hole present on the garment of the deceased can be caused by the weapon recovered from the suspect or crime scene.

(viii) Whether stains of grease/paint/soil present on the clothing of the deceased match with samples collected from crime scene.

(ix) Whether vegetable stains on the clothing of the deceased match with that of the plant present at the scene.

(x) Whether pollen grains are present in nasal secretion and match with the pollen grain in the surrounding area of crime scene.

3.6 Death Due to Fall from Height

Death due to fall from height are not uncommon. Such types of death may be suicidal/ homicidal/accidental. Observations made at the place of occurrence, position of the body, bloodstain pattern, and circumstantial evidence help in ascertaining the facts.

The pattern of injuries depend on the height of fall, intervening objects in the trajectory of fall, body weight, velocity, nature of surface impacted, orientation of body at the moment of impact and the elasticity and viscosity of tissue of the contact body region. However, height of fall is the major determining factor.

The following guidelines are suggested in investigating such types of cases:

3.6.1 Observation at the Crime Scene

On reaching the crime scene, investigating officer should

(i) Check whether the victim is dead or alive.

(ii) If the *victim shows any sign of life*, provide necessary medical help and rush the victim to the hospital.

(iii) If the victim had already been taken to the hospital by someone else, inquire whether victim was conscious/unconscious/dead and, if conscious, contents of the statement if any made by him.

(iv) Ask doctors and accompanying person(s) whether victim had narrated anything to them.

(v) If regained consciousness, arrange to record dying declaration in consultation with the doctor about his health and mental condition, obtain certificate about his mental condition required for deposing dying declaration.

(vi) The place of occurrence should be protected to avoid any alteration at the scene.

(vii) *If the victim is dead*, take photographs of the victim and place of occurrence from different angles and distances as per requirements to record the details of the scene including the body.

(viii) Prepare crime scene sketch showing the dead body and other items depicting their correlative positions, including distances between them.

(ix) Team of forensic experts or medico-legal experts should be called for scientific evaluation of the scene.

(x) Position of the body, its distance from the base of the building or any other structure from where the deceased was suspected to have fallen. Heights are helpful in reconstructing the incident. Experimentation using a dummy similar to the height and weight of the deceased facilitates in drawing the conclusion whether the fall was accidental/homicidal.

(xi) Projections (if present) within the path of fall should be examined for presence of evidence showing any contact between projections and the body before landing on the floor.

(xii) Check possible path taken by the victim to reach the point from where deceased was suspected to have fallen and any other physical evidence to support or contradict the statement given by witnesses, possible means to reach up to that place.

(xiii) Check presence of any signs of struggle at crime scene like broken buttons and glass bangles, torn clothes, bloodstains, any mark of dragging, mark on parapet, any weapon of offence like *lathi*, rod, etc.

(xiv) In case of married women, all aspects related to dowry and element of harassments meted out to the victim, torture, marital relationship, history of marriage, marriage negotiator, medical history, and number of children. etc., should be enquired into.

(xv) Search of the room where the victim used to stay is very important to obtain further clues indicating the reason/motive behind the death.

3.6.2 Observation on the Body of Deceased

(i) Record the position of the body, type of injuries, quantity and pattern of the bloodstains. Blood splashes should be specifically looked for.

(ii) Detailed history of the person should be obtained including his mental condition, economic status, job profile, financial condition, threat or fear, relationship with family and friends, educational background, medical history, etc.

(iii) Body should be sent for post-mortem.

(iv) Obtain the injury report from the Doctor and assess the nature and type of injuries, interact with Doctor to seek clarifications whether the injuries were caused due to fall from height or otherwise.

(v) Examination of wounds is important to rule out or confirm the possibilities of hurt or other causes of homicide. Estimation of age of wounds helps to prove whether victim was assaulted immediately or much before the actual death.

3.6.3 Evidence Material Likely to be Found

(i) Foot/shoe prints

(ii) Finger/palm prints

(iii) Bloodstains and bloodstain pattern

(iv) Hair strands, *bidi*/cigarette butts torn pieces of clothes, torn buttons, broken pieces of glass bangles, any other belonging of victim/suspect.

(v) Botanical evidences (fibers, leaves, flowers, pollen grains and plant fragments).

(vi) Soil samples from place of occurrence and that present on the clothes of victim or accused.

(vii) CCTV camera footage

3.6.4 Collection and Packaging of Evidence Materials

(i) Liquid blood can be collected on cotton gauze cloth piece, air dried and packed in paper envelopes or a few drops of blood can be collected on FTA card.

(ii) Bloodstains can be scraped/chipped off and placed in paper envelope or can be collected on cotton gauze cloth by swabbing. Material from representative unstained areas should be collected and sent as control.

(iii) Blood soaked soil, hair, grass, etc. should be thoroughly dried in air and kept in paper envelopes. Similarly, unstained soil should be collected and sent as control.

(iv) Bloodstained garments/clothings should be thoroughly dried in air and each garment should be wrapped in clean paper sheet taking care that stained areas do not contaminate unstained area of the garment and packed in thick paper envelope or cotton cloth bag. Plastic envelopes/airtight envelopes should not be used.

(v) Hair strands if recovered from the clothes of victim/suspect should be collected using forceps with plastic covering on the tip and placed in paper fold and packed in paper envelope.

(vi) Control samples of hair from victim/suspect should be collected by combing and method of collection and site of collection should be mentioned in the forwarding letter.

(vii) Fingerprints developed from the suspected places should be photographed, lifted and preserved using adhesive tape.

(viii) If the latent prints cannot be developed due to any reason at the place of occurrence, the article may be packed in a strong cardboard or a wooden box so that the prints are not destroyed during transit to finger print laboratory.

(ix) Foot/footwear prints or impression should be photographed placing scale along with it and collected using appropriate method (electrostatic lifting, tracing, making casts).

(x) Blood sample and viscera, if required, should be collected and preserved during post-mortem for chemical analysis.

Note: *All evidence material collected from crime scene should be properly sealed and labelled including- name and number of exhibits, FIR No., u/s, name of Police Station, Case No., date and place from where exhibits are collected, name and signature of the IO.*

3.6.5 Forwarding of Evidence Materials

(i) Forwarding memo should be filled up giving brief history of the case, details of the parcels and their contents, nature of examination required (see Chapter 2 for details).

(ii) Certificate authorizing the Director, Forensic Science Laboratory, for examination of the exhibits.

(iii) Specimen of the seal impression in wax on a piece of cloth duly attested by the concerned official should also be sent along with forwarding memo.

(iv) Copy of inquest or *panchnama* should also be sent along with the forwarding memo.

3.6.6 Likely Queries to be Raised (may vary from case to case)

From Medico-legal expert

(i) Cause, manner and mode of death.

(ii) Nature, cause and age of injuries.

(iii) Whether injuries are due to fall from height.

(iv) Time since death.

From Forensic expert

(i) Whether blood is present on the exhibits. If yes, its species of origin and grouping.

(ii) Whether fingerprints lifted from scene match with the suspect's fingerprints.

(iii) Whether foot/footwear marks lifted from scene match with suspect's foot/footwear marks.

(iv) Identification and comparison of hair, fiber and botanical evidence for linking the victim, suspect and crime scene.

(v) Whether the torn button, piece of cloth match with the garments recovered from suspect.

(vi) Whether the blood sample/viscera contains any drug/alcohol/poison or any other chemical substance.

3.7 Death Due To Burning

Many times, deaths caused by poisoning, drowning, hanging or strangulating are followed by burning to simulate the crime as suicidal/accidental burning. While investigating burning cases, it is imperative to carry out thorough search of the scene of occurrence and evaluate the physical evidence to determine whether the death was due to homicidal or suicidal or accidental burning. In case of ante-mortem burning, soot particle in trachea is an important indication to prove the point. Due to inhalation of carbon monoxide, the blood would contain carboxy-hemoglobin and colour of blood changes from dark brown to cherry red.



Figure 3.2: Burnt body showing pugilistic position

3.7.1 Crime Scene Investigation

On reaching the crime scene, IO should

(i) Check whether the victim is dead or alive.

(ii) *If the victim shows any sign of life*, provide necessary medical help and rush the victim to the hospital.

(iii) The place of occurrence should be protected to avoid any alteration at the scene.

(iv) *If the victim is dead*, take photographs of the victim and place of occurrence from different angles and distances as per requirements to record the details of the scene, including the body.

(v) Prepare crime scene sketch showing the dead body and other items depicting their correlative positions, including distances between them.

(vi) Team of forensic experts or medico-legal experts should be called for scientific evaluation of the scene.

3.7.2 Observations at the Scene of Death

(i) Ascertain the place of burning of the body by observing charring of floor and objects around. Absence of charring may indicate shifting of body from another place.

(ii) Check presence of matchbox (burnt/un-burnt match sticks) or any source of ignition and any container and smell of inflammable material like kerosene, petrol, diesel, etc., at the place of occurrence. *Absence of these indicates homicidal burning.*

(iii) Check position of container and its lid in relation to the body and quantity of inflammable liquid in container. In case of suicidal burning the container in shape or fused/melted could be in vicinity of the victim with little or no liquid in that. The victim would not try to close the lid of container while committing suicide.

(iv) Presence of water/sand indicate attempt made by rescuers to save the burning victim.

(v) Check presence of foot/shoe prints at the place of occurrence and ascertain whether they belong to the victim or any other person. Presence of victim's footprint would show that the victim was alive and in movement during burning.

(vi) Presence of foot/shoe prints of any other person would show that someone else was present during the incident.

(vii) If victim is female, check presence of any broken piece of glass bangles at the scene and also record the presence of intact bangles on the wrist of the victim.

(viii) If scene of burning is indoor, check whether the room was bolted from inside or outside or was open. Normally in suicide cases the room is found bolted from inside. However, possibility of bolting the door/window of the room from inside while standing outside should not be ruled out.

(ix) Look for any attempt made by the family members to break open the door to save the victim/deceased.

(x) Check bolts of the door for deposition of smoke. If door was bolted, then the smoke will be present on the lower portion of the bolt not on upper portion.

(xi) Check the deposition of the smoke on the crevices of the doors and windows through which smoke gushes out if these are closed.

(xii) All the articles in scene of crime room will have soot deposition on their exposed area. Any article removed later on from crime scene will leave its impression. Similarly, any article added later on to the crime scene will not have any soot deposition on the exposed area.

(xiii) Check presence of burning/charring on the household items (furniture and other fire sensitive articles) in the room.

(xiv) Check presence of finger print/palm print impressions/smears of soot on the walls and other places, suggesting movement of the body while burning, in an attempt to save himself/herself.

(xv) If burning has taken place in the kitchen, check position of knobs of stove or gas burner and knob of regulator (cylinder) to verify whether these were on or off.

(xvi) Check presence of cooked or partially cooked food items, tea, coffee, etc., to verify the statements of witnesses that burning took place accidently while working in the kitchen.

(xvii) Check presence of any bloodstain at the scene.

(xviii) If deceased has been cremated to hide the real cause of death, skeletal remains are to be recovered.

3.7.3 Observations on the Body of Deceased

(i) Record position of the dead body and the place where it was found.

(ii) Record percentage of burns or the degree of burns on the body.

(iii) Record whether body was in pugilistic position (boxer posture- stiffening of muscles due to heat) or otherwise.

(iv) Check presence of lines (creases/folds) without smoke around nose and eyes which are created due to tightening of the face during live burning. These lines indicate ante mortem burning.

(v) Check blisters, if present on the body were air filled or having liquid. Blisters formed during ante-mortem burning are filled with liquid rich in albumin. Post-mortem blisters do not have albumin rich liquid.

(vi) Sometimes blisters (on exposed area) also get burned, in such cases parts of the body where fire cannot enter easily like- skin near genitals, inside the ear, area between fingers, armpits, etc., should be checked for presence of blisters.

(vii) Check presence of any signs of violence on the body.

(viii) If inflammable liquid (kerosene, petrol, and diesel) was used for burning, the inflammable liquid on the garments would burn first which results in burning of exposed areas followed by burning of covered areas, resulting in more burning on exposed area as compared to covered areas.

(ix) Presence of line of redness (demarcation of dead and live tissue around blisters) which indicate live burning.

(x) Check presence of smell of inflammable material in the remnants of head hair and garments of the victim which shows that burning was caused by pouring the inflammable material over the body.

(xi) Burnt residues of synthetic garments found adhering to the sole of the victim, indicates that person was alive during burning.

(xii) Presence of cherry red coloured blood (due to inhalation of carbon monoxide) oozing out from nose or mouth indicates live burning.

(xiii) After making and documenting all the above observations the body should be sent for post-mortem.

Note**:** *In case victim is female (within 7 years of marriage) and there is allegation of demand for dowry, the following points should be taken into consideration, in addition to points listed above*:

(i) Check financial transactions made by the victim or her family member.

(ii) If marriage was arranged through mediators, details about the dowry demands should be recorded from those mediators.

(iii) Check any letters, mails, messages sent by the victim to family members indicating harassment and demand of dowry.

(iv) Details about the married life of the victim and her relations with her husband and in-laws should be obtained from relatives, friends and neighbours and recorded.

(v) Body of the victim should be properly examined for any signs of violence.

(vi) Check presence of any sign of burning and inflammable material on the body or clothing of the suspects/rescuer.

According to data compiled by National Crime Records Bureau (**NCRB**), a total of **8083** incidents of dowry death (**sec. 304B IPC**) cases were reported during 2013 across the country.

3.7.4 Evidence Material Likely to be Found in Burning Cases

(i) Foot prints, finger/palm print smears.

(ii) Blood/bloodstains.

(iii) Containers of inflammable material like kerosene, petrol, and matchsticks/box, etc.

(iv) Pieces of partially burnt garments and ashes.

(v) Partially burnt hair.

(vi) Pieces of broken bangles (in case of female).

(vii) Condition of the doors, windows and the position of bolts/handles/latches whether in closed or open position.

(viii) Pattern of smoke deposit on the walls, ceiling, handles, bolts, latches.

(ix) Soot deposited should also be collected for chemical analysis.

(x) If body has been cremated, pieces of burnt bones are to be recovered along with ashes.

(xi) Garments of the suspects should also be collected for detection of inflammable material used in burning in case of suspected homicide.

(xii) Hair and clothes of the victims should also be collected during post-mortem.

(xiii) During post-mortem, blood sample should be obtained for detection of carboxy-haemoglobin in the blood and trachea should also be collected to check the presence of soot particles and carbon monoxide.

(xiv) Samples (blood, bones, teeth, tissues) should be collected for DNA profiling for identification of victim.

3.7.5 Collection and Packaging of Evidence Material

(i) Liquid blood can be collected on cotton gauze cloth piece, air dried and packed in paper envelopes or *a few drops of blood can be collected on FTA card*.

(ii) Bloodstains can be scraped/chipped off and placed in paper envelope or can be collected on cotton gauze cloth by swabbing.

(iii) Fragments of partially burnt garments and hair should be collected and packed separately in air tight glass containers.

(iv) Pieces of broken bangles should be collected and kept in paper envelope and packed in glass containers or hard cardboard box.

(v) Containers having traces of inflammable material should be collected and packed separately in air tight polythene bags taking care that fingerprints on the container are not destroyed.

(vi) Soot deposits should be collected by scraping and packed in air tight glass container.

(vii) The garments of the suspects should be collected and packed in air tight glass containers.

(viii) Shoe/foot impression (if required) of the suspect should also be collected.

(ix) Remnants of burnt bones are very fragile, hence should be handled carefully. They should be collected and placed in a wooden or tough cardboard box in between the cotton wool layers. The parcel should be labelled fragile.

(x) Ashes from the cremation site should also be collected and packed in a wooden/ cardboard box.

Note**:** *All evidence material collected from crime scene should be properly sealed and labelled including- name and number of exhibits, FIR No., u/s, name of Police Station, Case No., date and place from where exhibits are collected, name and signature of the investigating officer.*

3.7.6 Forwarding of Evidence Materials

(i) Forwarding memo should be filled up giving brief history of the case, details of the parcels and their contents, nature of examination required (see Chapter 2).

(ii) Certificate authorizing the Director, Forensic Science Laboratory, for examination of the exhibits.

(iii) Specimen of the seal impression in wax on a piece of cloth duly attested by the concerned official should also be sent along with forwarding memo.

(iv) Copy of inquest or *panchnama* should also be sent along with the forwarding memo.

3.7.7 Likely Queries to be Raised (may vary from case to case)

From Medico-legal expert:

(i) Whether burns are ante-mortem or post-mortem. If ante-mortem, whether cause of death is burning.

(ii) If burning is post-mortem, then, what is the cause of death?

(iii) Is there any other finding over the body to suggest any other cause of death?

(iv) Nature and cause of injuries/fractures, if present, other than burns.

(v) Whether trachea contains any soot deposit.

(vi) Whether burning is accidental/suicidal/homicidal.

From Forensic expert:

(i) Whether the smoke pattern inside the room, crevices of the doors and windows, bolts and handles of the door corroborates with the statements made by family members regarding burning of the victim.

(ii) Whether the finger/palm prints smear (if present) match with that of the victim/ suspect or otherwise.

(iii) Whether foot/shoe prints collected from scene match with the given samples of suspect/victim.

(iv) Whether the containers, partially burnt hair and garments of the deceased contains any traces of inflammable material.

(v) Whether pieces of broken bangles match with that of the victim.

(vi) Whether blood stains collected from scene match with that of victim.

(vii) Whether the pieces of burnt bones are of human origin and if so what is the sex and age.

(viii) Whether the given sample of blood contains carboxy-hemoglobin.

(ix) Examination of charred deposits from walls/doors, if collected, to know whether it is of skin or otherwise.

Table 3.1: Difference between ante-mortem and post-mortem burns

S.No.	*Features*	*Ante-mortem*	*Post-mortem*
1.	Appearance	Red wet base	Pale yellow dry appearance
2.	Line of redness	Present	Absent
3.	Pattern of Burns	Usually soles are not burnt	Parts of body and clothing in contact with the ground are not burnt
4.	Smoke particles in lower respiratory tract.	Present	Absent
5.	Colour of blood	Cherry red	Normal
6.	Struggle marks	May be Present	Absent
7.	Smokeless creases on the face.	May be Present	Absent

Case Study 1	
A young couple was living in a rented house at Ambala (Haryana). The husband was working as a lecturer in a government college and the wife was a home maker. One day the neighbour saw dense smoke coming out from their house. The entrance door of the house was closed and bolted from inside. The neighbours forced open the door and saw the burnt body of the wife. Police was informed and the husband of the deceased was called from his college. The dead body was sent for autopsy and the house was sealed by the police. The parents of the deceased lodged FIR against the husband of the deceased alleging that their daughter has been burnt by her husband after tying her to a chair placed near the wall of the kitchen. The police called the forensic experts to examine the place of occurrence. The house was examined by FSL team in the presence of the parents of the deceased and the investigating officer. Bolting of the door from inside while standing outside the room had to be ruled out.	Based on the soot pattern deposits on the walls, on the bolts, hinges of the doors and windows, it was clear that a dense smoke was emitted during burning of the deceased and the bolt of the entrance door was in closed position during burning. On one wall of the drawing room, there were black palm impressions/smears indicating the movement of the victim while burning. Burnt patches of her clothing (upper-front) were found sticking on the back of the sofa and broken pieces of glass bangles were also found at several places. A match box with partially burnt match sticks and a container having traces of liquid smelling of kerosene were also found on the floor of kitchen. All these findings showed that the lady had committed suicide by burning herself using kerosene and the entrance door was bolted from inside during incident. The parents of the deceased were convinced about the findings at the place of occurrence and withdrew the case against their son-in-law.

Source: Dr K.P.S. Kushwaha, FSL Haryana.

3.8 Sexual Offences

Sexual offence is defined as assault by a person(s), involving sexual intercourse and related acts, with another person without consent of that person. In these kinds of offences, the victim may survive (rape), or victim can also be killed (sex-related homicide).

According to National Crime Records Bureau (**NCRB**) data, **33707** incidents of **rape** (**u/s 376, IPC**) were reported during the year 2013 in India.

3.8.1 Crime Scene Investigation

In sexual assault cases, the investigator should first secure the scene of crime - whether indoor, outdoor or mobile.

I. If the victim is alive (rape)— the following points should be taken into consideration while handling the victim:

(i) Victim should be handled with utmost sympathy and sensitivity.

(ii) For providing immediate medical help, rush the victim to the hospital.

(iii) Doctor should examine the victim (victim's consent is necessary). In case of court order, examination can be done without victim's consent. Consent of the guardian is to be taken in case of a minor victim.

(iv) A female police officer must ordinarily be present during interaction with the victim.

(v) Complete information about the victim should be obtained like- name, age, address occupation, height, marital status, etc.

(vi) During medical examination

(a) Clothes and belongings worn by the victim at the time of offence should be preserved as it is for forensic examination.

(b) Body especially forearm, wrist, face, breast, chest, lower parts of abdomen, inner aspects of thighs and back, should be checked for marks of violence, such as scratches, abrasions, and bruises caused as a result of struggle.

(c) Genitals should be properly examined and swabs should be prepared for forensic examination.

(d) Pubic hair should be collected and preserved for forensic examination.

(vii) Victim should not be called to the Police Station. IO should visit (in plain clothes) the victim's house to ascertain the facts in presence of her relatives/family members.

(viii) Efforts should be made to get the statement of the victim recorded u/s 164 CrPC at the earliest.

(ix) Details of the incident should be recorded as early as possible from the victim verbatim (in the same words used by the victim) and effort should be made for immediate arrest of the accused.

(x) No embarrassing or indecent questions should be put to victim who is already under shock or trauma.

(xi) If the victim alleges against a particular person, the ground on which her suspicion is based should be ascertained.

(xii) The accused should be sent for medical examination at the earliest after preparing injury sheet giving details of injuries/scratches, bruises or nail marks on his body. No consent is required for medical examination of the accused person.

(xiii) Forensic expert should be called to examine the place of occurrence.

(xiv) In order to bring out the victim from trauma and preparing her to cooperate in the investigation, help from NGOs may be taken.

1. Handling Child Victims of Sexual Abuse

Protection of Children from Sexual Offences Act (**POCSO Act), 2012:** It defines different forms of sexual abuse with a child below 18 years of age.

Child victim because of his / her physical and mental status, needs special safeguards and care and is to be treated with compassion and dignity for which IO is required to follow the following guidelines:

(i) The complaint should be recorded promptly and accurately without any loss of time.

(ii) Case should be handled by designated lady police officer, well trained in investigation of female child abuse cases.

(iii) The statement of the victim should be recorded verbatim (in the same words used by the victim). The officer recording the statement should not be in police uniform.

(iv) The statement of child victim should be recorded at the residence of the victim or at any other place where victim can make statement freely without any fear.

(v) While recording the statement, parents of the child victim or any other person in whom the victim has trust and confidence may be allowed to remain present.

(vi) While recording the statement IO should ensure that child victim is made comfortable and the statement carries accurate narration of the incident including all relevant aspects of the case.

(vii) If required, IO may take the assistance of a psychiatrist.

(viii) IO should ensure that at no stage child victim should come in contact with the accused.

(ix) The child victim should not be kept in police station overnight for any purpose including medical examination.

(x) The IO should ensure that the child victim is medically examined at the earliest (within 24 hours, in accordance with Section 164-A Cr.P.C.) at the nearest government hospital or a hospital recognized by the government.

(xi) In case child is under 12 years of age, consent for examination needs to be sought from his/her parent or guardian.

(xii) The IO should ensure that the identity of child victim is protected from publicity.

(xiii) The place of occurrence should be examined at the earliest to secure and collect all incriminating evidence available. Assistance of forensic team may be taken for scientific examination of the site.

(xiv) The evidence material collected from the place of occurrence, victim and the suspect, if apprehended should be sent for forensic examination and report should be obtained on priority basis.

(xv) The cases involving sexually abused children should be investigated on priority basis and investigation should be completed preferably *within 90 days* of registration of case and should be periodically supervised by the senior officer(s).

2. Handling Differently Abled Persons

Differently abled women and children (long term physical, mental, intellectual or sensory impairments) are particularly vulnerable to sexual violence and they may be repeatedly victimized especially by caretakers. Women and girls with disabilities who are institutionalized are at risk of abuse at shelters and hospitals. As per amendments made in Indian Penal Code, Criminal Law Amendment Act, 2013, this has been

recognized as 'custodial rape'. While dealing with the victims (with disability) of sexual abuse the following guidelines should be taken into consideration:

(i) The IO should make necessary arrangements to make the victim comfortable by providing proper place for examination and establish trust for conducting thorough examination.

(ii) Examination of a disabled victim may take a long time and therefore, the IO should not rush through the things as it may cause trouble to the victim.

(iii) The IO should not presume that a victim who is differently abled cannot give history of sexual violence himself/herself. As abuse by caretakers and near and dear ones is common, therefore, history should not be taken from them.

(iv) History should be taken independently and directly from the victim.

(v) If the victim has speech, hearing or mental disability, assistance of interpreters, translators or special educator may be taken. Even so, IO should communicate with the victim directly as much as possible and should be present during the presence of interpreter or special educator.

(vi) The IO should ensure that the victim is medically examined at the earliest (within 24 hours, in accordance with Section 164-A Cr.P.C.) at the nearest government hospital or a hospital recognized by the government.

(vii) All such victims are ordinarily able to give or refuse to give informed consent. However the victim should be:

  (a) Provided with necessary information (what the procedure involves, the reason for doing the procedure, the potential risks and discomforts) in a simple language and in a form that makes it easy for him / her to understand the information.

  (b) Given adequate time to arrive at a decision.

  (c) Provided the assistance of a friend/colleague/care-giver in making the informed consent decision and in conveying his/her decision to medical personnel.

(viii) The decision of the person to either give/refuse consent with above support, to the medical examination, should be respected.

(ix) The IO should ensure that the identity of victim is protected from publicity.

(x) The evidence material collected from the place of occurrence, victim and the suspect, if apprehended, should be sent for forensic examination and report should be obtained on priority basis.

3. Inspection of the Scene of Crime

(i) IO should safeguard the crime scene so that clues available at the crime scene may not be disturbed.

(ii) The crime scene should be photographed from all angles including close-ups with scale in the frame for reference.

(iii) Crime scene sketch should be prepared indicating the distances among evidence items found at the spot.

(iv) The crime scene should be thoroughly inspected using appropriate method of crime scene search and all out efforts should be made to collect maximum evidence from the spot.

(v) Forensic team may be summoned to help in identification and collection of evidence.



Figure 3.3: Putrefied body in rape and murder case

II. If the victim is dead (sex-related homicide)

(i) Do not alter anything at the crime scene; everything should be preserved as such.

(ii) Complete description of the dead body should be recorded including- sex, appearance, age, build, colour of hair of the deceased.

(iii) Check positioning of the body.

(iv) Check condition of garments on the body.

(v) Check injuries and signs of struggle on the body and place of occurrence.

(vi) Check any evidence of seminal fluid on, near or in the body.

(vii) Check evidence of other sexual activity, i.e. fantasy, ritualism, symbolism, and/or masturbation.

(viii) Check multiple stabbing or cutting on the body. This includes slicing wounds across the abdomen of the victim, throat slashing, and over-kill type injuries which are considered highly suggestive of a sexual motivation.

(ix) Examine the scene of occurrence especially bed, sofa, etc., for any disturbances from its normal position.

(x) If body is not identified record full description of the body and garments for the purpose of identification and samples should be collected for DNA profiling for identification purpose.

3.8.2 Evidence Materials Likely to be found at Crime Scene

(i) Seminal stains

(ii) Used condoms/clothes

(iii) Footprints/shoe prints/tyre marks

(iv) Bloodstains and bloodstain pattern

(v) Bite marks and saliva

(vi) Hair strands/pubic hair

(vii) Fingerprints

(viii) Botanical evidences, (fibre, leaves, flowers, diatoms, pollen grains and plant fragments).

(ix) Weapon of offence (firearms and other than firearms).

(x) Entomological evidences (insects, maggots)

(xi) Sometimes drugs like date rape drugs, diazepam and other related drugs, alcohol, ketamine, flu nitrazipam, gamma-Hydroxybutyric acid (GHB**)**, etc., are used so that victim gets unconscious. In such cases, blood sample of the victim should be sent for chemical examination.

3.8.3 Collection and Packaging of Evidence Materials

(i) All bloodstained exhibits, including clothing should be thoroughly air dried in shade and packed carefully in paper envelopes. Exhibits should not be dried in sunlight or in front of heater.

(ii) Each item of the dried stained exhibit should be packed separately taking care that stained areas do not contaminate unstained areas. This can be done by covering the stained areas with clean paper.

(iii) Blood soaked/seminal stains over any surface like soil, hair, grass, etc., should be thoroughly air dried in shade and kept in paper envelopes. Similarly, unstained soil should be collected and sent as control.

(iv) Dried blood from absorbent surfaces should be removed by scraping or by chipping off the stained areas and kept in separate paper envelopes. Material from representative unstained areas should be sent as control.

(v) If a pool of blood is present at the scene of crime, clean cotton cloth should be soaked in it, air dried in shade thoroughly and packed in paper envelopes.

(vi) Bloodstained portion of the knife, axe, bullet, sticks, etc., should be wrapped with a clean paper and packed in cloth bag or paper envelopes.

(vii) Blood can also be preserved on FTA card.

(viii) Post-mortem blood sample should be taken on cotton gauze pad, dried and packed in paper envelope.

(ix) Semen stained clothes should be dried and packed in the same manner as blood stained clothes.

(x) Semen stained areas should be marked, if possible, by pencil.

(xi) Vaginal and cervical swabs collected by medico legal expert should be air dried and packed in a paper envelope. Vaginal smear on the microscopic slide should also be prepared.

(xii) In murder, assault and rape cases, hair on clothes of both the victim and the suspect should be collected.

(xiii) Control samples of hair from victim/suspect should be collected by combing and method of collection and site of collection should be mentioned in the forwarding letter.

(xiv) Saliva can be swabbed from bite marks on the victim.

(xv) Crime scene should be checked for presence of any pornographic material (magazines, CDs, laptops, mobiles, etc.).

(xvi) Search the vulnerable places for fingerprint evidence in bright light by means of a magnifying lens. If the prints are clear, take photographs with a scale in the frame. Then lift the same by means of transparent tape for comparison.

(xvii) If the print is not clear, or if it is partial, it should be developed using appropriate finger print powder.

(xviii) If the latent prints cannot be developed due to any reason at the place of occurrence, the article may be packed in strong cardboard or wooden box so that the prints are not destroyed during transit to finger print laboratory.

(xix) Foot/footwear prints should be collected using appropriate method (electrostatic lifting, tracing, making castes).

(xx) Soft organs or tissues if taken during post-mortem autopsy should be preserved in Dimethylsulphoxide (DMSO) and not in formalin which affects DNA profiling result.

3.8.4 Forwarding of Evidence Materials

(i) Forwarding memo should be filled up giving brief history of the case, details of the parcels and their contents, nature of examination required (see Chapter 2 for details).

(ii) Certificate authorizing the Director, Forensic Science Laboratory, for examination of the exhibits.

(iii) Specimen of the seal impression in wax on a piece of cloth duly attested by the concerned official should also be sent along with forwarding memo.

3.8.5 Likely Queries to be Raised (may vary from case to case):

From Medico-legal expert

(i) Cause, manner and mode of death.

(ii) Nature and cause of injuries.

(iii) Time since death.

(iv) Age and other identifying characters in case of the unknown deceased.

From Forensic expert

(i) Whether the given stain is of semen. If yes, its species origin and grouping.

(ii) Whether the given stain is of blood. If yes, its species origin and grouping.

(iii) Whether sample fingerprints match with the suspect's fingerprints.

(iv) Whether sample foot/footwear marks match with the suspect's foot/footwear marks.

(v) Whether the DNA profiling result of the crime samples matches with specimen sample.

(vi) Identification and comparison of hair, fiber and botanical evidence for linking the victim and suspect with the crime scene.

(vii) Whether saliva stains from bite marks match with that of accused/suspect and its grouping.

(viii) Comparison of bite marks with teeth of accused/suspect (taking help of dental surgeon for making cast of the bite mark and suspect's denture).

Do's and Don'ts for the IOs while investigating cases of sexual offence
Utilize services of FSL experts on the spot as well as during post-mortem for checking the blood, semen/seminal stains, saliva stains and bite marks.
Suspects if apprehended should be examined for the presence of blood on their pubic region in cases where there is bleeding from genitalia of deceased/victim.
The place of occurrence and body of the deceased/ victim should be thoroughly examined for the presence of any hair/fiber which could have been left by the accused using forensic lights (if required) and utilizing the services of the forensic experts or medico-legal experts.
Even a single hair with root, if left by the accused on the crime scene or on the garments or body of deceased/ victim, can link the accused with the crime through DNA profiling.
For DNA profiling match, reference sample should be either blood or saliva of the accused preferably on FTA card generally available with Forensic Science Laboratory. This would facilitate quicker and scientific DNA profiling and avoid sample contamination.
Never take semen sample of the accused for DNA profiling because DNA is same in all the body fluids and tissues.

Case Study 2

Dead body of a lady, aged around 55yr, was found in her house. There were several injuries on the abdominal region and abrasions over the face and neck. Bite marks were seen on the face. The garments were torn exposing thighs and breast. Few small strands of hair were recovered from the floor adjacent to the body of the deceased. The pubic hair of deceased was found matted.

There were blood smeared drag marks showing that the body was dragged from drawing hall to the place where dead body was found. Along the drag marks several faint blood smudged footwear impressions were detected which were photographed and traced. Latent fingerprints were developed and lifted from the tumblers lying on the table in the drawing hall. Two strands of hair (approx. 4 cm.) were found on the floor near the table. Evidence collected from the crime scene and the body: Shoeprints, fingerprints, blood stains, strands of hair, and saliva from bite marks, garments, pubic hair and vaginal swab. These were sent to Forensic Science Laboratory.

A few days later, two suspects were apprehended by the police. Their shoes, garments, fingerprints and buccal swabs were taken and sent for forensic examination and comparison with the crime exhibits sent earlier.

Results: The pattern of the tread surface of the shoes belonging to the suspects tallied with the shoeprints found at the scene. Traces of blood were also detected on the tread surface of the shoes. DNA profile generated from the seminal stains found on the garments of the deceased, vaginal swab, saliva from the bite marks and hair collected from scene and from the buccal samples of the suspects linked the suspects with the crime.

Source: Dr K.P.S. Kushwaha, FSL Haryana.

Significance of Scientific Aids at the Spot in Sexual Offence Cases- Illustrative case studies from FSL Haryana (Source- FSL Calling, XV All India Forensic Science Conference, 18-20 January, 2004, held at Karnal, Haryana)

Case Study 3	
Dead body of a minor girl was found in the wheat field near her village. Police called FSL experts for lifting shoe impressions from the spot. Expert found the shoe impression belonging to that of the family member of the deceased girl. The PM report was available on the spot in which it was mentioned that vaginal canal is badly torn and profusely bleeding. Accordingly it was suspected to be the case of rape and murder. In order to trace the criminal, FSL expert advised the IO to get the youngsters of the	village examined for the presence of blood on their pubic region. In all, 35 youngsters were examined using benzidine test. On the pubic region of two boys' benzidine test was found to be intensively positive. On interrogation by the IO they admitted the crime. Giving due weightage to the expert report Honourable Session Court convicted the accused. Subsequently scientific aid was rendered on the spot by FSL experts on similar lines and several such type of cases were solved.

Case Study 4	
Dead body of a minor girl was found in a field near her village. FSL team visited the spot in the late evening to ascertain sexual assault. The spot was screened using portable U.V. light and chemical tests for detection of seminal and blood stains. A dry vegetable twig stained with blood was found at the spot. Next morning FSL experts visited mortuary during autopsy of the deceased girl for ascertaining the presence of semen on the deceased. The swabs taken by the doctor in a routine way from outer surface of the	pubic region and from the vaginal canal were found to be negative for semen. However, taking cue from the above mentioned case in which vaginal canal was found to be badly torn, the expert suggested the medico-legal expert to take the swab from the peritoneal cavity to explore the possibility of detecting seminal fluid discharged and lodged in the peritoneal cavity due to rupture of the vaginal canal during sexual assault. Interestingly, the swab taken from the peritoneal cavity gave intense positive test for semen.

3.9 Hanging

It is a violent form of death due to asphyxia, caused by either complete or partial suspension of the body with a ligature mark partially or completely encircling the neck in the form of a noose. Constriction force is the weight of the body or weight of the head. In such cases, body is hung by rope, turban, cord, dhoti, saree, chain, scarf, wire, belt, etc. Place of occurrence can be indoor or outdoor.

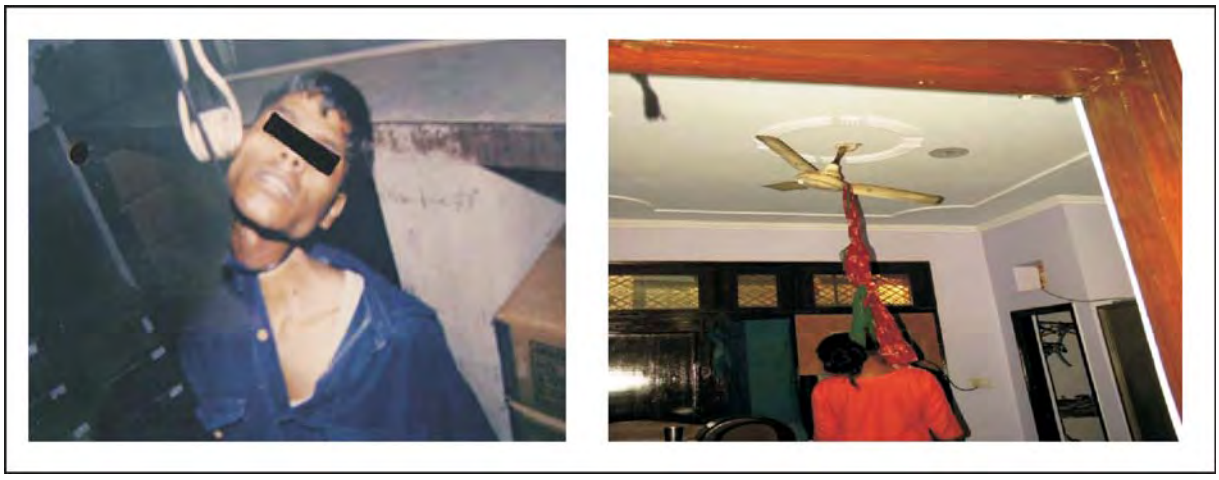


Figure 3.4: Cases of hanging

3.9.1 Types of Hanging

(i) Based on position of knot:

(a) Typical hanging: Knot is present at the back of the head (occiput).

(b) Atypical hanging: Knot is present anywhere other than occiput.

(ii) Based on degree of suspension:

(a) Complete hanging: In this type of hanging, no part of the body touches the ground. Body is completely suspended.

(b) Incomplete hanging: Body is suspended but a part of the body touches the ground or some other object.

(iii) Manner of hanging

(a) Suicidal hanging

- Common method of committing suicide.

- Upper end of rope is attached to a high point (beam, branch, ceiling fan etc.).
- Chair, bench, bucket, stool, box, or any other support, etc., should be present below the hanging body to enable the victim to tie the rope to the anchor point.
- Occasionally, victim may tie his/her hands at the back to prevent any change of mind and possibility of retrieval or to mislead investigator.
- Common amongst people with disability, disease, etc.
- For paralyzed persons, it is impossible to suspend themselves.

(b) Accidental hanging is less common and can be found in cases like:

- Children climbing tree, wall, railing, etc., fall and their clothing or garments gets entangled in a branch, nail or other projecting objects.
- Stuntmen during performance of stunts.
- Chin gets suspended against edge of a sofa or arm of chair.
- If victim slips from staircase and neck gets caught in one of the vertical bars.
- During vehicular accidents, neck gets caught in steering wheel.
- In industrial areas/factories, neck may get caught in some machinery.

(c) Homicidal hanging

- Extremely rare, because it is difficult for a single person to overpower another adult person.
- Homicidal hanging is possible if person is unconscious, child, old, infirm, physically challenged or very weak person.
- Homicidal hanging is suspected when clothing of the deceased is disarranged or torn, injuries are present on the body, or there are any signs of struggle.
- Dead bodies are sometimes hanged to simulate suicide. In these cases, ligature mark may be present but signs of asphyxia are absent.

3.9.2 Crime Scene Investigation

On reaching the crime scene, IO should:

(i) Check whether the victim is *dead or alive*.

(ii) If the person shows any signs of life, provide him support, cut the ligature much above the knot and bring the victim down.

(iii) Provide necessary medical help and rush the victim to the hospital.

(iv) If the victim is dead, first photography of the victim and crime scene should be done, then only bring the body down by cutting the ligature much above the knot.

(v) Note the type of knot like slip knot, simple loop, non-slipping knot.

(vi) It is important to photograph the ligature and ligature mark properly with different angles including close-ups.

(vii) Safeguard the crime scene as soon as possible so that nothing is altered and crime scene is preserved as such.

(viii) Prepare crime scene sketch showing the dead body and other items depicting their correlative positions including distances between them.

(ix) Team of forensic experts or medico-legal experts should be called for scientific evaluation of the scene.

(x) Write down complete description of the body: sex, appearance, age, build, and colour of hair of the deceased for purpose of identification.

(xi) Search for any support like chair, bench, bucket, etc., used to get access for tying the ligature near the site of hanging.

(xii) Note the height of the support used for hanging, height of the anchor point and height of the victim.

(xiii) Support (table, chair, etc.) used for hanging should be checked for the presence of foot/shoe prints.

(xiv) Check whether door was closed from inside or outside. Rule out the possibility of bolting the door from inside while standing outside.

(xv) Entry and exit points and the support taken during commitment of crime should always be checked for the presence of fingerprints/footprints.

(xvi) Check for the presence of any suicide note at the crime scene.

(xvii) Crime scene should be thoroughly checked for the presence of any circumstantial evidence.

(xviii) Send the body of deceased for post-mortem.

3.9.3 Observations of the Body

(i) Face may be pale or may show signs of congestion.

(ii) Eyes open/closed/partially open/open on one side, eyes protruded/ normal with conjunctival congestion and hemorrhage.

(iii) Tongue may be swollen, slightly protruded out and bitten in between teeth.

(iv) Saliva trickles down from mouth along with the streaks of blood (seen on side opposite to the knot).

(v) Petechial hemorrhages can be seen on the face especially in eyes.

(vi) Neck may be stretched or elongated (in prolonged hanging and long drop).

(vii) Victim may expel urine and feces.

(viii) Seminal secretion can be seen in case of males and blood tinged fluid from vagina in females (which can be mistaken for sexual activity before death).

(ix) Post-mortem staining will be seen on hands, forearms, genitals, legs and feet if body suspension is in upright position.

(x) If body remains suspended for prolong duration (about 6–8 hours), petechial hemorrhage and ecchymosis can be seen in areas of post-mortem staining due to rupture of blood vessels.

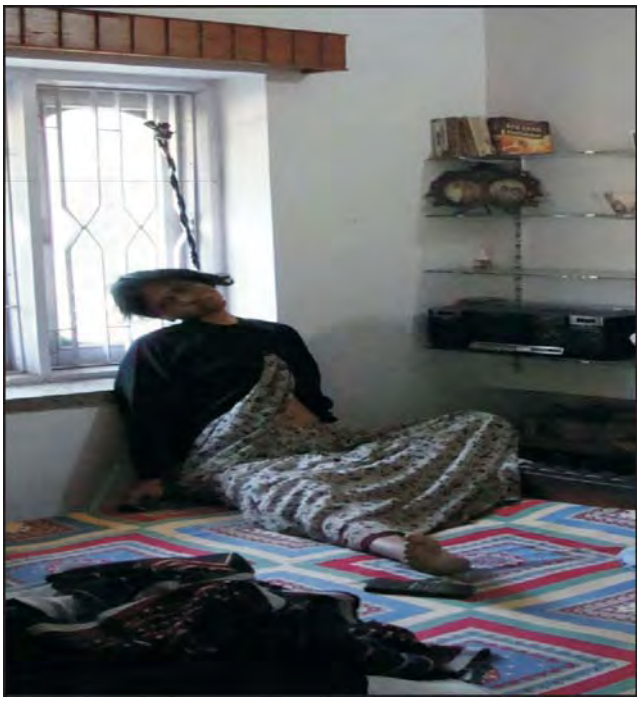


Figure 3.5: Partial hanging

3.9.4 Local External Findings

Ligature: Complete description of the ligature used should be noted including:

(a) Nature of ligature-rope, bed sheet, belt, dhoti, saree, etc.

(b) Texture-any particular pattern (like weaving pattern in ropes) present on the ligature.

(c) Circumference of the loop of ligature.

(d) Strength- is the ligature strong enough to support the weight and jerk of the body? Cases have been reported where ligature material gets broken if it is not able to bear the weight of the body.

(e) Tightness- how tight ligature is wrapped? Tight ligature produces deeper groove and impression of knot can also be seen.

(f) Any material on ligature- blood, vomit, saliva, hair, fiber, etc.

(g) Location of knot- at occiput, below chin, below ear or any other specific location.

(h) Type of knot-fixed or running.

(i) Check for the source of the ligature taken for hanging.



Figure 3.6: Body of the victim that has fallen down due to breakage of ligature

Ligature mark: It appears as parchmentized pressure abrasion which may be completely/ partially encircling the neck. It should be noted that this is not a fixed rule and variations can occur.



Figure 3.7: Deep groove ligature mark

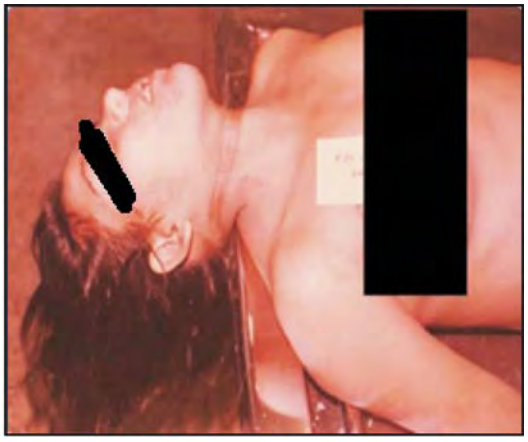


Figure 3.8: Broad ligature mark

(a) Ligature mark may show impression of material used.

(b) Nature of ligature mark may vary with nature of ligature material, duration of suspension, manner of tying the ligature and weight of the body.

(c) Position of ligature mark is usually in front of the neck but sometimes at the back of neck also.

(d) In fixed noose, inverted 'V' shape pattern is seen at knot area.

(e) In running noose, mark may not completely encircle the area and may be deficient at nape of neck or any other site (due to intervening hairs or clothes).

(f) Mark is always located above the thyroid cartilage.

(g) Ligature slippage can produce broader mark with narrow ligature material.

(h) Mark is most prominent at area of maximum pressure.

3.10 Periligature Injuries

(i) Tough ligature may produce rope burns (blisters) around ligature mark due to friction of ligature material.

(ii) Some scratch marks may be seen around the ligature mark occasionally. These may be produced by victim himself /herself in action to preserve life in terminal stages. These should not be mistaken for assault.

3.10.1 Evidence Material Likely to be Found at Crime Scene

(i) Points of entry and exit should be checked for the presence of finger prints/ footprints.

(ii) Presence of table, stool, bucket, box, etc., used for tying the rope to a fixed object.

(iii) Foot/shoe prints on the table, chair, stool, etc., used by the victim for hanging.

(iv) Streaks of saliva on the garments or on the floor.

(v) Any other stain present at crime scene or on the garments of victim.

(vi) Signs of struggle at the scene.

(vii) Surface of the anchor point (fan, beam, etc.) to which ligature is tied should be examined for any marks.

(viii) Any suicidal note.

(ix) Viscera should be sent for chemical analysis for presence of any drug, poison or chemical substance.

3.10.2 Collection and Packaging of Evidence Material

(i) Ligature from the site should be collected and packed in paper envelope.

(ii) Any stain (blood, semen, saliva vomit, etc.) present on the body of the victim or at the crime scene should be collected separately using cotton gauze swabs, air dried and packed in paper envelopes.

(iii) Small fibers may be found sticking to the ligature mark which is collected using an adhesive tape and secure those on glass slide and pack in paper envelope.

(iv) Each garment of the victim should be collected and packed separately in paper envelope.

(v) Foot/shoe prints should be traced and lifted using adhesive footprint lifter/electrostatic lifting device.

(vi) Fingerprints should be developed and lifted using appropriate methods.

(vii) Collect shoe/foot prints of the deceased as per requirements.

(viii) Suicide note if found should be packed in paper envelope.

Note**:** *All evidence materials collected from crime scene should be properly sealed and labelled including- name and number of exhibits, FIR No., u/s, name of Police Station, Case No., date and place from where exhibits are collected, name and signature of the investigating officer.*

3.10.3 Forwarding of Evidence Material

(i) Forwarding memo should be filled up giving brief history of the case, details of the parcels and their contents, nature of examination required (see Chapter 2 for details).

(ii) Certificate authorizing the Director, Forensic Science Laboratory, for examination of the exhibits.

(iii) Specimen of the seal impression in wax on a piece of cloth duly attested by the concerned official should also be sent along with forwarding memo.

3.10.4 Likely Queries to be Raised (may vary from case to case):

From Medico-legal expert

(i) Cause of death.

(ii) Whether hanging was suicidal or homicidal.

(iii) Whether hanging was ante-mortem or post-mortem.

(iv) Nature of other injuries, if present.

From Forensic expert

(i) Whether saliva stains/streaks are present on the garments of the deceased. If present, whether they belong to the victim.

(ii) Whether given sample stains are of blood/semen.

(iii) Species origin of the given sample stain and its grouping.

(iv) Whether fibers recovered from ligature mark matches with the ligature collected from the site.

(v) Whether remnants of fibers recovered from cutting tool matches with the fibers of the ligature material.

(vi) Whether the cut ends of the ligature and the ligature material matches with that of the ligature (rope, cord, etc., recovered from the place of occurrence or from the possession of suspect).

(vii) The writing on the suicide note tallies with the standard samples.

(viii) Whether foot/shoe prints collected from the scene match with that of the deceased.

(ix) Any drug, poison present in the viscera.

Table 3.2: Differences between hanging and strangulation

S. No.	*Features*	*Hanging*	*Strangulation*
1	Manner	Generally suicidal	Generally homicidal
2	Ligature mark	'V' shaped, oblique and fragmented, above thyroid cartilage (between lower jaw and larynx).	Circular, horizontal, continuous around the neck, below thyroid cartilage in the centre of the neck.
3	Face	Usually pale and petechiae rare	Congested, livid and marked with petechiae.
4	Struggle marks (neck and face)	Absent	Generally present
5	Blood oozing out from nose, mouth and ear	Rarely present	Frequently Present
6	Trickling of saliva	Usually Present	Absent
7	Injuries to the muscles of neck	Rare	Common
8	Fracture of the larynx and trachea	Very rare and that, too, in judicial hanging	Often found; also hyoid bone

Table 3.3: Differences between ante-mortem and post-mortem hanging.

S. No.	*Features*	*Ante-Mortem Hanging*	*Post-Mortem Hanging*
1	Ligature mark	Show vital reaction. Tissues under mark are dry, hard and parchment like.	No such reaction and appreciable change.
2	Salivary dribbling mark	May be present	Absent
3	Cyanosis	Seen, particularly in nails, face, ears, lips etc.	Not seen
4	Petechial haemorrhages on face, eyes, ears	May be present	Absent

S. No.	*Features*	*Ante-Mortem Hanging*	*Post-Mortem Hanging*
5	Tongue position	Protruded (may be in between teeth)	Not protruded
6	Faecal and urinary expulsion	Present	Absent
7	Post-mortem lividity	On legs, soles, hands (if hanged for sufficient time and not removed immediately after hanging)	If body hanged soon after death post-mortem lividity is same as in ante mortem. And if body is suspended 8hrs after death then it is fixed in respective position
8	Struggle marks	No	May be present
9	Cause of death	Hanging	Other than hanging
10	Suicide note	Present/Absent	Present/Absent
11	Doors close from inside	Generally yes	Never
12	Overturned stool or chair, etc., below feet	Generally present	Generally absent

Case Study 5

Husband and wife (as shown in the Figure 3.9), were found hanging from the ceiling fan with a single piece of a rope. Head of the wife was on the right shoulder of husband. The neck of the wife had two rounds of rope whereas husband had four rounds of rope around his neck. A sliding knot was tied on the ceiling fan and the rope was double folded. Both the bodies were in partially hanging position near the double bed. The distance between the knot tied over the fan and the knots around the neck was approx. 63 inches. Tongue of wife was protruding out and in between the teeth. Urine was passed out and dribbling of saliva present in both the cases.

Inference: The manner in which the rope was tied clearly showed that the husband had tied his wife first and then hanged himself with the same rope. The posture and position of feet of wife and posture of husband were suggesting that the husband tied rope around her neck first and then around his own neck while standing on the bed and pushed her for the jerk. The order of rounds of the rope also indicated the same. There were no signs of any injuries on both the bodies. The post-mortem report suggested the cause of death as asphyxia due to hanging.

Source: Dr. Neelam Arya, FSL, Haryana



Figure 3.9: Case of double hanging

3.11 Strangulation

Strangulation is a type of mechanical asphyxia due to constriction of neck, when the constricting force is other than the weight of body. In ligature type homicide/strangulation, ropes, wires, pieces of clothing are used; these ligatures would leave an obvious groove on the victim's throat resembling the mark on the neck found in hanging cases. Medico legal expert may tell the investigator whether the mark left on the throat by the hands of assailant was created from rear or from the front of the victim. In homicidal strangulation damage to the internal structure of the neck, throat and larynx will be evident during autopsy. Strangulation is mostly homicidal, sometimes accidental and rarely suicidal.



Figure 3.10: Strangulation using multiple ligatures

3.11.1 Crime Scene Investigation

On reaching the crime scene, IO should:

(i) Check whether the victim is *dead or alive*.

(ii) If the victim shows any sign of life, provide necessary medical help and rush the victim to the hospital.

(iii) If the victim is dead, take photographs of the victim and place of occurrence from different angles and distances as per requirements to record the details of the scene including the body with scale in frame for reference.

(iv) Prepare crime scene sketch showing the dead body and other items depicting their correlative positions including distances between them.

3.11.2 Observations on the Body

(i) Presence of fresh abrasions, bruises, finger nail marks on the throat of the victim indicating homicidal strangulation.

(ii) Signs of struggle and violence found on different parts of the body.

(iii) Presence of petechial hemorrhages (minute blood clots which appear as small red dots) in the inner surface of the eye lids. This is presumptive evidence for strangulation.

(iv) Evidence of any trauma or damage to the tongue. Many times persons who are strangulated will bite their tongue.

(v) If strangulation is due to rope, circular and complete ligature mark could be seen in the lower part of neck.

(vi) Appearance of the victim: blue swollen face, eyes open, dilated pupils, blood-stained froth from nose and mouth, swollen tongue between teeth, clenched hands are common symptoms.

(vii) Discharge of urine and fecal matter due to relaxation of muscles.

(viii) If fingers are used (throttling), marks of pressure by thumb (higher and wider on one side of the neck) and fingertips (on other side obliquely downwards and outwards) are found on either side of neck.

(ix) Ligature mark- well defined, slightly depressed corresponding roughly to the breadth of the ligature used. Though marks disproportionate to the width of the ligature can be found in case of slippage of ligature during struggle by victim.

(a) Usually situated low in the neck below the thyroid cartilage, encircling the neck horizontally.

(b) Marks are multiple if ligature is twisted several times around the neck.

(c) Mark can be oblique as in case of hanging if the victim was strangulated from behind and backward and upward force was applied.

(d) Pattern of ligature may also be seen.

(e) Abrasion and ecchymosis are very often present in the skin near the mark.

(f) If very soft materials like stockings, scarf is used as ligature, then mark may not be present or may be very faint.

(g) Careful search of neck may reveal minute fibers or any other material from ligature which can be lifted using adhesive tape.

3.11.3 Evidence Materials Likely to be found at Crime Scene

(i) Strands of hair/fiber in the hands of deceased.

(ii) Minute fibers from the ligature mark.

(iii) Any tears, holes, stab, stains on the clothes of the victim.

(iv) Finger prints, foot/shoe prints at the crime scene.

(v) Buttons, broken pieces of glass bangles, or any other belonging to victim/suspect.

(vi) Any gagging material.

(vii) Ligature material.

3.11.4 Collection and Packaging of Evidence Materials

(i) Hair/fiber strands should be collected using forceps or adhesive tape and packed in paper envelope.

(ii) Blood stain, if present, should be collected on cotton gauze cloth, air dried and packed in paper envelope.

(iii) Although ligature mark may look clean, there are always small fibers sticking to the ligature mark. Collect them using an adhesive tape, secure them on glass slide and pack in paper envelope.

(iv) Each garment of the deceased should be collected and packed separately in paper envelope.

(v) Fingerprints developed from the suspected places should be photographed, lifted using adhesive tape and preserved by mounting the tape on a fingerprint card to avoid its damage.

(vi) If the latent prints cannot be developed due to any reason at the place of occurrence, the article may be packed in strong cardboard or wooden boxes so that the prints are not destroyed during transit to finger print laboratory.

(vii) Foot/footwear prints or impression should be photographed placing scale along with it and collected using appropriate method (electrostatic lifting, tracing, making castes).

(viii) Gagging material (if present), torn buttons, broken bangles, etc., should be collected and packed separately in paper envelopes.

3.11.5 Forwarding of Evidence Materials

(i) Forwarding memo should be filled up giving brief history of the case, details of the parcels and their contents, nature of examination required (see Chapter 2 for details)

(ii) Certificate authorizing the Director, Forensic Science Laboratory, for examination of the exhibits.

(iii) Specimen of the seal impression duly attested by the concerned official should also be sent along with forwarding memo.

3.11.6 Likely Queries to be Raised (may vary from case to case):

From Medico-legal examiner

(i) Cause of death.

(ii) Whether strangulation was suicidal or homicidal.

(iii) Whether hanging was ante-mortem or post-mortem.

(iv) Nature of injuries if present.

(v) Whether the mark left on the throat by the hands of assailant was created from rear or from the front of the victim.

From Forensic expert

(i) Whether footprint/finger print lifted from the scene matches with the specimen samples.

(ii) Whether hair/fiber collected from the scene matches with the specimen samples.

(iii) Whether blood collected from the scene matches with the suspect's/victim's sample.

Table 3.4: Differences between hanging and strangulation

S. No.	*Features*	*Hanging*	*Strangulation*
1	Manner	Generally suicidal	Generally homicidal
2	Ligature mark	'V' shaped, oblique and fragmented, above thyroid cartilage (between lower jaw and larynx)	Circular, horizontal, continuous around the neck, below thyroid cartilage in the centre of the neck.
3	Face	Usually pale and petechiae rare	Congested, livid and marked with petechiae.
4	Struggle marks (neck and face)	Absent	Generally present
5	Blood oozing out from nose, mouth and ear	Rarely present	Frequently Present
6	Trickling of saliva	Usually Present	Absent
7	Injuries to the muscles of neck	Rare	Common
8	Fracture of the larynx and trachea	Very rare that too in judicial hanging	Often found also in hyoid bone

Case Study 6

Dead body of a property dealer aged around 50 years was found lying in sofa in his office room. There were multiple rounds of a telephone wire encircling the neck of the deceased horizontally and one round between the jaws. There were abrasions below the neck and on the wrist of the deceased. Few strands of hair were found entrapped on the ring of the deceased. Two glass tumblers, a water bottle having about 200 ml. water and an empty liquor bottle were found on the table. On the floor of the room several faint-dusty footwear impressions were seen. During the post-mortem, viscera sample was preserved for chemical analysis and ligature material, garments of the deceased and strands of hair entrapped in the ring of deceased were taken. All the evidence material (glass tumblers, bottles, and shoeprints) collected from crime scene and taken from the body were sent to Forensic Science Laboratory. During investigation, one suspect was apprehended and a cut piece of telephone wire was recovered from his house. His shoes and garments were seized; fingerprints and saliva sample (for DNA matching) were taken and sent to FSL.

RESULT: The shoe print found at the place of occurrence tallied with the prints of the shoes of the accused. Fingerprints found on the bottles and one of the tumbler matched with that of the accused. Cut ends of the telephone wire were found matching, showing that the accused had brought the telephone wire along with him from his house. DNA profile generated from the tissues of hair roots matched with the DNA profile generated from the saliva cells of the accused.

Source: Dr. M.K. Goyal and Dr. K.P.S. Kushwaha, FSL, Haryana

3.12 Drowning

Drowning is a form of asphyxia caused by entering of fluid into air-passage, caused by complete or partial submersion in water or any other liquid. In drowning, respiratory passages are filled with fluid medium, thus, interfering with the person's capacity to breathe.

3.12.1 Types of Drowning

(i) **Wet drowning**—-Water is inhaled which results in respiratory blockage and death can occur within minutes of submersion. It can be fresh water drowning or salt (sea) water drowning.

(ii) **Dry drowning**— In this, minimal or no water is inhaled into respiratory passage. Death may occur due to cardiac arrest, laryngeal spasm preventing further entry of water as well as air into the lungs. Commonly seen in children and adults under influence of alcohol, sedatives or hypnotics.

When the victim shows an apparent initial recovery from drowning and dies hours or days after the incidence owing to complications of drowning episode, it is termed as *secondary drowning*. When the victim survives at least 24 hours after the event, it is referred to as *near drowning*.

3.12.2 Crime Scene Investigation

The IO should:

(i) Check whether the victim is *dead or alive*.

(ii) If the victim shows any sign of life, provide necessary medical help and rush the victim to the hospital.

(iii) The place of occurrence should be protected to avoid any alteration at the scene.

(iv) If the *victim is dead*, take photographs of the victim and place of occurrence from different angles and distances as per requirements to record the details of the scene including the body.

(v) Prepare crime scene sketch showing the dead body and other items depicting their correlative positions including distances between them.

(vi) Team of forensic experts or medico-legal experts should be called for scientific evaluation of the scene.

3.12.3 Observations on the Body

The following observations should be made which depends upon duration of submersion, environmental factors and condition of the individual:

(i) Condition of the clothes may be wet or dry, small aquatic animals may be found adhering/trapped into the clothes.

(ii) Body may appear pale and cold due to contraction of cutaneous blood vessels.

(iii) Face may show cyanosis, congestion, show petechial hemorrhage especially in lower eyelids, pupil dilated, foam or froth (fine, white, leathery, tenacious, copious) coming out of the mouth and nostrils. After mopping, the froth appears again.

(iv) Tongue may be swollen and protruded.

(v) Goose skin (granular surface of skin) is characteristic feature of ante-mortem drowning or when body is thrown into water within 2–3 hours of death.

(vi) Head, neck, front of upper chest, distal parts of limbs may show post-mortem lividity which may be pink in colour. It may not appear if water is running.

(vii) Skin at the areas like feet and hands becomes whitened, swollen, wrinkled and corrugated (*washer women's effect*). These changes signify only the submersion in water.

(viii) Grass, weeds or any other material firmly gripped in hands due to cadaveric spasm.

(ix) *Ante-mortem* and *post-mortem* injuries may be found on the body due to predatory animals and birds or striking with other objects.

3.12.4 Evidence Material Likely to be found at Crime Scene

(i) Water sample from site of drowning.

(ii) Any material present in the clenched hands of the victim.

(iii) Clothes and other belongings of the victim.

(iv) Blood sample from the left side of the heart should be collected during post-mortem by the doctor for diatom analysis. If left side is empty, then blood laden tissues from left side of heart should be collected.

(v) For detection of poison, blood from right side of the heart should be collected separately. Both the samples should be marked properly indicating right and left side of heart.

3.12.5 Collection and Packaging of Evidence Materials

(i) About 2 liters of water sample should be collected from the crime scene and packed in air tight container.

(ii) Material collected from the hands of the deceased should be air dried in shade and packed in paper envelope.

(iii) Clothes of the victim should be collected, air dried and packed in paper envelope.

(iv) Blood during post-mortem should be collected in airtight container and EDTA should be added as preservative.

(v) Viscera should be sent for the chemical analysis for presence of any drug.

Note: *All evidence material collected from crime scene should be properly sealed and labelled including- name and number of exhibits, FIR No., u/s, name of Police Station, Case No., date and place from where exhibits are collected, name and signature of the investigating officer.*

3.12.6 Forwarding of Evidence Materials

(i) Forwarding memo should be filled up giving brief history of the case, details of the parcels and their contents, nature of examination required (see Chapter 2 for details)

(ii) Certificate authorizing the Director, Forensic Science Laboratory, for examination of the exhibits.

(iii) Specimen of the seal impression duly attested by the concerned official should also be sent along with forwarding memo.

3.12.7 Likely Queries to be Raised (may vary from case to case):

From Medico-legal expert

(i) Cause of death.

(ii) Whether the drowning was ante-mortem or post-mortem.

From Forensic expert

(i) Whether diatom profile generated from crime scene sample (water) matches with the diatom profile of the sample (blood, bone) collected form deceased during autopsy.

(ii) Whether viscera sample contains any kind of drug/poison.

Case Study 7	
A male body was seen stuck under the bridge of a river by the villagers and the police was informed. The IO, with the help of local people, took out the body. The body was decomposed to the extent that it could not be identified. Few fragments of water plants were found clenched in the fist of the body. Photographs were taken. Two litres of water sample was collected from the site. Body was sent for post-mortem. During post-mortem, one femur bone was taken. The water sample and femur bone were sent to FSL for diatom examination and DNA profiling. Result: Fifteen different types of diatoms were detected in the bone marrow of femur	indicating ante-mortem drowning. However, the diatom profile of the bone marrow and that of the water sample did not match indicating that the drowning took place at some other site upstream. FSL findings helped in ascertaining that it was ante-mortem drowning. DNA profile helped in the identification of deceased. During investigation of the case, the IO gathered information about two missing persons from the area about 100 km. upstream. Reference blood samples were taken from the blood relations of the missing persons and body was identified, based on DNA profiling match.

Source: Dr. K.P.S. Kushwaha, FSL Haryana.

References

1. Anil Aggarwal, *Textbook of Forensic Medicine and Toxicology*, New Delhi, 2014.
2. A.K. Bapuly, *Forensic Science: Its Application in Crime Investigation*, Hyderabad, 2006.
3. A.S. Deoskar, *Medical Jurisprudence, Toxicology and Forensic Science For Class Room, Investigation and Court Room With Case Laws*, Nagpur, 2014.
4. B.V. Subhrahmanyam, Modi's Medical Jurisprudence and Toxicology, India, 2004.
5. *Crime in India 2013 Statistics*, National Crime Records Bureau, Ministry of Home Affairs, New Delhi.
6. Kumar J.V. Kiran, A.K. Srivastava, 'Pattern of Injuries in Fall from Height', Original Research Paper, Indian Academic Forensic Med. vol. 35.
7. M.B. Rao, *Hand Book on Forensic Science for Police Officers*, Hyderabad, 2008.
8. Vernon J. Geberth, *Practical Homicide Investigation- Tactics, Procedure, And Forensic Techniques*, Washington. D.C.,1996.

9. http://uphealth.up.nic.in/med-order-14-15/med2/sexual-vil.pdf

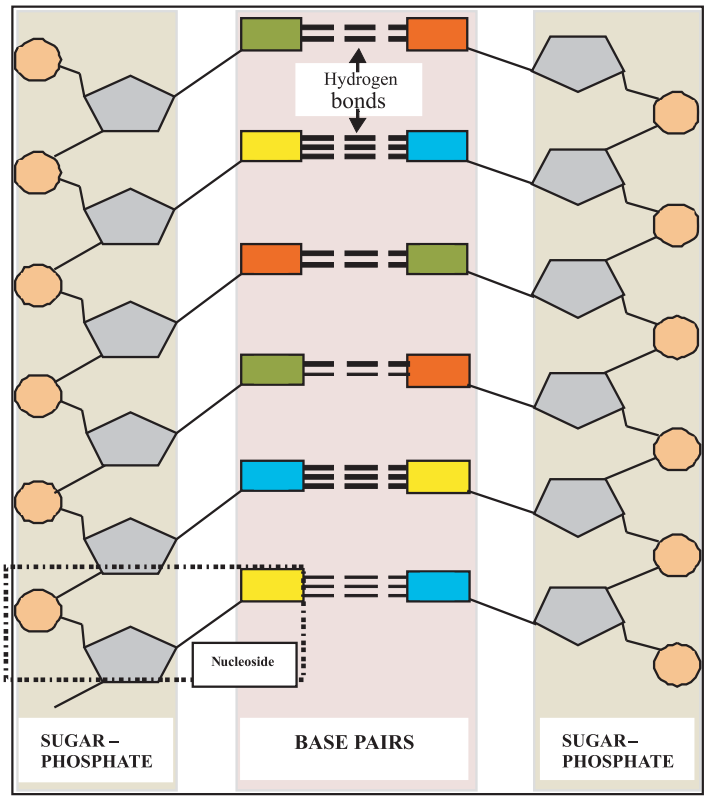
10. http://delhi.gov.in/wps/wcm/connect/2b456f804de381eb9840d96c28b72f2a/scannew_opt.pdf?MOD=AJPERES&lmod=1136310469&CACHEID=2b456f804de381eb9840d96c28b72f2a

11. Photographs courtesy: Dr. Neelam Arya FSL Haryana; Dr. V. Dhankar Professor and Head Dept. of Forensic Medicine Dr. BRA Hospital, Delhi; A.K. Bapuly FSL Odisha; Dr. Bharat Singh former Additional Director (General) of Health Services Government of India; Dr. Parshuram FSL NCT Delhi; Superintendent of Police, Kancheepuram Dist. (Tamil Nadu); Superintendent of Police, Gangtok.

4 DNA PROFILING

DNA profiling (earlier called 'DNA fingerprinting') was introduced in 1984 by British geneticist Alec Jeffrey. It was first used in catching and convicting Colin Pitchfork who raped and murdered two girls, one in 1983 and another in 1987. Since then, the science of DNA profiling has undergone developments and it will continue to do so in the future. It has now become a routine test in any forensic setting, and is in great demand in the process of criminal investigation and administering justice in criminal cases and civil disputes. Due to the extensive validation studies and challenges in courts, DNA is now considered a gold standard in forensic science.

DNA (deoxyribonucleic acid) is the hereditary material in humans, animals, other organisms, bacteria, viruses and plants. DNA located in the cell nucleus is called nuclear DNA, and DNA present outside the cell nucleus in the mitochondria is called mitochondrial DNA (mtDNA). Both these DNAs are used in criminal investigations. The cell nucleus in our body contains approx. 6 ft. DNA strand in the form of double stranded twisted ladder. The arm of this genetic ladder is made of only two molecules sugar and phosphate alternatively arranged. The sugar on both sides of the ladder is connected by four chemical units namely A (adenosine), T (thymine), G (guanine), C (cytonine), where A pairs with T and G pairs with C only.



Legend to Figure 4.1



Figure 4.1: Schematic arrangement of chemical units in the DNA strands
Courtesy: Prashant Kalikotay (student, LNJN NICFS, Delhi)

Extensive research on human population groups have revealed that assembly of 3/4/5/6 or 7 chemical units of AGCT (in any sequence) are repeated a number of times at thousands of sites on our DNA strand. These numbers of repetition of small fragments of DNA are called Short Tandem Repeats (STRs). Initially 13 loci (sites) were selected and validated for use in forensic science and presently the number of these has increased up to 23 STRs sites. However, most of the forensic laboratories are using 16 marker multiplex kits. The power of discrimination of DNA profile using even 13 markers is so high that the probability of another person having the same DNA profile is negligible. The forensic DNA profiling has been standardized to ensure that the same core set of DNA loci are examined between jurisdictions, states and countries. This allows national and international sharing of the DNA profiling database.

The latest innovation in the technology is the launching of a machine, Rapid 200 which is capable of generating DNA profile from samples in 90 minutes. This equipment runs with two cartridges, one of which is for DNA isolation and the other one is for genotyping.

4.1 Overview of the DNA Testing Process

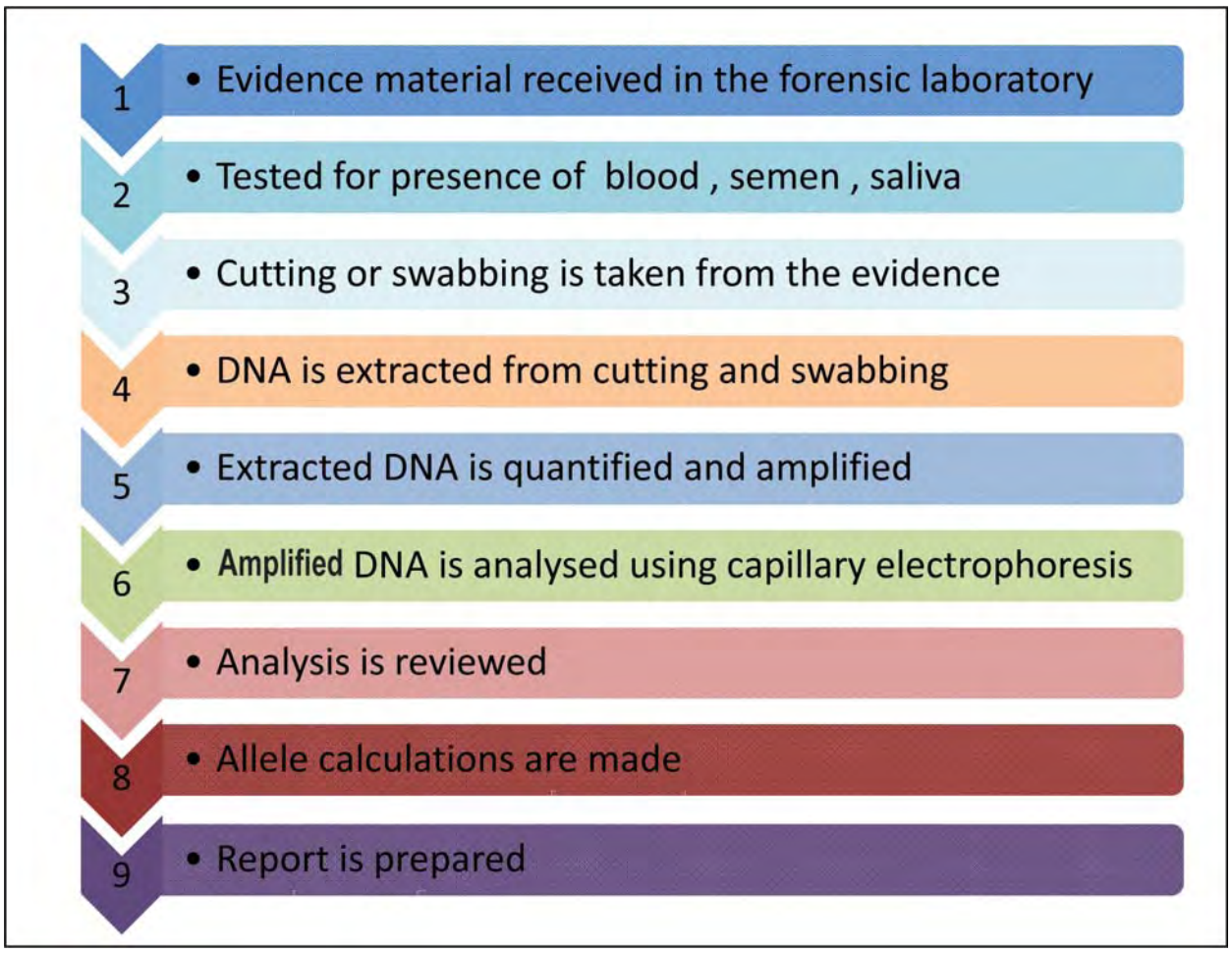


Figure 4.2: Steps involved in DNA profiling

As shown in Figure 4.2, on receipt of the biological samples for DNA profiling in the laboratory, first the samples are tested for their identification i.e. whether blood, semen, saliva, etc. are present on the evidence material received. The second step is to extract DNA from the evidence material. The DNA extracted is then quantified and the target loci (sites) are amplified (molecular Xeroxing) using polymerase chain reaction (PCR) which is carried out in a small machine called thermal cycler. The amplified products are loaded in to the capillaries of DNA sequencing machine which separates and identifies the STR fragments. The results are reviewed, calculated and finally report is prepared.

DNA can be extracted from:

- Blood/semen/saliva and their stains on any surface.
- Organs and tissues including soft tissues like liver, kidney, spleen, gonad, etc.

- Bones and teeth
- Hair (with root)
- Nail clippings
- Hair shaft contain mt DNA
- Urine and fecal matter
- Sweat, tears, ear wax, finger print (touch DNA)
- Skin and muscle tissues
- Dandruff
- Samples of plant origin
- Microorganisms
- Vaginal cells transferred to the outside of a condom during sexual intercourse
- Tobacco spits
- Cigarette/*bidi* stub
- Chewing gum
- Successful STR typing has been reported from dental pulp exposed to 300°C. and for mtDNA typing up to 500°C.
- Long bone fragment burnt at 800°C and thigh skeletal muscle at 900°C.

Table 4.1: DNA content of different types of tissues

Tissue Type	*Quantity of DNA Present*
1 Sperm	3 Pico gram
1 Blood cell	6 Pico gram
1 Plucked hair	300 Nano gram
1 Shed hair	10 Nano gram
1 Drop blood	1500 Nano gram
1 mg Liver	15 Microgram
1 mg Muscle	3 Microgram

Source: *Gene Detection Systems & Reagents*, 2005

Note: *Optimum quantity required for STR analysis is 1 nano gram; however, 0.5 nano grams can serve the purpose with improved techniques.*

4.2 Application of DNA in Forensics

(a) Criminal cases

- Blood, semen, saliva, bone, hair, and other body tissues encountered in physical and sexual assaults, murder, accident, concealment of birth.
- Identification/restoration of kidnapped/exchanged babies.
- Identification of babies born out of wedlock or sexual assault.
- Identification of mutilated bodies in mass disaster cases, when conventional method of identification fails.
- Identification of plant materials and microbes.
- Identification of species of biological evidence material in poaching cases.
- In linking cases e.g. different rape cases–serial rapist.
- Soil microbial DNA profile represent the site of collection-proves a link between suspects and crime scene.

(b) Civil cases

- Determination of paternity/maternity
- Inheritance cases
- Immigration cases

4.3 Documentation, Collection, Preservation, Packaging and Forwarding of Evidence Materials for DNA Profiling:

Any DNA evidence material recovered from a scene of crime or taken from relevant donor should be properly documented observing all legal formalities prior to collection. Improper documentation may raise questions on the origin and authenticity of the evidence.

DNA profiling result obtained from evidence material depends on proper collection, preservation and packaging, as there are chances of cross contamination and deterioration of the evidence material. Therefore, following guidelines should be adopted for proper collection, preservation and packaging of evidence materials.

Table 4.2: Guidelines for proper collection, preservation and packaging of evidence materials

Sample	*Condition*	*Location/ Source*	*Collection, Preservation and Packaging*	*Transportation*	*Precautions*
Blood	Liquid	Living person	In EDTA tube (2–5 ml.) in duplicate or on FTA card	Liquid blood sample must be kept in thermos flask or thermocol box filled with ice/coolant pack and transported at the earliest to the lab preferably within 24 hours	Use disposable syringe for collection of blood into EDTA tubes
	Liquid	Dead person/ autopsy sample	In EDTA tubes (2–5 ml.) or on FTA card direct from cardiac puncture		
	Liquid	Crime scene	In EDTA tube using syringe or dropper or transfer on cotton gauze cloth, air dry and keep in paper envelope or collect on FTA card		
	Wet cloth	Crime scene	Collect in sterile tube and add equal volume of normal saline or transfer clot onto cotton gauze cloth, air dry and keep in paper envelope		Handle fabrics/ clothes as little as possible. Never use direct sunlight, hot air blower, heater to dry the stains
	Wet	Clothing from the crime scene, victim's and suspect's	• Thoroughly air dried at room temperature • Roll in clean paper or brown paper sheet separately	Must be submitted in the laboratory without any delay	

			• Pack in paper bag/envelope or cotton bag		
	Wet	Objects	Thoroughly air dried at room temperature. Pack the items in paper bag/envelope or cotton cloth as such depending on the size of the object		Never try to pack the clothes dry or wet in air tight container or polythene bags Always document the stain pattern by sketching, photography or videography before removing them Never mix blood scrapings. Collect scraps of different spots in separate packets/envelopes Never make swab of stains at different place by single cloth. Collect swabs of different spots separately, dry it in shade and pack in separate packets/envelopes Never forward loaded firearms. If forwarded 'loaded' should be mentioned on it Pack bullets/pellets with sufficient padding to avoid any rattling
Dried bloodstain, semen stain, vomit, sputum and other body fluid stains	Crust/stain/ spatters	Crime scene or unmovable surface, floor, wall, etc.	Scrap the crust onto paper with scalpel and pack it in paper envelope or transfer onto a moistened clean cotton gauze cloth by rubbing against the stain, air dry and pack in paper envelope. Collect control blank from adjacent area	Must be submitted in the laboratory without any delay	
	Stain	Weapon/fire arm/bullet. Small objects as house hold utensils, stones, bricks, etc.	Allow the stains to dry and collect the item directly. Pack and seal in cotton cloth	Must be submitted in the laboratory without any delay	
	Stain	Vehicle upholstery, carpet, wallpaper, wood, etc.	Cut out the stained area. Allow to dry in shade. Pack each cutting separately. Also collect an unstained cutting as a control from adjacent area	Must be submitted in the laboratory without any delay	
Semen	Liquid	Victim	Collect the samples with sterile cotton cloth/swab, air dries the swab and pack in paper packet/envelope	Must be submitted in the laboratory without any delay	
	Liquid	Object, crime scene			
Vaginal/ anal/oral swabs	Stain	Victim	Request the concerned medical officer to air dry the swabs completely and pack preferably in paper envelope or		

			in sterile glass vial. Also request medical officer to prepare smear slide from the swab and forward both		Air dry the swab thoroughly and pack, preferably in paper envelope or in sterile glass vial
Tissue/ organ/ fetal remains	Wet/semi dry	Dead body fragmented or mutilated remains at crime scene or place of recovery	Tissue/organs/viscera should be placed in a clean container having normal saline	Must be submitted in the laboratory without any delay. While transporting the exhibit containers must be kept in thermocol box stuffed with ice/coolant pack	Never add any fixatives like formalin. Samples must be packed separately
Bones/ teeth	Wet/semi dry/dry	Dead body/ crime scene or place of recovery	Clean and wash the bones/teeth to remove any debris. Allow it to dry completely in air. Roll/pack in brown paper envelope and seal in cotton cloth	Must be submitted in the laboratory without any delay	Send at least two intact bones. order of preference for sending intact bones should be: Femur, tibia, humerus, teeth (molar), ribs Completely burnt bones are not useful for DNA
Hair with root	Dry or wet with blood, semen, saliva	Crime scene, weapon, victim/ suspects body and clothing	Collect with the help of tweezers/forceps and pack in paper envelope. If found attached in dry blood, weapon, etc., do not remove the hair rather entire substrate should be packed intact. If the object is small, mark and wrap the object with clean brown paper and pack the object in cotton cloth. Collect reference samples from the victim and suspect. 50–100 strands of hair should be collected and forwarded	Must be submitted in the laboratory without any delay	If wet, allow hair to dry in shade. In rape cases, the victim or the suspect should be made to stand on clean white sheet during medical examination and their pubic region should be combed Never wash the recovered hair

Source: *FSL Bulletin Forensic Science Laboratory*, vol. ii, no. iv, June 2008.

Notes:

- *Maternity/paternity dispute cases: Blood samples of mother, child, and suspected biological father are required.*
- *Identification of deceased/unidentified body, human remains: If available blood samples of nearest relations such as mother, father, brother, sister, children are required along with the unidentified remains.*
- *When collecting samples from dead body, the samples should be collected in order of preference mentioned as under. At least two different types of samples should be collected. Always collect samples from dead body in duplicate.*
- *Two vials of 2–5 ml. blood collected directly from heart (cardiac puncture) in EDTA vials.*
- *In cases where no liquid blood is available, section of liver or deep skeletal red muscles (50–100 g.) should be collected in two separate containers having normal saline solution.*
- *Intact long bones and teeth in the following order of preference:*
  i. *Femur*
  ii. *Tibia*
  iii. *Humerus*
  iv. *Teeth (preferable molar)*
  v. *Ribs*
- *Identification of rapist in sexual assault cases: Exhibits collected from the victim during medical examination (garments, vaginal/anal/oral swabs, slides, etc.) along with blood sample of the victim and suspects are required.*

Table 4.3: Do's and Don'ts for collection, preservation and packaging of evidence materials for DNA profiling

Do's	Don'ts
To establish identity of deceased from skeletal remains, always collect intact long bones (femur, humerus)/molar teeth in duplicate.	Never prefer to collect the clavicle bone.
Preserve tissue, fetus and other similar samples in 0.9 per cent DNS and keep it in refrigerator for a short period if there is any delay in completing legal formalities for forwarding the sample to the laboratory.	Never use formalin to preserve tissues and bones.
Liquid blood with EDTA in sterile vials and container having tissue, fetus and other similar samples should be kept in thermos flask/ thermocol box stuffed with ice/coolant packs.	Never send such samples without ice/coolant pack.
Always wrap stained clothes and fabrics in paper sheet after completely drying and pack in cotton cloth or aerated container.	Do not pack clothes/garments, stains and swab in wet condition.
If there is more than one sample, pack them separately.	Never dry stains, swabs in direct sunlight, by use of heater, hot air blower, etc.
Always take two or more types of samples in duplicate from a corpse.	Do not send completely burnt/broken bones, burnt or singed hair.
Always use paper bag as packing material for biological evidence.	Never use polythene bag as packing material for biological evidence.

References

1. *FSL Bulletin Forensic Science Laboratory, Haryana*, vol. II, no. IV, June 2008.

2. John M.Butler, *Forensic DNA Typing Biology, Technology and Genetics of STR Markers*, London, 2005.

5 BLOODSTAIN PATTERN

Bloodstain pattern analysis is an useful forensic tool used in crime scene investigations and has been used informally for centuries. However, the first modern study of bloodstains was done in 1895 by Eduard Piotrowski. The study described the formation, form, direction and spreading of bloodstains resulting in blunt trauma at the head. In 1954, Samuel Sheppard was convicted for the brutal murder of his pregnant wife, Marilyn Reese Sheppard, at their home in a village in Ohio. He spent almost a decade in prison. Then a retrial was ordered and he was acquitted in 1966 based on blood spatter evidence report of Dr. Paul Kirk who was able to establish the relative positions of the attacker and the victim when the assailant struck the victim. The report also pointed that the assailant struck the victim with his left hand. This case on which the movie 'The Fugitive's' based is one of the earliest instances of the legal system recognizing the importance of blood spatter analysis. Different kinds of analysis are used on the blood at a crime scene, but care must be taken to handle it properly and to prevent putrefaction. Photos and notes should be taken before any blood is lifted. Samples should not be exposed to heat, moisture or bacterial contamination, because this shortens the survival time of proteins, enzymes, antigens and DNA markers.

5.1 Bloodstain Pattern Analysis:

It is the examination of the shapes, locations and distribution patterns of bloodstains. This is done in order to provide an interpretation of the physical events which gave rise to their origin.

The study of bloodstain pattern to reconstruct details of activities at the scene of violent crime has recently emerged as a recognized forensic skill.

Some of the terms used for describing and interpreting the bloodstain pattern are given below:

Angle of impact: It is the angle at which a blood droplet strikes a surface.

Arterial spurts: These are large patterns created under pressure, but with less volume and usually more distinctive evidence of blood pressure rising and falling.

Arterial gushing: The large pattern of blood that is created when blood escapes an artery under pressure is arterial gushing. In this the increase and decrease in blood pressure is apparent as shown in Figure 5.1.



Figure 5.1: Bloodstain resulting from arterial gushing

Clot: A mass of blood and other contaminants caused through clotting mechanisms.

Cast-off stains: Blood that has been thrown from a secondary object (weapon or hand) onto a target other than the impact site.

Drop Patterns: Characteristic patterns present when blood drips into standing wet blood.



Figure 5.2: Dripping pattern of blood

Expiratory blood: Blood which is spattered onto a target, as a result of breathing. This occurs when an injury is sustained to the throat, mouth or airway.

Impact site: It is usually the point on the body that received the blow or applied force, from which the blood was shed.

Origin: The point in space where the blood spatter came from.

Parent drop: The droplet from which satellite spatter originated.

Projected blood: Blood under pressure that strikes a target.

Satellite spatters: Small drops of blood that break off from the parent spatter when the parent droplet strikes a target surface.

Shadow or Void: When some object comes in the path of blood flow/spatter and target object remains unstained due to the presence of the object, the area which remains unstained is called void or shadow. If the object has been removed after the incident of blood spattering/ flow, the shape of void indicates the shape of the object which obstructed the staining of target surface.

Skeletonized stain: The pattern left when an object moves through a partially dried stain, removing part of the blood, but leaving the outline of the stain intact.

Spatter: Bloodstains created from the application of force or energy to the area where the blood is present.

Spines: The pointed edges of a stain that radiate out to form the spatter.

Splash: Pattern created when a volume of blood in excess of 1 ml. strikes a surface at a low to medium velocity.

Swipe: The transfer of blood onto a target surface by a bloody object that is usually moving laterally.

Transfer pattern: The pattern created when a wet, bloody object comes in contact with a target surface, leaving a pattern that has the features of the object making it useful for identifying the object.

Target: The surface where the blood ends up.

Wipe: Pattern created when a secondary target moves through an existing wet bloodstain on some other object.

5.2 Basics of Formation of Bloodstain Pattern

(i) When blood leaves the body as a liquid, it follows the laws of motion and gravity. The blood drops behave in predictable ways when they strike a surface or a force acts upon them.

(ii) Blood begins to clot after it leaves the body (clotting can occur within 15 minutes). Hence, if some blood spatters are found more clotted than others, it can indicate that multiple blows or gunshots occurred over a period of time. This can help in the reconstruction of a crime.

(iii) Blood spatters can also contain bits of tissue and bone. The type of tissue can help to determine the location and severity of the injuries sustained.

(iv) Blood may be dripped out, sprayed from an artery, oozed out through a large wound, or flung off a weapon raised to strike another blow. Blood trails are created, either in the form of smears when a bleeding body is dragged (as shown in Figure 5.3) or in droplets when it is carried. Trails are also formed when a person is wounded and walks away leaving bloodstains along the way.

(v) The shape of the stain can illustrate the direction in which it was travelling and the angle at which it struck the surface.

(vi) The site of origin from which a bloodshed event occurred can be determined.



Figure 5.3: Bloodstained drag marks

(vii) Breaking of a blood drop on impact with a surface is directly related to the texture of the surface. On a smooth surface, such as glass, stain with clean edges and shapes

of proper proportion will be formed (as shown in Figure 5.4). A rough surface, like concrete, will break the drop irregularly and generate a stain with irregular margin (as in Figure 5.5).



Figure 5.4: Blood drop on smooth surface



Figure 5.5: Blood drop on rough surface

(viii) Blood spurting from arteries may provide information about the location and severity of the injury, position of the victim when the injury was inflicted and any subsequent movement by the injured person. If the person was in motion when the blood leaked or spurted, or if the drops flew through the air and hit an angled surface, the drops generally look like stretched-out exclamation marks. The end of the stain that has the smallest size blob indicates the direction in which the source was moving.

(ix) The absence of blood (void) where one would expect to find it, suggests movement or removal of objects and changes to the scene. Cast off patterns, or drops that are thrown off from a swinging instrument in the arc of the swing, can illustrate the position of the assailant when swinging a knife, or a club.

(x) When a drop of blood falls vertically at a 90-degree angle, a round stain is formed. As the angle of impact increases, the drop of blood becomes elongated and develops a tail pointing towards the direction of travel of the drop. However, if blood falls from a short distance (around 12 inches) the stain tends to be circular up to an angle of 45 degree.

(xi) By measuring the length and width of the stain and dividing the width by length, the angle at which the drop fell on the surface can be calculated.

(xii) If blood drops fall several feet straight down, the edges may become serrated, and the farther the distance from the source to the surface, the more prominent the serrations.

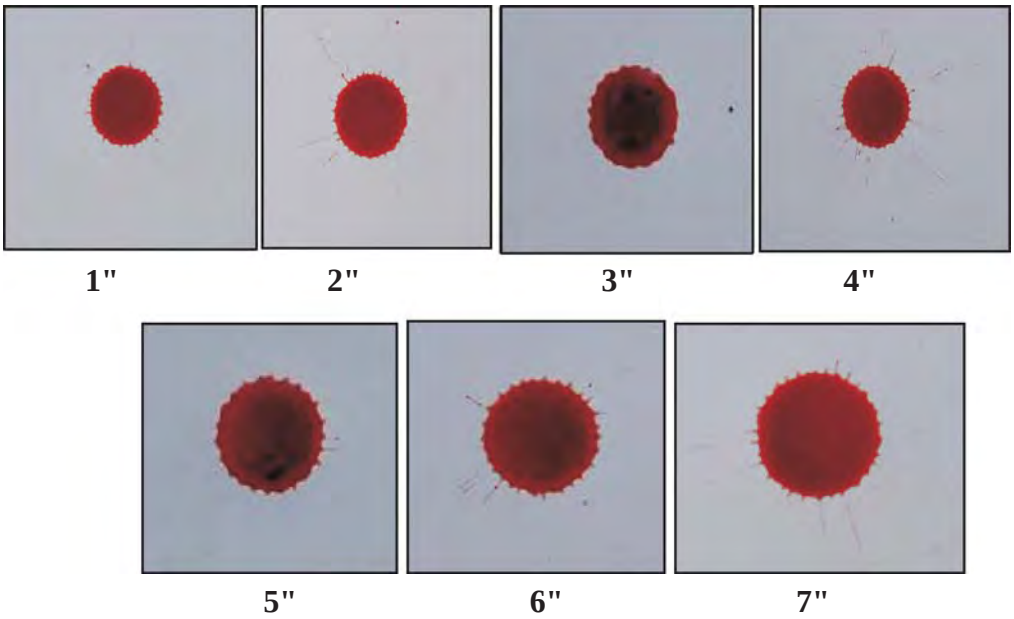


Figure 5.6: Blood drops falling perpendicularly on the surface. Size of the drop increases with the increasing height. Secondary spatters originating from the primary one with the increasing height.

(xiii) A height of 6 ft. or more can produce small spurts that radiate out from the main drop. If there are many drops less than an eighth of an inch across, with no larger drop, then it may be concluded that the blood spatter probably resulted from an impact.

(xiv) Based on the aforesaid characteristics exhibited by the bloodshed during the commission of crime or in accidents, the bloodstain pattern formed at the scene, on the vehicles and on the clothing of the victims or assailants can corroborate other evidence on the basis of which investigators can seek additional clues.

(xv) Bloodstain patterns help the investigators to understand the positions and the means by which the victim and suspect moved, interacted, and struggled through the crime scene. With an understanding of what and how things occurred, investigators can focus on finding fingerprints, footprints, hair, fibers and other forms of trace evidence. Hence, gaining insight from bloodstain patterns can strengthen interrogation strategies and provide a clear visual impression of the crime events during court proceedings.

5.2.1 Information Revealed by Bloodstain Pattern Analysis

The bloodstain pattern interpretation is a discipline which utilizes the sciences of biology, physics, and mathematics. The interpretation of bloodstain pattern can be done by direct evaluation of scene and/or careful study of crime scene photographs in conjunction with detailed examination of clothing, weapon, and other physical evidence. The proper interpretation of bloodstain evidence is crucial where the manner of death is questioned and the issue of homicide, suicide, accident, or natural death is to be resolved in a criminal investigation.

Relative to the reconstruction of a crime scene, bloodstain interpretation may provide information to the investigator in many areas:

(i) Origin(s) of the bloodstains.

(ii) Distances between impact areas of blood spatter and origin at time of bloodshed.

(iii) Type and direction of impact that produced bloodstain or spatter.

(iv) Type of injuries or wounds.

(v) Which injuries or wounds were inflicted first?

(vi) Object(s) that produced particular bloodstain pattern.

(vii) Number of blows, shots, etc., that occurred.

(viii) Handedness of assailant (right handed/left handed).

(ix) Position of victim, assailant, or objects at the scene during bloodshed.

(x) Evidence of struggle at crime scene.

(xi) Movement and direction of victim, assailant or objects at scene after bloodshed.

(xii) Whether the victim was in motion or lying still when the injury was inflicted.

(xiii) Whether the victim was moved after the injury was inflicted.

(xiv) How long ago the crime was committed?

(xv) Whether death was immediate or delayed.

(xvi) Support or contradiction of statements given by suspects or witnesses.

5.2.2 Types of Bloodstain Patterns:

(i) **Passive bloodstains**: Drops created or formed by the force of gravity acting alone.

(ii) **Transfer bloodstain:** This is created when a wet, bloody surface comes in contact with a secondary surface. A recognizable image of all or a portion of the original surface may be observed in the pattern, as in the case of a bloody hand or footwear.

(iii) **Projected bloodstains:** These are created when an exposed blood source is subjected to an action or force, greater than the force of gravity. The size, shape, and number of resulting stains will depend, primarily, on the amount of force utilized to strike the blood source.



Figure 5.7: Types of bloodstain patterns

5.2.3 Classification of Bloodstain Spatter by Velocity

There are three basic categories of stain groups based on the idea of the size of the bloodstain compared with the amount of force propelling that bloodstain.

(i) **Low-Velocity Impact Blood Spatter**: Low-velocity is considered to be a force or energy equivalent to normal gravitational pull up to a force or energy of 5 ft. /s (5 ft. per second). The resulting stain is relatively large, usually 4 mm. in diameter or greater. Free-falling drops of blood affected only by gravity.

(ii) **Medium-Velocity Impact Spatter**: Medium-velocity is considered when a source of blood is subjected to a force from 5 to 25 ft. per second. The resulting stains range from 1 to 4 mm. in diameter. These type of stains are usually associated with beating or stabbing.

(iii) **High-Velocity Impact Spatter**: High-velocity bloodstains are created when the source of blood is subjected to a force with a velocity greater than 100 ft. per second. The resulting stain is predominantly less than 1 mm. in diameter although smaller and larger stains may be observed. These types of stains are usually associated with gunshot injuries.

5.2.4 Determination of the Direction

(i) When a droplet of blood strikes a surface perpendicularly (90 degrees), the resulting bloodstain will be circular and thus, the length and width of the stain will be equal.

(ii) Experimentally, it is easily demonstrated that freely-falling drops of blood with typical volume of 0.5 ml. will produce bloodstains of increasing diameters when allowed to drop from increasing increments of height up to 6 inches onto smooth, hard cardboard. After 6 inches there is no appreciable increase in diameter.

(iii) However, when blood strikes a surface at an angle less than 90 degrees the stain will be elongated or have a teardrop shape. For instance, the teardrop shaped stains with pointed end always points in the direction of travel.



Figure 5.8: Blood drops determining the direction

5.2.5 Determination of the Point or Area of Convergence or the Point or Area of Origin

(i) Once the direction of a group of stains has been determined, it is possible to determine a two dimensional point or area for the group of stains.

(ii) By drawing a line through the long axis of a group of bloodstains the point of convergence can be determined. Where the lines of the group of stains intersect one another, the convergence point can be established.

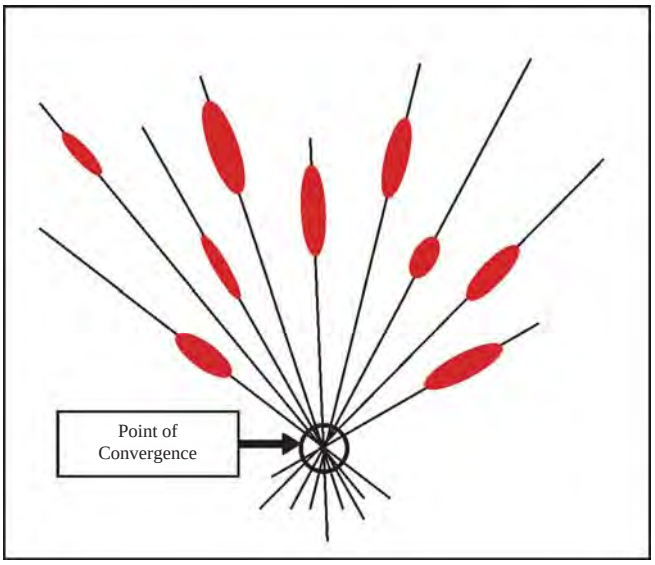


Figure 5.9: Point of convergence
Courtesy: Prashant Kalikotay (student, LNJN NICFS), Delhi

Since bloodstain pattern cannot be carried to the laboratory, so care in documenting the scene is of utmost importance. Photographs and detailed sketches drawn to scale are invaluable part of the forensic report. Services of forensic expert, well trained in bloodstain pattern analysis may be utilized for scientific interpretation of stains in the context of the crime.

References

1. A.K. Bapuly, *Forensic Science*: *Its Application in Crime Investigation*, Hyderabad, 2006.

2. Anita Y. Wonder, *Bloodstain Pattern Evidence: Objective Approaches and Case Applications*, U.K., 2007.

3. Jay A. Seigel, Max M. Houck, *Fundamentals of Forensic Science*, U.K., 2010.

4. Stuart H. James, William G Eckert, *Interpretation of Bloodstain Evidence at Crime Scene*, Washington D.C., 1999.

5. Photographs Courtsey: A.K. Bapuly, FSL, Odisha.

6 POISONING

Poisons are frequently involved in homicidal, accidental or suicidal deaths. They are sometimes used to destroy animals and plants. The detection of poisons and their identification is an important aspect of forensic science. The investigation of cases of poisoning is one of the most difficult tasks. The quantity of a poison required to kill victim is extremely small in some cases. The problem aggravates when most of the poisons are easily available. They are given in secrecy after winning the confidence of the victim and easily administered through food and drinks. Their symptoms may correspond to some illness.

The common poisons are generally categorised as follows:

1. Animal poison
2. Plant poison
3. Volatile poison
4. Non-volatile poison
5. Pesticides
6. Drugs/Medicines

6.1 Sections of Law

Section 302 IPC:

Punishment for murder-whoever commits murder shall be punished with death, or imprisonment for life, and shall also be liable to fine.

Section 304B IPC:

Where the death of a woman is caused by any burns or bodily injury or occurs otherwise than under normal circumstances within seven years of her marriage and it is shown that soon

before her death she was subjected to cruelty or harassment by her husband or any relative of her husband for, or in connection with, any demand for dowry, such death shall be called 'dowry death', and such husband or relative shall be deemed to have caused her death.

Section 174 CrPC:

Police to enquire and report on suicide, etc.

1. the report shall be signed by such police officer and other persons, or by so many of them as concur therein, and shall be forthwith forwarded to the District Magistrate or the Sub-divisional Magistrate.

2. When

(i) the case involves suicide by a woman within seven years of her marriage; or

(ii) the case relates to the death of a woman within seven years of her marriage in any circumstances raising a reasonable suspicion that some other person committed an offence in relation to such woman; or

(iii) the case relates to the death of a woman within seven years of her marriage and any relative of the woman has made a request in this behalf; or

(iv) there is any doubt regarding the cause of death; or

(v) the police officer for any other reason considers it expedient so to do, he shall, subject to such rules as the State Government may prescribe on this behalf, forward the body, with a view to its being examined, to the nearest civil surgeon, or other qualified medical man appointed on this behalf by the State Government, if the state of the weather and the distance admit of its being so forwarded without risk of such putrefaction on the road as would render such examination useless.

3. The following magistrates are empowered to hold inquests, namely, any District Magistrate or Sub-Divisional Magistrate and any other Executive Magistrate specially empowered on this behalf by the State Government or the District Magistrate.

Section 176 CrPC:

Inquiry by Magistrate into cause of death.

1. The Magistrate holding such an inquiry shall record the evidence taken by him in connection therewith in any manner hereinafter prescribed according to the circumstances of the case.

2. Whenever such Magistrate considers it expedient to make an examination of the dead body of any person who has been already interred, in order to discover the cause of his death, the Magistrate may cause the body to be disinterred and examined.

3. Where an inquiry is to be held under this section, the Magistrate shall, wherever practicable, inform the relatives of the deceased whose names and addresses are known, and shall allow them to remain present at the inquiry. Explanation: In this section, expression 'relative' means parents, children, brothers, sisters and spouse.

Section 327 IPC:

Voluntarily causing hurt to extort property, or to constrain to an illegal act. Whoever voluntarily causes hurt, for the purpose of extorting from the sufferer, or from any person interested in the sufferer, any property or valuable security, or of constraining the sufferer or any person interested in such suf-ferer to do anything which is illegal or which may facilitate the commission of an offence, shall be punished with imprisonment of either description for a term which may extend to ten years, and shall also be liable to fine.

Section 323 IPC:

Punishment for voluntarily causing hurt—whoever, except in the case provided for by section 334, voluntarily causes hurt, shall be punished with imprisonment of either description for a term which may extend to one year, or with fine which may extend to one thousand rupees, or with both.

Section 284 IPC lays down the punishment for careless handling of poisonous substances, while sections 299, 302, 304A, 306, 307, 309, 324, 326, 328, and 489 A deal with offences relating to administration of such substances. *Possession, sale and control of poisons* are governed by the poisons Act 1919, the Drugs Act 1940, the Drugs and Magic Remedies Act 1954, the Narcotic Drugs and Psychotropic Substances Act 1985, and the Pharmacy Act 1948

6.2 List of Equipments Required

Crime Scene Kit

(i) Clipboards

(ii) Crime scene cards

(iii) Graph papers

(iv) Pencils, erasers

(v) Straight-edge ruler

(vi) Measuring tape (100 ft)

(vii) Steel tape (12ft)

(viii) Magnetic compass

(ix) Digital camera

(x) Polythene bag

(xi) Cordoning tape



Figure 6.1: Crime Scene Kit

6.3 Constituting the Team for Handling the Crime Scene

Make list of persons to be associated with:

(i) Protection of scene

(ii) Searching the scene

(iii) Identification and collection of evidence (fingerprint expert, forensic expert)

(iv) Measuring and sketching the crime scene

(v) Photography of crime scene

(vi) Information gathering

(vii) Evidence custodian

6.4 Crime Scene Investigation

For effective crime scene investigation adopt the following steps:

6.4.1 Protection of Crime Scene

The crime scene must be protected from entry by unauthorized persons so that physical evidence materials are not altered, moved, destroyed, lost or contaminated. Investigator should adopt the following steps for the protection of crime scene:

(i) Safeguard the location as quickly and as effectively as possible.

(ii) The scene of crime area should be photographed at the earliest before shifting of the injured/deceased.

(iii) If injured body shows any sign of life, provide immediate medical help and transport the body to the hospital, taking caution so as to disturb the scene to the minimum extent.

(iv) All unauthorized persons (relatives, friends, onlookers, photographers, etc.) should be excluded from the scene.

(v) Officer-in-charge of the case should determine when, why and who should enter the scene.

(vi) Police officer should not leave the scene unguarded.

(vii) The witnesses, suspects and informant should be detained for further details.

(viii) Crime scene should not get altered; it should be barricaded, enclosing a larger area then smaller one so that no clues are left out.

(ix) Officer should not introduce any material, like cigarette butts/ash, foot or footwear marks, fingerprints, etc.

(x) During examination, the original condition of doors, windows, staircase, lighting, routes of entry/exit should be preserved.

(xi) Officer should not use bathroom, wash basin, lavatory, towel, telephone, etc., at the scene.

(xii) Nothing should be picked up, touched, changed or altered until it has been described in a notebook, its location shown in a sketch and photographs taken.

(xiii) Scene should not be cleaned till thoroughly examined.

6.4.2 Photography of the Crime Scene

The crime scene should be properly photographed as the photographs of the crime scene are extremely important. Proper photographs of the scene bring the scene in the court room as it is rare for judges, lawyers, etc., to visit the crime scene. Sometimes, eyes may not observe certain facts, the camera will photograph and make permanent record of them which is available to the investigating officer at later stages also.

6.4.3 Sketching of Crime Scene

It is important to draw sketches of the crime scene by the expert as sketches are helpful in depicting the scene of occurrence, provide an ideal presentation of scene in combination with photographs as they indicate inter-distances between relevant objects and indicate relevant evidence only. Marking the directions on the sketch should be done compulsorily.

6.4.4 Crime Scene Search

The crime scene should be searched thoroughly and carefully. Search techniques and planning varies from one scene to another. The most practical method is to begin the search at the point where the body is first discovered and extend the search in an outward direction until entire room or location has been covered. Search should begin with locating the latent fingerprints before any item is touched or moved. The investigator should direct the fingerprint expert indicating the areas to be examined. All visible details should be observed and described before dusting anything for latent fingerprint.

6.5 Classification of Poisons

Classification of poison can be done in many ways. The following classification is based on their action on the body.

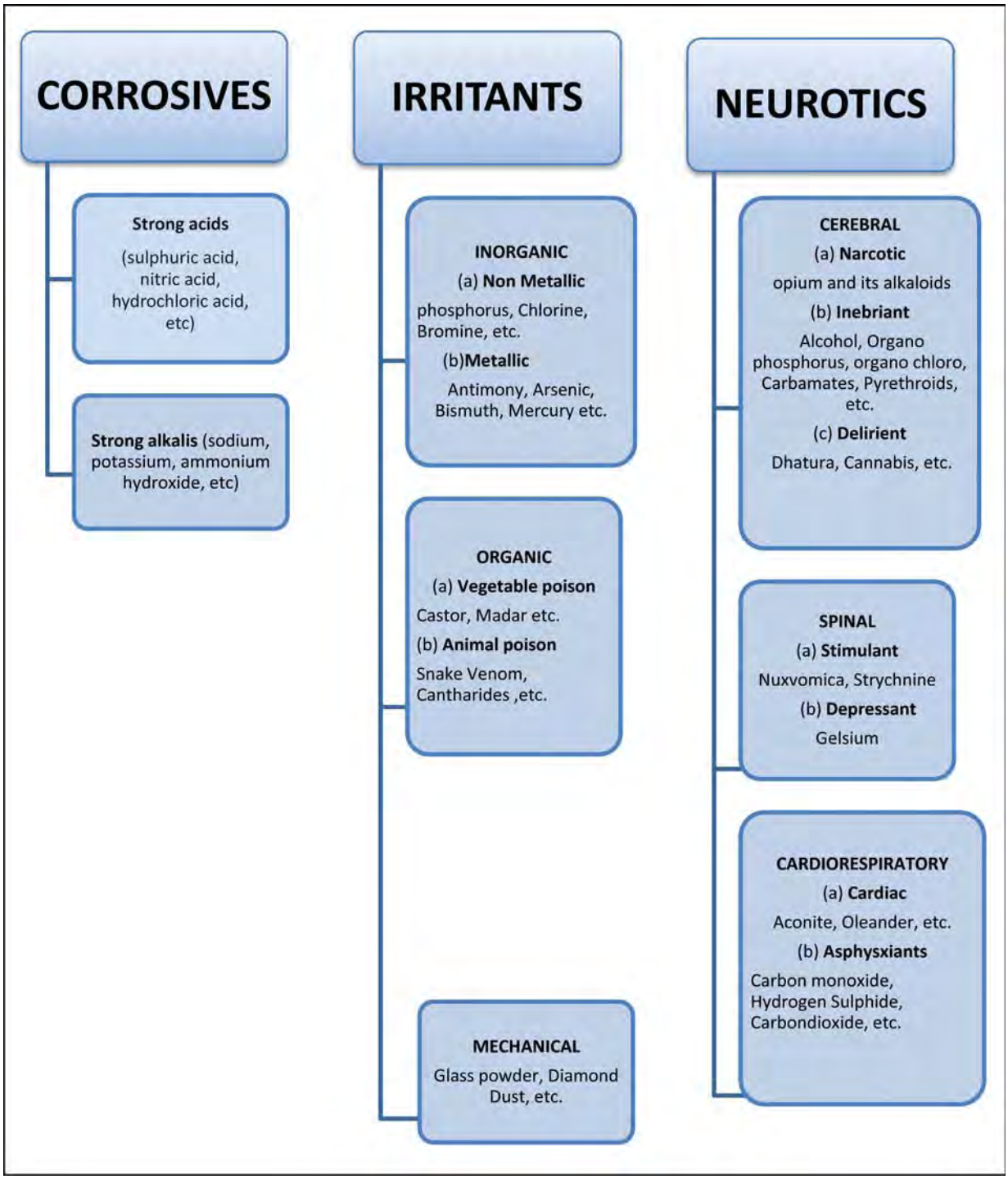


Figure 6.2: Classification of poisons based on their action on the body

6.6 Information to be Obtained while Investigating a Case of Poisoning

(i) Was the deceased in good health before the incident?

(ii) If not, what was he suffering from?

(iii) What medicine was he taking?

(iv) What were the first symptoms and signs?

(a) Was he thirsty?

(b) Did he faint?

(c) Did he complain of headache or giddiness?

(d) Did he appear to have lost the use of his limbs?

(e) Did he sleep heavily?

(f) Was he at any time insensible?

(g) Did convulsions occur?

(h) Did he complain of particular taste in mouth?

(i) Did he notice any peculiar taste in his food/drink?

(j) Did he complain of burning/tingling in the mouth and throat or of numbness and tingling in the limbs?

(k) Was there any vomiting?

(l) Was there loose motions?

(m) Was there any stomach pain?

(n) Mention any other symptoms?

(o) Had he ever suffered previously from similar attack?

(v) How many other persons took the meal or food or drink by which the deceased is supposed to have been poisoned?

(vi) How many were affected and in which way?

(vii) Did the deceased move from the place where the first symptoms were noticed and, if so, how far?

(viii) Did the deceased vomit before death?

6.7 Factors Affecting the Effect of Poisons

1. Dose
2. Form of poison
3. Hypersensitivity
4. Allergy
5. Shock
6. Synergism
7. Incompatible combination
8. Tolerance
9. Cumulative action
10. Mode of administration
11. Health and age of person

6.8 Examination of the Body of the Victim

In case victim is alive

1. **The IO must take the victim/victims to the nearby hospital in emergency without any delay**.
2. The clothes of the victim should be searched for any suspicious poisonous material.
3. **Clinical History:** Clinical history is of great importance.

   (a) Was there any sign of abdominal or colic pain?

(b) Vomiting or diarrhea?

(c) Any disease related to the central nervous system like paralysis/tremors/ convulsions/seizures?

4. **Clinical Signs:** Important clinical signs which point to poisoning are:

(a) Blood pressure-Abnormally high or low

(b) High heart rate

(c) Ocular signs-Disturbed vision

(d) Any ear disorder (like buzzing in ear)

(e) Oral signs (like burns, dry mouth)

(f) High breathing rate

(g) Cutaneous signs (like blisters, etc.)

(h) Abnormal temperature of the body

(i) Colour of the stool/urine

(j) Froth coming from mouth

(k) Stain of blood in natural orifices

(l) Any disagreeable smell

Evidences to be Collected in Non-Fatal Poisoning Cases:



Caution: Do *not* handle anything bare handed as it can result in destruction of latent finger prints

(i) Food, medicine, drink and container from which the poison was administered.

(ii) Wrappers, vials, syringes and liquor bottles.

(iii) Any edible item lying.

(iv) Clothes of the victim.

(v) Urine-24 hour specimen collected in a clean bottle.

(vi) Blood-10-15ml. collected by doctor (to be collected by the physician).

(vii) Vomit and stomach washings (first aspirate) should be sent in cases where the poison is taken by mouth. Faeces (in case of suspected metallic poison).

(viii) Hair and nail clippings for NAA (Neutron Activation Analysis) in suspected case of chronic poisoning.

(ix) Suspected contaminated food material available at the scene of crime.

In case victim is dead

1. The IO must take the victim/victims to the nearest hospital without any delay for medico-legal examination.

2. Diagnosis of poisoning of the deceased is done mainly by the following:

2.1 Clinical history:

a. Full clinical history (if any) should be taken from relative or people present with the victim at the time of incidence.

b. Record should be made of the drugs, medications to which the deceased had access.

c. Empty bottles, foils of drugs should be searched and collected from the scene of crime.

2.2 Then the body should be sent for post-mortem examination.

Evidences to be Collected in Fatal Poisoning Cases:

(i) A thorough examination for suicide note.

(ii) Look for any empty wrapper/container/bottle containing the remnants of poison.

(iii) Any vomit or vomit stained clothes should be packed without drying in air tight container without delay.

(iv) Vomit stained soil should be collected with control soil sample separately in a plastic jar.

(v) Any syringe/needle found, should be collected in a polythene bag.



Figure 6.3: Tools used by the addicts for injecting the poison and drug

(vi) Clothes of the victim.

(vii) Any edible item, liquor bottles/soft drink or water bottles, glass tumblers, etc.

(viii) Visceral organs/fluids to be collected by doctor as under:

(a) The stomach and its contents

(b) A loop of small intestine and its contents

(c) Liver- atleast one pound

(d) Kidneys- atleast one

(e) Spleen

(f) Brain, in case of suspected poisoning by drugs

(g) Lungs, in case of suspected poisoning by inhalation

(h) Blood- all available in the heart

(i) All the urine present in the bladder

(j) Sample of preservative used for preserving visceral organs



Figure 6.4: Packaging and labelling of evidences after post-mortem by medical officer

Separate viscera bottles with proper labelling should be sent for chemical examination as under:

Bottle no. 1: Stomach contents 10-20 ml in plastic or glass container without preservative. (First aspirate)

Bottle no. 2: Whole stomach, pieces of small intestine with its contents.

Bottle no. 3: Liver, spleen, and kidney.

Bottle no. 4: Blood from heart (PM blood preferably more than 50-100ml., if available).

Bottle no. 5: All vitreous humour should be collected into tubes containing 2% sodium fluoride preservative**.**

Bottle no. 6: Urine.

Bottle no. 7: Skin piece along with tissue beneath (in case of animal bite and injectable poison).

Bottle no. 8: Sample of preservative used (preservative used should be saturated solution of common salt and also in enough quantity. Rectified spirit should be used as preservative in case of poisoning by acid or alkali. Blood should be preserved in Sodium Fluoride).

Sufficient quantity of post mortem blood (preferably more than 100ml. if available) and stomach contents (600-800 g. each) should be sent for chemical examination.

Notes:

(i) *The containers used should be leak-proof and airtight.*

(ii) *All articles should be packed separately so as to avoid any contamination.*

(iii) *All the packed articles should be sealed and labelled properly.*

(iv) *Label each article properly with the following information:*

(a) Police station

(b) FIR no./IPC section

(c) *Name, age and gender of deceased*

(d) *Number and date of post-mortem*

(e) *Signature of IO*

(v) *Copy of post-mortem report and inquest report.*

(vi) *Brief history of case should be taken.*

6.9 Forwarding of Evidences to FSL

(i) All the exhibits to be sent to FSL for chemical examination must be properly labelled.

(ii) The forwarding letter should be signed by the competent authority and must include:

(a) A copy of FIR/DD

(b) Copy of post-mortem report

(c) Copy of police papers supplied to the doctor before postmortem

(d) Copy of any other statement given by relative/friend

(e) Dying declaration/suicide note, if any

(f) Copy of treatment, if any.

(iii) Sample of seal on lac duly attested and signed by sealing authority and bearing case details.

Note:

(i) *Adhesive tape on seal should not be used.*

(ii) *No coin shall be used as a seal.*

Ideally a self-destructive paper seal should be used.

6.10 Guidelines for Preservation of Exhibits

Table 6.1: Preservation of exhibits

Case History	*Materials to be sent*	*Preservative to be used*	*Preservative that should not be used*
Normal Cases	1. Viscera (stomach, intestine with their contents) 2. Liver, spleen and kidney	Common salt or its saturated solution	Rectified Spirit, Formalin
	Blood (10–15 cc.)	Potassium Oxalate + Sodium Fluoride	
Acid Poisoning	1. Viscera (stomach, intestine with their contents) 2. Liver, spleen and kidney	Rectified Spirit	Common salt or its saturated solution
	Blood (10–15 cc.)	Potassium Oxalate + Sodium Fluoride	
Alcohol Poisoning	1. Viscera (stomach, intestine with their contents) 2. Liver, spleen and kidney	Common salt or its saturated solution	Rectified Spirit, Formalin
	Blood (10–15 cc.)	Potassium Oxalate a+ Sodium Fluoride	
Cyanide Poisoning	1. Viscera (stomach, intestine with their contents) 2. Liver, spleen and kidney	Common salt or its saturated solution	Formalin
	Blood (10–15 cc.)	Potassium Oxalate + Sodium Fluoride	
Carbon Monoxide and other gas poisoning	Blood (10–15 cc.)	Sodium fluoride/ Potassium Oxalate with a layer of liquid paraffin above	-
	Lungs	Common salt or its saturated solution	
Arsenic Poisoning	1. Viscera (stomach, intestine with their contents) 2. Liver, spleen and kidney 3. Nails, bones, hair	Common salt or its saturated solution	-
Snake-bite and injection cases	Blood (10–15 cc.)	Potassium Oxalate + Sodium Fluoride	-
	Skin piece at the site of bite/injection	Common salt or its saturated solution	
Blood for grouping	Blood (as referred in serology)	Equal volume of 5 per cent Sodium Citrate + 0.25 ml. of Formalin	-

6.11 Checklist on Investigation of Death due to Poisoning

1. Whether found dead or alive.
2. If alive, whether sent to hospital.
3. Dying declaration available or otherwise.
4. Who was the first to see the dead body?
5. Who and when saw living last?
6. Position of the dead body.
7. Post-mortem staining.
8. Rigor mortis present on the dead body.
9. State of decomposition.
10. Whether suspected homicide/suicide/accident.

6.12 Do's and Don'ts for the Investigating Officers

Do's	Don't's
The IO should carry a GPS to the scene of crime	There should be no delay in reaching the scene of crime/occurrence, lest crucial evidence should be lost
Statement of witnesses must be taken	The scene should not be allowed to be tampered by anyone
Clinical history, in case of victim being admitted to a hospital should be collected	
Visceral material from the hospital should be collected immediately after post-mortem, i.e. same day	The IO should not leave any work pending, e.g. collection of samples, statement of witness, relative, etc., in the first visit as the first visit is most reliable and important visit
They should send the viscera to concerned Forensic Science Laboratory as early as possible	Formalin as preservative should not be used in viscera taken for chemical examination
They should collect the following articles from the scene of crime, preserved and pack them separately A. Poison container. B. Vomit stained soil along with control	

sample of the soil. C. Vomited matter. D. Tumbler, pots, utensils, if any, used for poisoning. E. Clothes of deceased. F. Exhibits collected from scene of crime to be sent for chemical analysis along with viscera.	
Sample of gastric lavage and ante-mortem blood, if any, taken at the time of Medico legal examination	
They must make sure that the articles are properly labeled according to the forwarding letter (memo)	
Forwarding letter accompanied by the copy of PM report, treatment given, if any, *panchnama*, samples of seals. seizure, memo must be sent with the exhibit	
Samples collected by doctor for histopathological examination, wherever necessary must be sent separately to the concerned hospital	

6.13 Alcohol

The term 'alcohol' generally means ethyl alcohol, which is the active ingredient of various alcoholic drinks and liquors. Denatured spirit, which is not meant for human consumption also contains ethyl alcohol. Alcoholics often clandestinely consume this denatured spirit on account of its cheapness and ready availability. This results in poisoning due to denaturing material (Methyl alcohol, Pyridine, Cochacine oil, etc.) used in it.

The commonly available alcoholic drink contains ethyl alcohol as shown below:

S.No	*Alcoholic Drinks*	*Percentage of Alcohol*
1	Beer	2–11
2	Wine	8–15
3	Country liquor, etc.	12–48
4	Whisky, Gin, Brandy	42–50
5	Rum	40–60

6.13.1 Fatal Dose

The fatal dose of liquor for an ordinary adult person is about 200–500 ml. of absolute alcohol and about 50 ml. onwards for children under the age of 12 years.

6.13.2 Fatal Period

The fatal effects of alcohol may appear within 10–24 hours. However, in some cases death may take place even after a number of days.

6.13.3 Evidence in Cases of Alcohol Intoxication

Intoxication may have to be established in cases of sudden deaths, in offences against person, in motor vehicle accidents, and in cases where diminished responsibility is claimed as defense. The alcohol actually present in the brain causes intoxication, as it is the ethyl alcohol which affects the normal functions of a person. The blood alcohol is in equilibrium with that of the brain. Therefore, blood alcohol concentration is fair index of the alcohol present in the brain. It is the material of choice for alcohol concentration determination, though for practical reasons, urine and saliva are also used. Breath, of course, has become the most convenient material, to detect alcohol concentration as high precision and rapid instruments have come up for on the spot breath alcohol analysis. Alcohol concentrations in all the body fluids at equilibrium are co-related. The fluids containing more water will have correspondingly higher concentration.

6.13.4 Location and Collection of Liquor/Illicit Liquor

(i) Thorough search of the premises, especially cattle sheds, unfrequented places, cow dung heaps, ravines and jungles is necessary to locate unauthorized stills and stores. The shadows and informers are helpful. Specially trained dogs have also been used with success.

(ii) Collection of evidence includes the collection of the paraphernalia used in illicit alcohol production, fingerprints and tool marks.

6.13.5 Collection of Samples

A. Blood Samples

The alcohol concentration varies in blood samples collected from various parts of the body. These variations are minor and, hence, ignored. Usually blood from the femoral or subclavian vessels is collected in a living person. The following precautions must be taken while collecting blood samples:

(i) Only qualified medical person should take the samples of blood.

(ii) Take two samples of blood, 10-15 ml. each. Preserve each sample with 100 mg. of sodium fluoride.

(iii) Disinfect the skin before taking the sample with non-alcoholic disinfectant, such as mercury chloride solution.

(iv) Use blood alcohol kits for the collection of the sample. The kit consists of:

A. Sterile disposable syringe.

B. Blood collection tubes.

C. Preservative. Usual one is sodium fluoride.

D. Mercury salts.

E. Anti-coagulants like fluoride, citrate, and oxalate.

(v) Dispatch the blood at the earliest, observing legal formalities.

(vi) Store the collected blood in a refrigerator, if it has to be stored. Blood collection kits can be organized by the departments where such sample collection is extensive.

B. Urine Samples

(i) The urine sample is easy to collect. However, it may not give true index of blood alcohol at the time of arrest as the urine may be accumulating for a long time in the bladder. The difficulty is overcome by collecting the urine, which gets collected after the arrest in about half an hour. The bladder should be emptied immediately after the arrest. A second sample after another half an hour should suffice.

(ii) Wherever possible, collection kits on the pattern of blood collection kit should be used. Sampling of urine from the accused must be taken under strict supervision of doctor/IO.

In cases of women subjects, urine sample should be collected by female police official or by another reliable female. The latter should witness the sample.

6.13.6 Breath Analyzer

Breath analyzer is used to measure blood alcohol level. It serves as on the spot test. If the result is positive, then the individual is taken into custody and a detailed analysis of his blood and urine is done.



Alcometer with printer



Alcometer

Figure 6.5: Portable breath analyzer of different makes

This works on the principle that the alcohol contained in the breath is oxidized by an oxidizing agent and produces change in its colour which is measured visually, calorimetrically or spectrophotometrically. The change of colour is proportional to the amount of alcohol.

The Motor Vehicles Act 1988: Driving by a person under the influence of alcohol or drugs-while driving, or attempting to drive, a motor vehicle:

(a) has, in his blood, alcohol exceeding 30 mg. per 100 ml. of blood detected in a test by a breath analyser, or

(b) is under the influence of a drug to such an extent as to be incapable of exercising proper control over the vehicle,

shall be punishable for the first offence with imprisonment for a term which may extend to six months, or either fine which may extend to two thousand rupees, or with both, and for a second or subsequent offence, if committed within three years of the commission of the previous similar offence, with imprisonment for a term which may extend to two years, or with fine which may extend to Rs. 3000, or with both.

6.13.7 Likely Queries to be Asked from Forensic Expert:

In the investigation of crimes involving liquor, the following type of questions are important.

(i) Is the given sample an alcoholic drink?
(ii) Is it illicit liquor? (For Excise department)
(iii) What is the alcoholic strength of the liquor?

(iv) Were the drivers involved in an accident, under the influence of alcohol?

(v) Did the person die of alcoholic poisoning? (For medico legal expert)

(vi) Did the dead person consume alcohol before his death?

(vii) Was the person who claims diminished responsibility actually under the influence of alcohol?

6.14 Pesticides

These compounds are used extensively in agriculture and horticulture. They are also used to kill household bugs, flies, rodents and other pests. Pesticides can be classified as follows:



Figure 6.6: Types of pesticides

6.14.1 Organophosphorus Pesticides

Organophosphorus compounds are easily accessible and are often used to commit suicides. Accidental poisoning may also occur especially when they are kept within the reach of children. Farmers could get exposed without protective clothing.

1. Common Organo Phosphorus Pesticides:

(i) Malathion

(ii) Metasystox

(iii) Rogor (Dimethoate)

(iv) Dimecron

(v) Monocrotophos

(vi) Chloropyriphos



Figure 6.7: Common Organo Phosphorus pesticides

2. Route of Administration of Organo–Phosphorus Compounds

These substances are taken orally or inhaled accidentally. As they are very strong poisons, they are being increasingly used for homicidal and suicidal purposes. They can be administered through injection also. The accidental inhalation of the pesticides is commonly seen in the fields while spraying the pesticides on the crops.

3. Symptoms of Organo–Phosphorus Poisoning

(i) Headache, giddiness and nausea.
(ii) Salivation and vomiting.
(iii) Diarrhoea, spasm abdominal cramps.
(iv) Mental confusion and delirium.

4. Post–Mortem Findings of Organo–Phosphorus Poisoning

(i) Nothing characteristic, though usual signs of asphyxial death are seen in many cases.
(ii) Kerosene like smell in stomach or in breath.
(iii) Pulmonary odema.
(vi) Congestion and sub mucosal hemorrhage.

5. Common Organo Phosphorus Pesticides

Table 6.2: Common Organo Phosphorus Pesticides

S.NO	*Name*	*Source*	*Brand Name*	*Fatal Dose*	*Symtoms*
1	Parathion	Pesticide market and chemist shop	Agropara, Agrotex, Paracrop, Parahit, Metacid, Metahit, Folidoll	15 mg.	1.It is an irreversible inhibitor of cholinesterase 2.Allows accumulation of acetylcholine 3.Loss of death perception 4. Headache 5. Giddiness 6. Blurred vision
2	Malathion	Pesticide market and chemist shop	Agromal, Cythion, Finit, Kathion, Maladan, Sulmathion, Tik 20	1.0 g.	Bradycardia hypotension, pronounced Gastrointestinal disturbances, spastic Myocardial infarction, recent Parkinsonism Peptic ulcer
3	Metasystox	Pesticide market and chemist shop	Hexacystox, Hymox, Knock out	1.0 g.	Headache, fatigue, faintness, giddiness, excessive sweating, nausea, abdominal pains, vomiting, diarrhoea, tightness of the chest, small pupils, respiratory distress, convulsions, coma
4	Dimethoate	Pesticide market and chemist shop	Rogor, Devigor, Hexagor, Ramgor, Tagor, Milgor, Dimex, Cygon	30 mg.	Headache, blurred vision. Respiratory failure
5	Dimecron	Pesticide market and chemist shop	Sudon, Vimidon, Phosul, Phamidon, Directon, Cildon	1.0 g.	Headache, fatigue, faintness, giddiness, excessive sweating, respiratory failure

Source: V.V. Pillay, *Pocketbook of Pesticide poisoning for Physician*, New Delhi, 2001.

6.14.2 Organochloro Pesticides

Organochloro pesticides are chlorine containing pesticides. These compounds are available as dusting powder, wettable powder, emulsions, granules, and solutions. Some are available as topical ointment, cream, or lotion. They are commonly encountered in deaths due to pesticide poisoning, may be accidental, suicidal and homicidal.

1. Common Organo Chloro Pesticides

Table 6.3: Common Organo Chloro pesticides

Pesticides	*Brand Name*	*Source*	*Fatal Dose*
Aldrin	Alcrop, Aldrin 30, Mildrin 30, Aldrex	Pesticide market and chemist shop	2–6 g.
BHC	Gammexane, Sevidol (with carbaryl), Solchlor, Sudarshan, Sulbenz 50	Pesticide market and chemist shop	10–30 g.
Chlordane	Termex, Agrodane 20EC, Sudarshan 5EC	Pesticide market and chemist shop	6 g.
DDT	Ramdit, Soltax, Tafarol, Tafidex, Sunbrand	Pesticide market and chemist shop	15–30 g.
Dicofol	Kelthane	Pesticide market and chemist shop	500 mg.
Endosulfan	Agrosulfan, Hildon, Thiodan, Endohit	Pesticide market and chemist shop	50–500 mg.
Lindane	Agrodane, Ultrascab, Scarb, Emscab, Gamaric	Pesticide market and chemist shop	15–30 g.

Source: Pillay VV Pocketbook of Pesticide poisoning for Physicians, CBS Publishers, New Delhi, 2001.

2. Route of Administration of Organochloro Compounds

(i) Oral

(ii) Inhalation

(iii) Transdermal

3. Symptoms of Organo Chloro Poisoning

(i) Nausea, vomiting, giddiness.

(ii) Headache, weakness, rapid eye movements, confusion and convulsions.

(iii) Fever, aspiration pneumonitis, renal failure.

4. Post-Mortem Findings of Organo Chloro Poisoning

(i) Signs of asphyxia with smell of kerosene in the stomach.

(ii) Petechial hemorrhages in the sub mucosa of the gastrointestinal tract.

6.14.3 Carbamates

Carbamate insecticides are used to kill or control insects. Carbamates are those pesticides which inhibits acetyl cholinesterase. They are also used to commit suicides. They are widely used in homes, gardens, and agriculture.

1. Common Carbamates

Table 6.4: Common Carbamates

Pesticide	*Brand Name*	*Source*	*Fatal Dose*
Aldicarb	Temik	Pesticide market and chemist shop	500–5000 mg.
Carbaryl	Sevin 50, Sulfarl 50, Sujacarb, Hexavin, Kevin 50, Caravet	Pesticide market and chemist shop	1.0–50 mg.
Carbofuran	Agrofuran 3G, Carbocil 3, Hexafuran	Pesticide market and chemist shop	50–500 mg.
Methomyl	Lannate	Pesticide market and chemist shop	1.0–50 mg.
Propoxur	Baygon, Protox Bait	Pesticide market and chemist shop	1.0–50 mg.
Triallate	Avadex	Pesticide market and chemist shop	500–5000 mg.

Source: Pillay VV Pocketbook of Pesticide poisoning for Physicians 2001. CBS Publishers, New Delhi.

2. Route of Administration of Carbamates Compounds

(i) Oral
(ii) Inhalation
(iii) Transdermal

3. Symptoms of Carbamates Poisoning

(i) Headache, giddiness and nausea.
(ii) Salivation and vomiting.
(iii) Diarrhoea, spasm abdominal cramps.
(iv) Mental confusion and delirium.

4. Post–Mortem Findings of Carbamates Poisoning

(i) Nothing characteristic, though usual signs of asphyxial death is seen in many cases.
(ii) Kerosene oil like smell.
(iii) Pulmonary edema.
(iv) Face is cyanosed.
(v) Blood stained froth at nose and mouth.

6.14.4 Pyrethroids

Pyrethrins are active extracts of the chrysanthemum plant. However, synthetic pyrethroids are now easily available and these are used as insect repellants and insecticides in household sprays, mosquito coils, and mats. They are also used to prevent pest infestation in granaries, and in agricultural pesticides. They are sold as liquids, sprays, dusts, powders, mats, and coils.

1. Common Pyrethroids

Table 6.5: Common pyrethroids

Pesticides	*Brand Name*	*Source*
Allethrin	Baygon mats, Pynamin Forte	Pesticide market and chemist shop
Cypermethrin	Tackle, Challenger, Cymet, Ustad, Superkiller, Sicerin, Ripcord,Motal, Ripcord, Parathrin, Cyper, Bilsif	Pesticide market and chemist shop
Decamethrin	Decathrin	Pesticide market and chemist shop
Fenvalerate	Agrofen, Fencidin, Fenhit, Fenval, Starfen, Parafen, Sumitox	Pesticide market and chemist shop
Permethrin	Ambush, Lee, Permethrin, Pounce	Pesticide market and chemist shop
Pyrethrum	Tortoise mosquito coil	Pesticide market and chemist shop

Source: Pillay VV Pocketbook of Pesticide poisoning for Physicians 2001. CBS Publishers, New Delhi.

2. Usual Fatal Dose

Pyrethrum has LD50 of over 1g. Most cases of toxicity are actually the result of allergic reactions.

3. Symptoms of Pyrethroid Poisoning

(i) Dermatitis, blistering.

(ii) Irritation.

(iii) Sore throat.

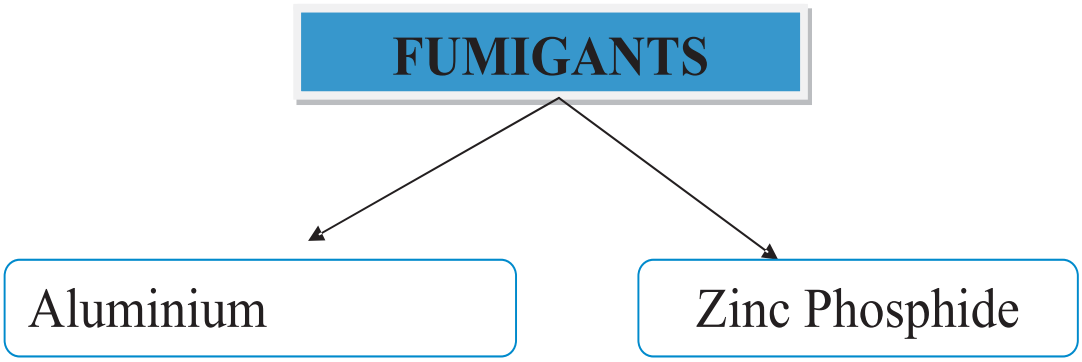
(iv) Nausea, vomiting, altered mental state, seizures, pulmonary edema, coma.

4. Post-Findings of Pyrethroid Poisoning

(i) Pulmonary edema.

(ii) Petechial hemorrhages in the sub mucosa of the gastrointestinal tract.

6.15 Fumigants



6.15.1 Aluminium Phosphide



Figure 6.8: Aluminium Phosphide as available in the market

(a) Nature

Aluminium phosphide (AlP) is a cheap, effective and commonly used pesticides mainly used as a wheat grain preservative. However, unfortunately, it is now one of the most common causes of poisoning both in rural and urban population because of its easy availability. It liberates lethal phosphide gas when it comes in contact either with water or atmospheric moisture or with hydrochloric acid in the stomach.

2. Mode of Administration

Oral or inhalation. This is commonly a suicidal poison and very rarely used as homicidal poison. Aluminum Phosphide tablets are used for preserving wheat grains and sometimes, accidentally get crushed along with the grains to make flour. Consumption of this flour results in poisoning.

3. Fatal Dose

Ingestion of 1–3 tablets (3–9 g.)

4. Fatal Period

24 hours. Range 1h–4 days

5. Symptoms

(i) Dizziness

(ii) Easy fatigability

(iii) Tightness in the chest

(iv) Headache

(v) Nausea

(vi) Vomiting

(vii) Diarrhoea

(viii) Numbness

(ix) Tremor

(x) Muscle weakness

(xi) Jaundice

(xii) Garlic-like smell from mouth

Post-Mortem Findings in Aluminium Phosphide Poisoning

(i) Garlic-like odor from mouth, nostrils and stomach contents.

(ii) Blood stained froth from mouth and nostrils.

(iii) Congestion:Lower part of esophagus, stomach, duodenum, intestines, all internal organs.

(iv) Sloughing (burning) of stomach and oral cavity.

6.15.2 Zinc Phosphide

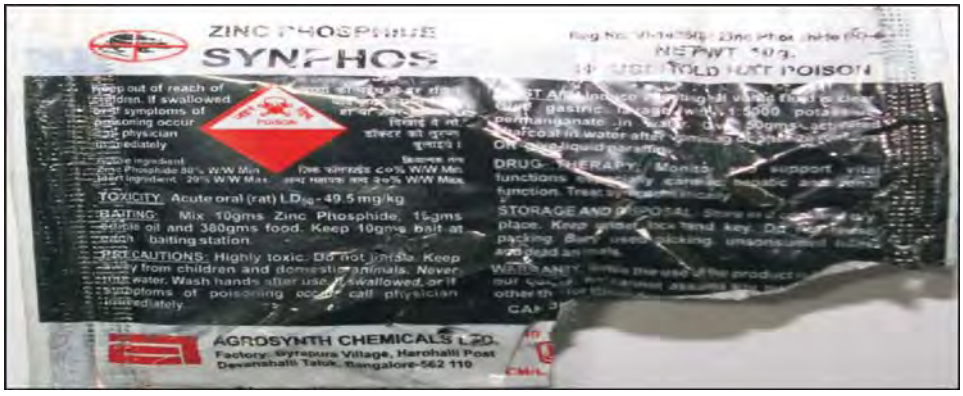


Figure 6.9: Zinc Phosphide as available in the market

1. Nature

It is fine black powder commonly used as rat poison. Poisoning by zinc phosphide has increased tremendously. Being a fine powder it adheres to the mucous membrane of the stomach and is not completely eliminated through vomiting. Death may ensure from the liberation of phosphine from the adhered material.

2. Mode of Administration

Zinc phosphide is taken orally, this is generally a suicidal poison.

3. Fatal Dose

4–5 g.

4. Fatal Period

1–2 days

5. Symptoms

(i) Vomiting

(ii) Garlic or rotten fish odor in breath
(with no recent history of eating either of these foods)

(iii) Rapid and/or difficult breathing

(iv) Blood in vomit

(v) Depression

(vi) Weakness

(vii) Convulsions/seizure

6. Post-Mortem Findings in Zinc Phosphide Poisoning

(i) Garlic like odour from mouth, nostrils and stomach contents.

(ii) Blood stained froth from mouth and nostrils.

(iii) Congestion: Lower part of esophagus, stomach, duodenum, intestines, all internal organs.

6.16 Poisonous Gases

These poisons are present in the gaseous state and if inhaled, destroy the capability of the blood as a carrier of oxygen and irritate or destroy the tissues of the air passages and lungs. When in contact with the skin and mucous membrane, gaseous poison produces lacrimation, vesication, inflammation, and congestion. These gases are commonly encountered in dead wells due to rottening of the vegetative material.

Table 6.6: Common poisonous gases

S.No	*Gas*	*Symptoms*	*Post-mortem*
1	Carbon dioxide	Increased respiratory rate, tachycardia, cardiac arrhythmias, convulsions, coma and death	The face is usually pale and flaccid. The pupils are dilated. Ecchymosed patches are noticed in small intestine
2	Carbon monoxide	Symptoms mainly associated with brain and heart, most sensitive to hypoxia, cherry red color of skin, parkinsonism, asphyxia, ischemia, cardiopulmonary failure and death	Lips and fingernails have bright red color. The mucus membrane of air passage is bright red. Hemorrhage and necrotic lesions in heart muscle
3	Hydrogen disulphide	Nausea, drowsiness, dilated pupil, muscular weakness, irritation of eyes and nose, coma and death	Putrefaction, offensive smell is noticed in the body, blood is liquid and dark brown in color. Congested lungs
4	Ammonia	Swelling of larynx, nausea, vomiting, convulsions, coma and death	Hemorrhagic patches on the mucous membranes of the GI tract with edema and ulcer. Pale and enlarged liver. Inflammation of small intestine

6.16.1 Carbon Monoxide

Carbon monoxide is an odorless and tasteless gas. It spreads freely in air and is insoluble in water.

1. Mode of Administration

Carbon monoxide is a highly poisonous gas. Carbon monoxide poisoning generally occurs when the person is asleep in a closed room in which a coal angithi is burning. Carbon monoxide is absorbed in the blood through the lungs and forms carboxy haemoglobin and thus the oxygen carrying capacity of the blood results in death.

Carbon monoxide poisoning is also caused by inhaling combustion fumes and automobile exhaust. When there's too much carbon monoxide in the air, your body replaces the oxygen in the haemoglobin of your red blood cells with carbon monoxide. This keeps life-sustaining oxygen from reaching your tissues and organs.

2. Symptoms



Figure 6.10: Change of skin colour in carbon monoxide poisoning

(i) Headache

(ii) Dizziness

(iii) Nausea

(iv) Flu-like symptoms, fatigue

(v) Chest pain

(vi) Impaired judgment

(vii) Shortness of breath on exertion

(viii) Impaired judgment

(ix) Chest pain

(x) Confusion

(xi) Depression

(xii) Pink discolouration of skin

(xiii) Vomiting

(xiv) Abdominal

(xv) Drowsiness

(xvi) Visual changes

(xvii) Seizure

(xviii) Memory problems

(xix) Walking problems

(xx) Hallucinations

(xxi) Agitation

3. Various Appliances Fueled by Wood or Gas Produce Carbon Monoxide Including:

(i) Fuel burning space

(ii) Furnaces

(iii) Charcoal grills

(iv) Cooking ranges

(v) Water heaters

(vi) Fireplaces

(vii) Portable generators

(viii) Fireplaces

(ix) Portable generators

(x) Wood burning stoves

(xi) Car and truck engines

Normally the amount of carbon monoxide produced by these sources is not the cause of concern. But if appliances are kept in good working order or if they are used in a closed or partially closed space such as using a charcoal grill indoors or running car in a closed garage, the carbon monoxide can build-up to dangerous levels. Smoke inhalation during fire can also cause carbon monoxide poisoning.

6.17 Plant Poisons

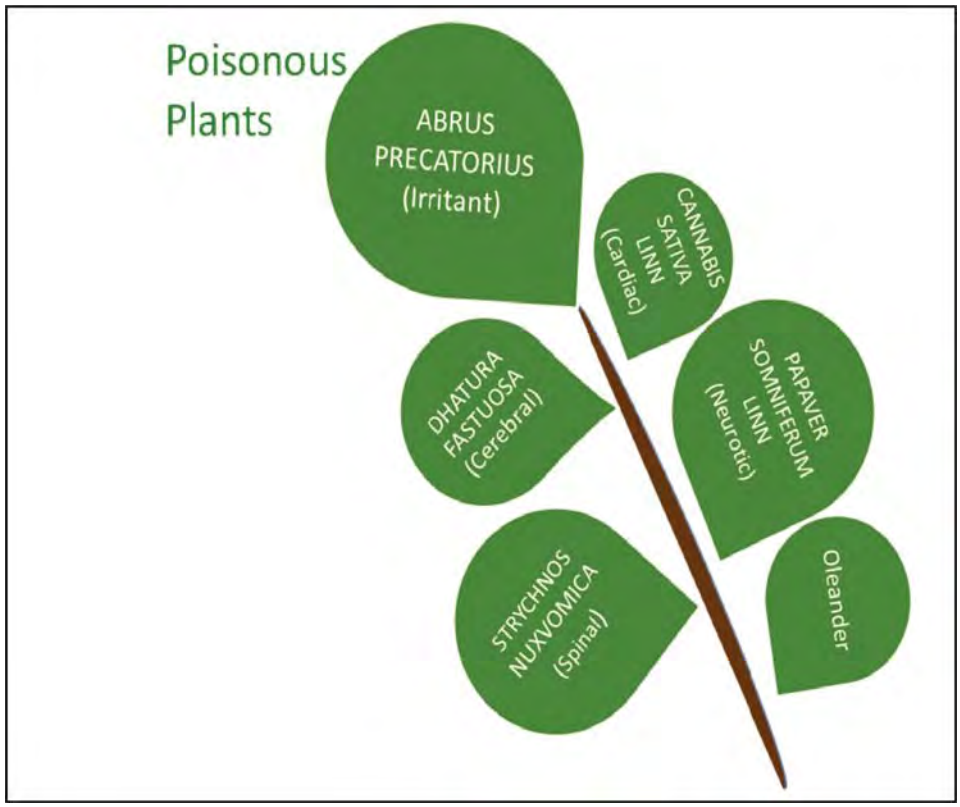


Figure 6.11: Commonly available poisonous plants

6.17.1 Rati (Abrus precatorious)

1. Nature



Figure 6.12: Rati (*Abrus*) seeds

Rati is best known for its seeds which are used as beads and in percussion instruments and which are toxic due to the presence of Abrin, a thermo labile toxalbumin. The seeds are generally red coloured with a black spot at one end.

2. Mode of Administration

Rati is administrated in the following ways:

(i) Extract injected is placed in the wound

(ii) Powder formed into a 'Sui' and injected in the body

3. Fatal Dose

The fatal dose is extract from 0.1–-0.15 g. of seeds (by injection).

4. Fatal Period

The fatal period is 3–5 days. The shortest is 24 hours.

5. Symptoms

(i) Loss of appetite

(ii) Odema

(iii) Inflammation

(iv) Death

6. Post-Mortem Findings of Rati

The mucous membrane of the stomach and the intestine is highly congested with numerous hemorrhagic patches on its surface as well as in the interior of the lungs, such as the lungs, liver and spleen.

6.17.2 Dhatura (*Datura Fastuasa*)



Figure 6.13: Dhatura flower and fruit

(i) Dhatura (*Datura fastuasa*) exists in many varieties. It grows in the wild. It is also known as thorn apple. All parts of dhatura are poisonous but seeds and fruits are especially so. The active principles are hyocyanine and hyoscine (Scopolamine). Traces of atropine are also found.

(ii) There are about 400–500 seeds in each fruit (Thorn Apple).



Figure 6.14: Dhatura fruit

1. Use/Abuse of Dhatura

(i) Dhatura is used in ayurveda system of medicine. It is misused as abortifacient. It is mixed in liquors to enhance the intoxication effect.

(ii) The criminals often use it to stupefy persons to rob them.

(iii) To stupefy children to kidnap them.

2. Route of Administration of Dhatura

Dhatura is administered in the following ways:

(i) Seeds and leaves are mixed with tobacco and given as smoke.

(ii) The powdered seeds are mixed in sweetmeats (given as *prasad*) and in food and given to the victims.

(iii) Aqueous extracts of plants especially of the seeds, are mixed with liquor and given to the victim as a drink.

3. Symptom of Dhatura

(i) Bitter taste, difficulty in speech, excessive thirst, dryness of mouth and throat.

(ii) Burning pain in stomach.

(iii) Dilated pupils, flushed face.

(iv) High temperature.

(v) Delirium, restlessness, confusion, hallucination, giddiness.

(vi) Coma.

4. Fatal Dose of Dhatura

Usually non-fatal, but excessive dose: 100–125 seeds (60 mg. of Dhaturine) can prove fatal. Corresponding dose of Dhaturine for children is about 4 mg.

5. Fatal Period of Dhatura

About 24 hours though often dhatura poisoning is not fatal.

6. Post-Mortem Findings of Dhatura

There is nothing characteristic. Seed may be found in viscera, gastrointestinal track may be congested and asphyxial signs are often present.

6.17.3 Oleander (Kaner)



Figure 6.15: Oleander (Kaner) flowers

1. Nature

Oleander is grown in gardens and on roadsides for the beauty of its flowers. It has two varieties:

(i) White oleander

(ii) Yellow oleander

All parts of plants are highly poisonous. The active substances are 'Nerin' in case of white oleander and 'Cerberin' and 'Thevetin' in yellow oleander. The plant parts are used as suicidal and homicidal poisons.

2. Mode of Administration

Oleander poisoning is often accidental when it is used as a medicine to secure abortion. It is also used as suicidal poisons.

Oleander is administered as pills. It is mixed with food materials, sweets, soft drinks and liquors. Or it is administered in the form of decoctions of its roots and leaves.

3. Fatal Dose

White oleander–15 g. roots (extract)

Yellow oleander–8–10 seeds

4. Fatal Period

24 Hours

5. Symptoms

(i) Burning sensation in the mouth and throat, frothy saliva.

(ii) Vomiting and diarrhoea with abdominal pain.

(iii) Dizziness, lock jawing, death and fainting.

6. Post-Mortem Findings

There is no specific characteristics. However, seed or leaf fragment may be found even in putrefied bodies. Gastrointestinal tract may be congested.

6.18 Animal Poisons

The snakes, scorpions, flies, insects are poisonous. The most important from the fatal poison point of view is the snake. There are about 2500 species of snakes in the world, of which, only about 50 of them are dangerous. Some of them, e.g. cobra, krait and viper are very poisonous.

1. Snake Venom

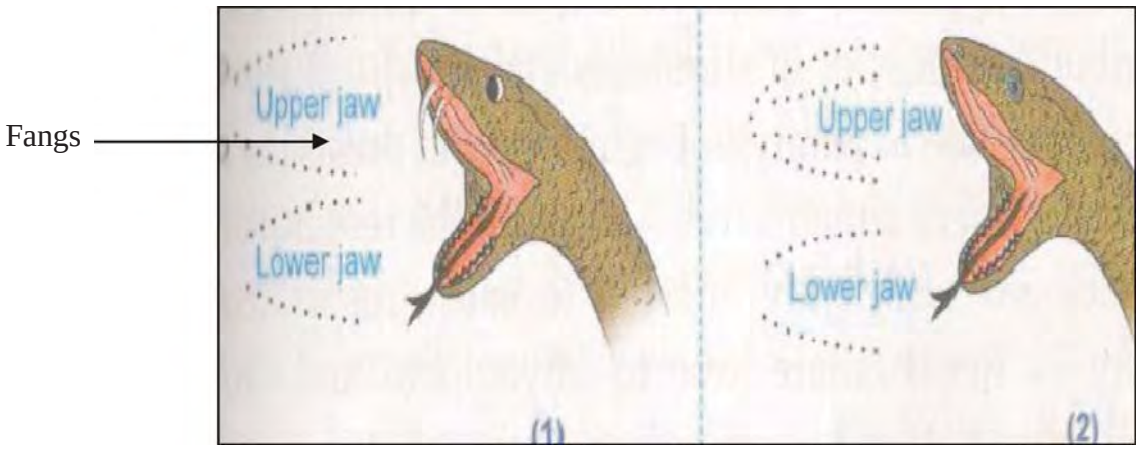


Figure 6.16: Poisonous Non poisonous

These two fangs are used for piercing in the body of the enemy.

(i) Snake venom is a clear transparent liquid. It is toxic even in the dry state. Snake venom contains a number of poisonous materials, including neurotoxins, haemotoxins, cardio-toxins, which affect the body and its parts in different ways.

(ii) They have usually the following toxic effects:

a. Neurotoxic effect: The venom affects the nervous system. The person feels weak, giddy, and lethargic. The weakness slowly changes into paralysis.

b. Hemotoxic effect: The blood does not clot. The wound continues to bleed. The lysine present in some venom is responsible to break down the protein, fibrinogen, responsible for coagulation.

(iii) Snake venom is dangerous when injected into the blood stream. The snake venom through mouth is harmful only when there is injury/ulcer in the mouth/stomach.

2. Administration of Snake Venom

(i) Snake venom is rarely used for criminal purposes, though there are reported cases where animals were poisoned by snake venom. It was administered through the vagina or rectum. Alternatively, snake may be made to bite an animal. However, in some homicidal cases, where the death is alleged to be from snakebite, presence of snake venom may have to be checked.

(ii) Deaths from accidental snake bites are frequent in warm and moist climates.

3. Fatal Dose

Table 6.7: Fatal doses

S.No	*Snake*	*Fatal dose (in terms of dried venom)*
1	Krait	6 mg.
2	Saw scaled viper	8 mg
3	Cobra	15 mg.
4	Russell's viper	20 mg.

4. Fatal Period

Death occurs from anywhere between 20 minutes–6 hours after a bite from colubrine snake and in 2–4 days after a bite from viperine snake. However, the death may occur instantaneously or within a few minutes if the venom is injected into the vein.

5. Symptoms of Snake Bite

The exact nature of the symptoms varies with the type of snake and the site of the bite but the general symptoms of the snake venom poisoning are:

(i) Burning pain.

(ii) Swelling and inflammation at the site of bite.

(iii) Giddiness, nausea and vomiting.

(iv) Lethargy, muscular weakness, spreading paralysis.

(v) Bite from a Krait may cause severe pain the abdomen and convulsion before death.

(vi) Difficulty in breathing, swallowing, respiratory failure.

6. Evidence Collection in Case of Snake Bite

In cases of snake/scorpion bites, skin piece at the site of bite and the venous blood sample should invariably be sent for chemical analysis. Viscera are not the proper sample for this.

7. At the Crime Scene in Case of Snake Bite

(i) Reassure the victim.

(ii) Do not tamper with the bite wound in any way.

(iii) Immobilize the bitten limb using a splint.

(iv) Immediate transport to hospital.

(v) Snake should also be taken to hospital if it has already been killed for recognition.

8. Post-Mortem Findings in Cases of Snake Bite

(i) There is a good deal of swelling and cellulitis about the bitten part and hemorrhage at the punctured as well as the mucous membranes of the body orifices.

(ii) The areolar tissue around the punctures is purple and infiltrated.

(iii) The blood is extremely fluid and purple in colour.

(iv) Solid clots may occur in the vein due to fibrin ferment.

(v) Petechial hemorrhages and intense congestion in different organs are seen.

6.19 Dog Bite Cases

In cases of dog bites, brain samples of the deceased should be sent for analysis to The Haffkine Institute, Mumbai.

Collection of Samples for Diagnosis of Rabies Antigen in Humans

1. Patient History: Physicians should provide a complete history of the patient and appropriately fill the clinical proforma of the Haffkine Institute stating the details of the patient.

2. Sample Packaging and Transport

(i) All samples should be considered potentially infectious.

(ii) All specimens should be collected in a primary container that is watertight and leak-proof and must be securely sealed (tape around the cap will ensure that the containers do not open during transit). If immediate transport is not possible, samples should be stored frozen at -20°C or below.

(iii) The primary container should be put in a secondary container such as zip-lock plastic bag with an insulating material between primary and secondary containers.

(iv) The secondary container should be put into a rigid outer packaging box during transport.

(v) Please ensure maintenance of cold chain (2–8°C) while the sample is being transported.

3. Sample Collection (Ante-Mortem Diagnosis)

a. Saliva

Saliva may be collected using a sterile eyedropper pipette and placed in a small sterile container which can be sealed securely. No preservatives or additional material should be added. Tracheal aspirates and sputum are not suitable for rabies tests. Laboratory tests to be performed: Detection of rabies RNA by Nested Reverse transcriptase Polymerase Chain Reaction- RT PCR.

b. Corneal Impression Smears

Impressions of the cornea of the left and the right eye may be taken on a clean grease free slide. Allow the smear to dry. Transport the slides in a closed container.

Laboratory tests to be performed: Detection of rabies antigen by direct Fluorescent Antibody Test for staining for viral antigen in frozen sections of the biopsy.

c. Nuchal Biopsy

(i) A section of skin 5–6 mm. in diameter should be taken from the posterior region of the neck at the hairline.

(ii) The biopsy specimen should contain a minimum of 10 hair follicles and be of sufficient depth to include the cutaneous nerves at the base of the follicle.

(iii) Place the specimen on a piece of sterile gauze moistened with sterile water and place in a sealed container. Laboratory tests to be performed: Detection of rabies RNA by Nested Reverse transcriptase Polymerase Chain Reaction- RT PCR and direct Fluorescent Antibody Test for staining for viral antigen in frozen sections of the biopsy.

d. Cerebral Spinal Fluid (CSF)

At least 0.5 ml. of serum or CSF should be collected; no preservatives should be added.

Laboratory test to be performed: Detection of rabies RNA by Nested Reverse transcriptase Polymerase Chain Reaction-RT PCR.

N.B.: For ante-mortem diagnosis, a negative test does not rule out Rabies Virus infection.

e. Sample Collection (Post-Mortem Diagnosis)

Brain Biopsy

Portions of the medulla (brain stem), the cerebellum, and the hippocampus are recommended for diagnosis. The biopsy may be placed in a sterile sealed container containing 50 per cent glycerol saline. Preservation of tissues by fixation in formalin is not recommended if rabies diagnosis is desired. Laboratory tests to be performed: Detection of rabies RNA by Nested Reverse transcriptase Polymerase Chain Reaction- RT PCR and direct Fluorescent Antibody Test for staining for viral antigen in frozen sections of the biopsy.

CLINICAL & EPIDEMIOLOGICAL DATA FOR RABIES

Doctor's Information			
Doctor's Name			
Hospital			
Contact No		E-mail	
Patient Information			
Patient's Name			
Address			
Hospital ID			
Sex	Male/ Female	Age	
Occupation			
Date of Illness Onset		OPD Visit Date	
Hospitalised	Yes/ No	Date Hospitalised	
Is/ Was patient in coma	Yes/ No	Date of coma onset	
Has the patient expired	Yes/ No	Date of Death	
Current differential diagnosis			

Which of the following symptoms have been present? Tick all that apply

Symptom		Duration	Symptom		Duration
Fever			Aerophobia		
Malaise			Hydrophobia		
Headache			Localised weakness		
Nausea/ Vomit			Parasthesia		
Anxiety			Confusion		
Muscle Spasm			Agitation		
Dysphagia			Autonomic instability		
Anorexia			Hyperactivity		
Priapism			Hallucinations		
Seizures			Insomnia		
Ataxia			Hypersalivation		

SYMPTOMATIC DETAILS OF THE PATIENT ARE UNKNOWN (Please tick, if applicable) ☐

Animal Exposure			
Any suspicious animal exposure	Yes/ No	Date of Exposure	
Species involved	☐ Dog ☐ Cat ☐ Other [Please Specify]:		
Exposure Type	☐ Bite ☐ Scratch ☐ Contact only ☐ Unknown		

Any Post Exposure Prophylaxis [PEP] measures taken? If yes, give details:

Additional Information (if any):

Source: Haffkine Institute, Mumbai

6.20 Food Poisoning

Food poisoning, also called foodborne illness, is illness caused by eating contaminated food. Infectious organisms including bacteria, viruses and parasites or their toxins are the most common causes of food poisoning.

Infectious organisms or their toxins can contaminate food at any point of processing or production. Contamination can also occur at home if food is incorrectly handled or cooked.

Food poisoning symptoms, which can start within hours of eating contaminated food, often include nausea, vomiting or diarrhoea. Most often, food poisoning is mild and resolves without treatment.

Contamination of food can happen at any point during its production: growing, harvesting, processing, storing, shipping or preparing. Cross-contamination, i.e. transfer of harmful organisms from one surface to another, is often the cause. Many bacterial, viral or parasitic agents cause food poisoning. Table 6.7 shows the details of some of the possible contaminants, when one may start to feel symptoms and common ways the organism is spread.

Table 6.7: Possible contaminants, when you might start to feel symptoms and common ways the organism is spread.

Contaminant	*Onset of Symptoms*	*Foods Affected and Means of Transmission*
Campylobacter	2–5 days	Meat and poultry. Contamination occurs during processing if animal faeces contact meat surfaces. Other sources include unpasteurized milk and contaminated water.
Clostridium botulin	12–72 hours	Home-canned foods with low acidity, improperly canned commercial food, smoked or salted fish, and potatoes baked in aluminum foil, and other foods kept at warm temperatures for too long.
Clostridium perfringens	8–16 hours	Meat, stews and gravies. Commonly spread when serving dishes. Don't keep food hot enough or food is chilled too slowly.
Escherichia coli (E. coli)	1–8 days	Beef contaminated with feces during slaughter. Spread mainly by undercooked ground beef. Other sources include unpasteurized milk and apple cider, alfalfa sprouts, and contaminated water.
Giardia lamblia	1–2 weeks	Raw, ready-to-eat products and contaminated water. Can be spread by an infected food handler.
Rotavirus	1–3 days	Raw, ready-to-eat products. Can be spread by an infected food handler.
Salmonella	1–3 days	Raw or contaminated meat, poultry, milk or egg yolks. Survives inadequate cooking. Can be spread by knives, cutting surfaces or an infected food handler.

Evidence Collection in Food Poisoning Cases

In food poisoning cases (i.e. bacterial poisoning), food materials and only stomach wash of the deceased should be sent for chemical analysis as viscera is not the proper sample for the same. Sample should be sent to state bacteriologist.

Information Revealed by the Evidence of Toxicology

1. Identification of Poison
2. Quantity of Poison

6.21 Seizure List

(i) Prepare list of evidence material collected from the scene.

(ii) List should be signed by two public witnesses giving their full details including permanent and temporary address.

(iii) The packets/parcels containing evidence material should be labelled giving description of its contents (exhibits), case reference and should be signed by the IO.

(iv) Forwarding memo should be filled up giving brief history of the case, details of the parcels and their contents, nature of examination required and certificate authorizing the Director, Forensic Science Laboratory for examination of the exhibits.

(v) Visceral material provided by doctor after post-mortem and exhibits collected from scene of crime should be sent collectively to FSL.

6.22 End of Search

Before leaving the crime scene, the IO should ensure that:

(i) The crime scene has been photographed properly.

(ii) The crime scene search has been done thoroughly.

(iii) All evidence collected at crime scene are properly packed, labelled and sealed.

(iv) All memos are duly filled in and all other formalities in respect of procedures mandated by the law are complete.

6.23 Scrutiny of Evidence Collected From Crime Scene

A thorough scrutiny of the evidence collected from a crime scene provides highly relevant and useful information for the purpose of investigation including crucial information about:

i. Victim-identity of victim, age of victim.

ii. Accused-identity of accused, information about other accused involved.

iii. Crime-items and/or description of items used for commission of crime, modus operandi.

6.24 Likely Queries to be Raised

From Forensic expert:

The IO should aim at finding answers to the following questions with the cooperation of the concerned persons**:**

(i) Is any poison(s) present in the exhibit?

(ii) What was the nature of the poison?

Medico-legal expert:

(i) Are there any needle marks present on the dead body? If yes, the skin including the tissue sample must be collected from the site of needle mark as well as control skin sample for chemical analysis.

(ii) What was the cause of death?

References

1. A.K. Bapuly, *Forensic Science*: *Its Application in Crime Investigation*, Hyderabad, 2006.
2. Anil Aggarwal, *Essentials of Forensic Medicine and Toxicology*, 2014.
3. Anil Aggarwal, *Textbook of Forensic Medicine and Toxicology*, 2014.
4. B.R. Sharma, *Forensic Science in Criminal Investigation and Trials*, 2012.
5. Dr (Mrs) Rukmani Krishnamurthy, *Introduction to Forensic Science in Crime Investigation*, 2011.
6. Jaiswal AK, Millo Tabin, *Handbook of Forensic Analytical Toxicology*, 2014.
7. Kannan K justice, Mathiharan Karunalaran,*Modi: A Textbook of Medical Jurisprudence and Toxicology*, 2013.
8. Kaye Sidney, *Handbook of Emergency Toxicology*, 1961.
9. Laboratory Procedure *Manual, Forensic Toxicology*, Directorate of Forensic science, Delhi, 2005.

7 HOOCH POISONING

'Hooch' is a term used for spurious alcoholic preparations. Consumption of such liquor preparations (also called 'Laththa') is harmful or fatal. Cases of 'hooch' poisoning are fairly common and have been reported from time to time in different parts of India. Outbreak of 'hooch' tragedies especially in the villages or slum areas are recorded because the spurious liquors are inexpensive and potent.

Spurious liquors include: illicit liquor (un-authorized preparation, not fit for human consumption and not complying with the BIS standards) and denatured alcohol (prepared for industrial uses and is rendered entirely unfit for human consumption by adding denaturants). The most common denaturants are–benzene, methanol, ethyl ether, acetone, acetaldehyde, toluene, cyclohexane, brucine, chloral hydrate, diethyl phthalate, camphor, amyl alcohol, isopropanol, cadmium iodide, terpinol, pyridine bases, colchicine, blue dye, chloroform, croton aldehyde, organo-phosphate, light caoutchoucine either alone or in combination. Methyl alcohol (methanol) is a commonly used adulterant because of its appearance and taste similar to ethyl alcohol and its easy availability. On consumption, methanol is changed into formic acid inside the body. The accumulation of formic acid in the body adversely affects various organ systems. Methanol poisoning can result in death within few hours if not treated immediately or may be delayed for 3-4 days. The potentially lethal dose of methanol is variable, minimum fatal dose reported is 30 ml. and permanent blindness has been reported even with 6–10 ml. of methanol.

Liquor prepared locally from coco-palm, rice, molasses or jaggery, mahuva, etc., are sometimes fortified with industrial alcohol to increase the alcohol concentration or to meet the demand. Consumption of such liquor also causes poisoning tragedies if it is mixed with methyl alcohol.

Unfortunately repeated 'hooch' tragedies have occurred in different states (as shown in Table 7.1). In order to curb this menace, some states have been declared as 'dry state'.

Table 7.1: Occurrence of death due to 'hooch' tragedy in different states

State	*Year*	*Victim*
Gujarat	1976	100
	1986	108
	1987	200
	1988	32
	2005	12
	2009	130
Punjab	2010	12
Haryana	1980	44
Delhi	1991	252
	2009	12
Orissa	1992	200
	2006	22
Kerala	2010	23
Uttar Pradesh	2001	18
	2009	29
	2010	13
	2010	35
	2015	40
Maharashtra	2004	87
	2004	27
West Bengal	2009	27
	2011	170
Karnataka	2008	180
Rajasthan	2008	25
Andhra Pradesh	2010	14
Bihar	2012	26

Source: Anil Aggarwal, 'Hooch Tragedies in India: A Review', *Anil Aggrawal's Internet Journal of Forensic Medicine and Toxicology*, 2014.

7.1 Reasons for Death of 'Hooch' Victims

1. Delay in getting proper medical treatment promptly. The victim starts experimenting with homemade remedies and seeks treatment only when condition becomes worse. This results in increased death rate or damage to the organs.

2. Patients and relatives are hesitant in disclosing the real facts about consumption of liquor due to its corollary like fear of police action.

3. Medical doctors are unable to recognize the 'hooch' episode in the beginning and, hence, proper treatment regime is not decided.

4. Delay in providing antidote (ethyl alcohol) at the initial stage leads to more casualties.

5. Delay in hemodialysis of the victim also results in casualties.

7.1.1 Investigation of 'Hooch' Tragedy Episode

Role of the first responder (police) –

On reaching the site of tragedy, the investigating officer should:

(i) Check whether the victim is alive or dead.

(ii) If the victim shows any sign of life, he must be rushed to the hospital/dispensary.

(iii) The site should be protected to avoid any alteration there.

(iv) If the victim is dead, take photograph of the victim and the site from different angles and distances as per requirements to record the details of the scene including the body.

(v) Prepare site sketch showing the dead body and other items depicting their correlative positions including distances between them.

(vi) Team of forensic experts may be called for scientific assistance in collecting the relevant evidence materials.

7.1.2 Symptoms Exhibited by the Victims

Initial symptoms of methanol poisoning may appear within 12 hours of consumption, and continue to develop up to 24 hours. Some of the symptoms are:

(i) Drowsiness, confusion and neuro-muscular incoordination.

(ii) Weakness, headache.

(iii) Nausea, vomiting, abdominal pain and cramps, burning in upper-middle region of abdomen, increased acidity.

(iv) Breathlessness, shallow and speedy respiration, unconsciousness and convulsions.

(v) Extremely low blood pressure.

(vi) Altered mental state.

(vii) Giddiness, sedation, seizure and coma.

(viii) Dilated pupil, loss of pupillary reflex, retinal congestion and edema, burning sensation and increased blood flow to optical disc.

(ix) Blurred or misty vision, double vision or changes in colour perception, constricted visual field.

(x) Loss of vision and blindness.

Note: *Some of these symptoms* (*i–iii*) *may resemble ethanol intoxication and hangover.*

7.1.3 Evidence Materials Likely to be Found at the Site of Occurrence

(i) Containers, bottles, tumblers having remnants of liquor.

(ii) Vomited substance.

(iii) Any device used for distilling spurious liquor.

(iv) Find out whether the alcohol was locally prepared or brought from any neighboring area.

(v) The mode of procurement by the consumer.

(vi) Check raw material used for preparation of illicit liquor.

7.1.4 Samples to Be Collected In Case the Victim is Alive

(i) On reaching hospital, blood and urine samples should be collected by the doctor for toxicological analysis.

(ii) Blood sample should be collected periodically and analyzed for methanol level in order to give an antidote.

(iii) Stomach wash should be collected (in case patient reaches the hospital within few hours of ingestion).

(iv) Police officer may record the information from the victim about the source of the specimen liquor.

7.1.5 Samples to be Collected in Case the Victim is dead

(i) Viscera comprising stomach and its contents, a part of the liver lobe, a section of the brain and both the kidneys are to be collected by the autopsy surgeon and to be preserved in saturated salt solution.

(ii) Sample of blood (10–15cc.) should be drawn from the dead body, transferred into a suitable air tight vial, sealed and labelled.

7.1.6 Treatment Regime of 'Hooch' Victim (by Doctors only) may Include

(i) Careful monitoring and presence of medical staff is required with the patient.

(ii) Care should be taken to prevent choking of airways.

(iii) Patient should be kept in left lateral position and head in lower position.

(iv) Ethanol 5 per cent or 10 per cent with 5 per cent dextrose drip as antidote should be given intravenously.

(v) Fomepizole and ethanol are antidotes used for toxic alcohol and glycol poisoning and should be initiated earlier to delay the metabolism of methyl alcohol to toxic metabolite (formate) and to prevent its accumulation and toxicity.

(vi) Inhibiting metabolic acidosis (increase of acidity in the blood and other body tissues) and methanol metabolism.

(vii) Enhancing the elimination of un-metabolized compounds and toxic metabolites from the serum. Stomach wash is useful within few hours of the consumption of spurious liquor.

(viii) Intra-venous (IV) fluids should be given to patients to prevent dehydration.

(ix) Vital parameters of the body should be thoroughly monitored.

(x) If blood pH is < 7.2 (serum bicarbonate < 15mmol/L) intravenous sodium bicarbonate should be given as per body weight requirements till pH is >7.2 (serum bicarbonate level reaches 18–20 ml/L).

(xi) For controlling seizure, intravenous diazepam or phenytoin may be administered.

(xii) Patient may be put on hemodialysis for removing methanol and formaldehyde.

Note: *In methanol poisoning antidote ethyl alcohol plays a vital role in saving life of the victim, if administered in the early hours of poisoning. Ethyl alcohol is metabolized into acetaldehyde which blocks the action of formaldehyde (metabolite of methyl alcohol).*

7.1.7 Forwarding of Evidence Material

(i) Forwarding memo should be filled up giving brief history of the case, details of the parcels and their contents, nature of examination required (see Chapter 2 for details).

(ii) Certificate authorizing the Director, Forensic Science Laboratory for examination of the exhibits.

(iii) Specimen of the seal impression duly attested by the concerned official should also be sent along with the forwarding memo.

(iv) Copy of inquest or *panchnama* should also be sent along with the forwarding memo.

7.1.8 Likely Queries to be Raised by the IO

From Forensic expert

(i) Concentration of methanol in blood/urine sample of the victim.

(ii) Concentration of methanol in the sample suspected to be liquor collect from the site or seized from bootleggers.

(iii) Ratio of ethanol and methanol in the victim's blood sample.

(iv) Presence of any adulterant and its concentration in liquor sample collected from the site or seized from bootleggers.

From Medico-legal expert

(i) Whether the victim is under influence of alcohol or not.

(ii) Whether the symptoms exhibited by the victims are due to methanol poisoning or any other adulterant.

(iii) What is the cause of death?

References

1. Anil Aggarwal, *Textbook of Forensic Medicine and Toxicology*, New Delhi, 2014.
2. Anil Aggarwal, *Essentials of Forensic Medicine and Toxicology*, New Delhi, 2014.
3. A.K. Bapuly Forensic *Science its Application in Crime Investigation*, Hyderabad, 2006.
4. *Application to Include Fomepizole on the WHO Model List of Essential Medicines.* http://www.who.int/selection_medicines/committees/expert/19/applications/Fomepizole_4_2_AC_Ad.pdf 16/01/2015.
5. Jaiswal AK, Millo Tabin, *Handbook of Forensic Analytical Toxicology*, New Delhi.
6. Jarwani S Bhavesh et al., 'Study of various clinical and laboratory parameters among 178 patients affected by hooch tragedy in Ahmedabad, Gujarat (India): A single center experience', *Journal of Emergencies, Trauma, and Shock*, 2012. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3665074/ 16/01/2015.
7. J. Bodwal et al., *Hooch Tragedies in India: A Review. Anil Aggrawal's Internet Journal of Forensic Medicine and Toxicology*, 2014. http://anilaggrawal.com/ij/vol015_no_001 /papers/paper002.html 16/01/2015.
8. *Laboratory Procedure Manual*, Forensic Toxicology, Directorate of Forensic Science, New Delhi, 2005.
9. Nand Laxmi et al., 'Methyl Alcohol Poisoning: A manifestation of Typical Toxicity and Outcome', *Journal of the Association of Physicians of India*, 2014. http://www.japi.org/august_2014/26_cr_methyl_alcohol_poisoning.html 16/01/2015.
10. Samanta et al., *Hooch Blindness: A Community Study Report on a Few Indoor Patients of Toxic Optic Neuropathy following Consumption of Adulterated Alcohol in West Bengal*
http://www.nepjoph.org.np/pdf/NEPjOPH_201201158.pdf (date of access 16 January 2015).

8 NARCOTIC DRUGS AND PSYCHOTROPIC SUBSTANCES (NDPS)

The term 'narcotic' in the legal sense is quite different from that used in the medical context which denotes a sleep inducing agent. Legally, a narcotic drug could be an opiate (a true narcotic), cannabis (a non-narcotic) or cocaine (the very antithesis of a narcotic, since it is a stimulant). The term 'psychotropic substance' denotes mind-altering drugs such as Lysergic Acid Diethylamide (LSD), Phencyclidine, Amphetamines, Barbiturates, Methaqualone, and designer drugs (MDMA, DMT, etc.).

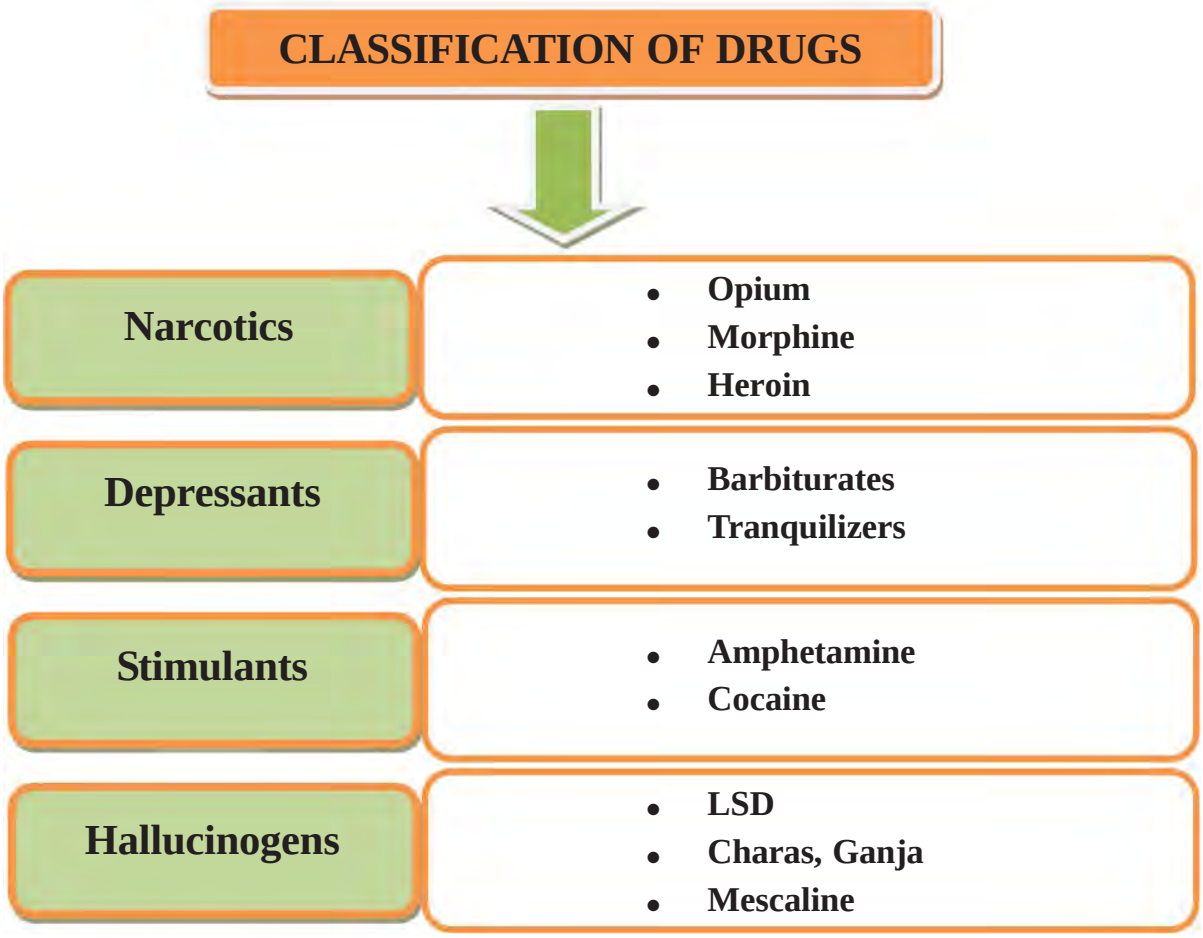


Figure 8.1: Classification of drugs

8.1 Definitions According to NDPS Act (Section 2)

(i) 'Cannabis (hemp)'is also known by the following terms:

(a) *Charas*, that is, the separated resin, in whatever form, whether crude or purified, obtained from the cannabis plant and also includes concentrated preparation and resin known as *hashish* oil or liquid *hashish*.

(b) *Ganja*, that is, the flowering or fruiting tops of the cannabis plant (excluding the seeds and leaves when not accompanied by the tops), by whatever name they may be known or designated.

(c) Any mixture, with or without any neutral material, of any of the above forms of cannabis or any drink prepared there from.

(ii) 'Cannabis plant' means any plant of the genus Cannabis.

(iii) **'**Coca derivative' means:

(a) Crude cocaine, that is, any extract of coca leaf which can be used, directly or indirectly, for the manufacture of cocaine.

(b) Ecgonine and all the derivatives of ecgonine from which it can be recovered.

(c) Cocaine, that is, methyl ester of benzoyl-ecgonine and its salts.

(d) All preparations containing more than 0.1 percent of cocaine.

(iv) 'Coca leaf' means:

(a) The leaf of the coca plant except of a leaf from which all ecgonine, cocaine and any other ecgonine alkaloids have been removed.

(b) Any mixture thereof with or without any neutral material, but does not include any preparation containing not more than 0.1 per cent of cocaine.

(v) 'Coca plant' means the plant of any species of the genus Erythroxylon.

(vi) 'Narcotic drug' means coca leaf, cannabis (hemp), opium, poppy straw and includes all manufactured drugs.

(vii) 'Opium' means:

(a) The coagulated juice of the opium poppy.

(b) Any mixture, with or without any neutral material, of the coagulated juice of the opium poppy, but does not include any preparation containing not more than 0.2 per cent of morphine.

(viii) 'Opium derivative' means:

(a) Medicinal opium, that is, opium which has undergone the processes necessary to adapt for medicinal use in accordance with the requirements of the Indian Pharmacopoeia or any other Pharmacopoeia notified in this behalf by the central government, whether in powdered form or granulated or otherwise or mixed with neutral materials.

(b) Prepared opium, that is, any product of opium obtained by any series of operations designed to transform opium into an extract suitable for smoking and the dross or other residue remaining after opium is smoked.

(c) Phenanthrene alkaloids, namely, morphine, codeine, the baine and their salts.
(d) Diacetylmorphine, that is, the alkaloid also known as diamorphine or heroin and its salts.
(e) All preparations containing more than 0.2 per cent morphine or containing any diacetylmorphine.

(ix) 'Opium poppy' means:
(a) The plant of the species Papaver somniferum L.
(b) The plant of any other species of Papaver from which opium or any phenanthrene alkaloid can be extracted and which the Central Government may, by notification in the official gazette, declare to be opium poppy for the purposes of this Act.

(x) 'Poppy straw' means all parts (except the seeds) of the opium poppy after harvesting whether in their original form or cut, crushed or powdered and whether or not juice has been extracted there from.

Table 8.1: Common narcotic drugs and psychotropic substances

Drug RUG	*Trade or Other Names*	*Nature*	*Mode of Administration*	*Effect of Overdose*	*Symptoms*	*Mode of Action*
Morphine	Morphia	Colourless crystalline substance	Oral and/or injection	75 mg.	Respiratory depression, hypotension, circulatory failure, coma, convulsions, renal failure	Analgesic/Anti-diarrheal and euphorogenic with potential for addiction
Heroin	Diacetylmorphine/ smack/ brown sugar/gard	Colourless crystalline substance	Injection/smoking/inhalation/ sniffing	200–500mg.	Coma, delirium, disorientation, drowsiness, muscle spasticity	Analgesic and euphorogenic with high potential for addiction
Cocaine	Crack	White crystalline powder	Oral/injection/ sniffing/ smoking	1.2g.	Dryness of mouth and throat, cramps in stomach, convulsions, death by respiratory failure	Stimulant with potential for addiction

Methaqualone	Mandrax/ Nidra	White powder	Orally in the form of tablet	3g.	Restlessness, insomnia, tremors, hallucinations, confusion, seizures	Euphoric action in the beginning causes addiction
Diazepam	Calmpose	White crystalline powder	Oral/Injection	100 – 500mg.	Bluish-colored lips and fingernails, blurred vision, confusion, depression, dizziness	Develops weakness, ataxia, drowsiness, respiratory depression
Barbiturate	Veronal, Luminal, Nembutal	White crystalline powder	Oral/Injection	3–5g.	Altered level of consciousness. Difficulty in thinking. Drowsiness or coma.	Depressant, death occurs from respiratory failure

Source: Narcotic Control Bureau (NCB)

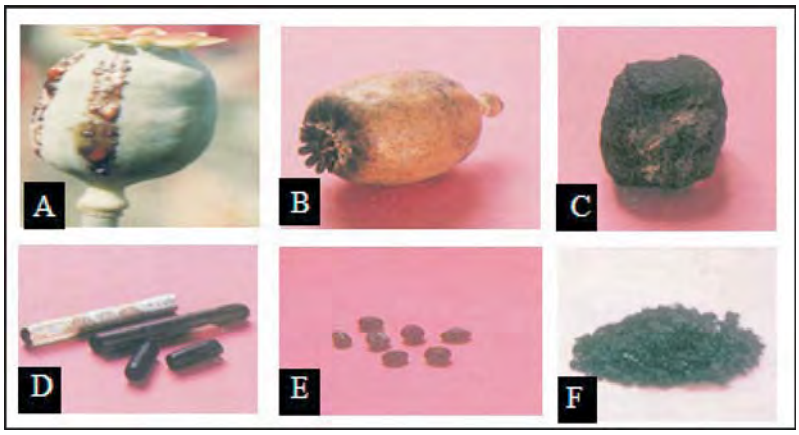


Figure 8.2: Common narcotic drugs and psychotropic substances A. Opium pod showing dried opium. B. Dried opium pod. C. Curde opium. D. Opium sticks. E. Opium pellets. F. Burnt opium powder after smoking.



Figure 8.3: Common narcotic drugs and psychotropic substances

A. Morphine powder, ranges in colour from offwhite to dark brown. B. Crude morphine C. Morphine tablets. D. Morphine ampoules.

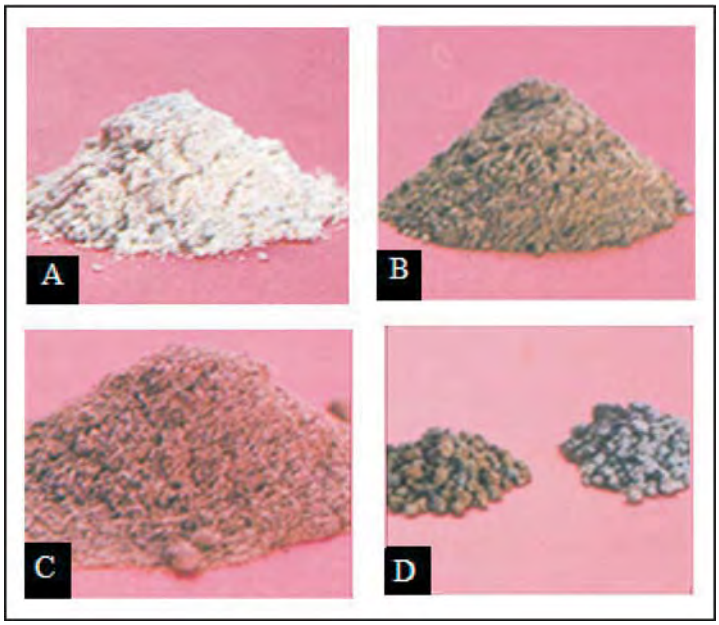


Figure 8.4: Illicit forms of Heroin

A**.** Pure grade IV heroin–fairly refined. B. Brown sugar. C. Grade III heroin. D. Brown sugar iranian.



Figure 8.5: Amphetamine in powder, tablet and capsule forms

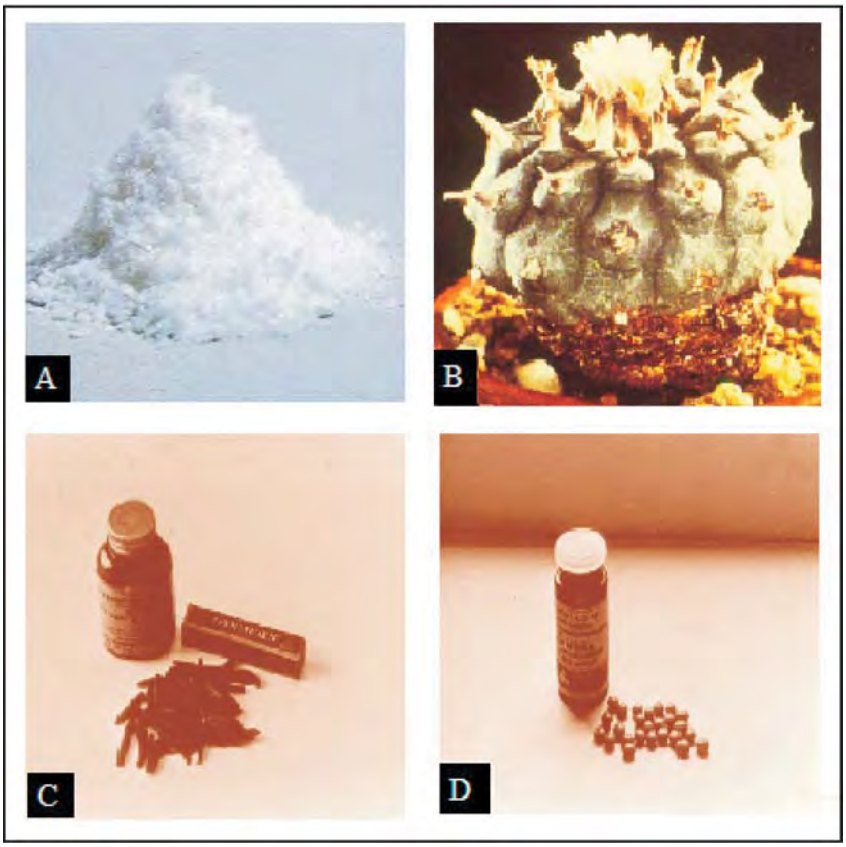


Figure 8.6: A. Pure cocaine. B. Peyote Cactus (active compound mescaline). C. Lysergic Acid Diethylamide (LSD 25). D. L.S.D in the form of pills.

8.2 Procedures under NDPS Act

Section 41

Power to Issue Warrant and Authorization

1. A Metropolitan Magistrate or a Magistrate of the First Class or any Magistrate of the second class specially empowered by the state government on this behalf, may issue a warrant for

the arrest of any person whom he has reason to believe to have committed any offence punishable under this Act, or for the search, whether by day or by night, of any building, conveyance or place in which he has reason to believe any narcotic drug or psychotropic substance or controlled substance in respect of which an offence punishable under this Act has been committed or any document or other article which may furnish evidence of the commission of such offence or any illegally acquired property or any document or other article which may furnish evidence of holding any illegally acquired property which is liable for seizure or freezing or forfeiture under Chapter V A of this Act is kept or concealed.

2. Any such officer of Gazetted rank of the departments of central excise, narcotics, customs, revenue intelligence or any other department of the central government including the para-military forces or the armed forces as is empowered on this behalf by general or special order by the central government, or any such officer of the revenue, drugs control, excise, police or any other department of a state government as is empowered on this behalf by general or special order of the State Government if he has reason to believe from personal knowledge or information given by any person and taken in writing that any person has committed an offence punishable under this Act or that any narcotic drug or psychotropic substance or controlled substance in respect of which any offence under this Act has been committed or any document or other article which may furnish evidence of the commission of such offence or any illegally acquired property or any document or other article which may furnish evidence of holding any illegally acquired property which is liable for seizure or freezing or forfeiture under Chapter V A of this Act is kept or concealed in any building, conveyance or place, may authorize any officer subordinate to him but superior in rank to a peon, sepoy or a constable to arrest such a person or search a building, conveyance or place whether by day or by night or himself arrest such a person or search a building, conveyance or place.

3. The officer to whom a warrant under sub-section (1) is addressed and the officer who authorized the arrest or search or the officer who is so authorized under sub-section(2) shall have all the powers of an officer acting under section 42.

'Controlled delivery' means the technique of allowing illicit or suspect consignments of narcotic drugs, psychotropic substances, controlled substances or substances substituted for them to pass out of, or through or into the territory of India with the knowledge and under the supervision of an officer empowered on his behalf or duly authorized under section 50-A with a view to identifying the persons involved in the commission of an offence under this Act.

Section 42

Power of Entry, Search, Seizure and Arrest without Warrant and Authorization

1. Any such officer (being an officer superior in rank to a peon, sepoy or constable) of the departments of central excise, narcotics, customs, revenue intelligence or any other department of the central government including para-military forces or armed forces as is empowered on this behalf by general or special order by the central government, or any such officer (being an officer superior in rank to a peon, sepoy or constable) of the revenue, drugs control, excise, police or any other department of a state government as is empowered in this behalf by general or special order of the state government, if he has reason to believe from persons knowledge or information given by any person and taken down in writing that any narcotic drug, or psychotropic substance, or controlled substance in respect of which an offence punishable under this Act has been committed or any document or other article which may furnish evidence of the commission of such offence or any illegally acquired property or any document or other article which may furnish evidence of holding any illegally acquired property which is liable for seizure or freezing or forfeiture under Chapter V A of this Act is kept or concealed in any building, conveyance or enclosed place, may between sunrise and sunset,

    (a) Enter into and search any such building, conveyance or place.

    (b) In case of resistance, break open any door and remove any obstacle to such entry.

    (c) Seize such drug or substance and all materials used in the manufacture thereof and any other article and any animal or conveyance which he has reason to believe to be liable to confiscation under this Act and any document or other article which he has reason to believe may furnish evidence of the commission of any offence punishable under this Act or furnish evidence of holding any illegally acquired property which is liable for seizure or freezing or forfeiture under Chapter V A of this Act; and

    (d) Detain and search, and, if he thinks proper, arrest any person whom he has reason to believe to have committed any offence punishable under this Act, provided that if such officer has reason to believe that a search warrant or authorization cannot be obtained without affording opportunity for the concealment of evidence or facility for the escape of an offender, he may enter and search such building, conveyance or enclosed place at any time between sunset and sunrise after recording the grounds of his belief.

2. Where an officer takes down any information in writing under subsection (1) or records grounds for his belief under the proviso thereto, he shall within seventy-two hours send a copy thereof to his immediate official superior.

Section 50

Conditions under which Search of a Person shall be Conducted

1. When any officer duly authorized under section 42 is about to search any person under the provisions of section 41, section 42 or section 43, he shall, if such person so requires, take such person without unnecessary delay to the nearest Gazetted Officer of any of the departments mentioned in section 42 or to the nearest Magistrate.

2. If such requisition is made, the officer may detain the person until he can bring him before the Gazetted Officer or the Magistrate referred to in subsection (1).

3. The Gazetted Officer or the Magistrate before whom any such person is brought shall, if he sees no reasonable ground for search, forthwith discharge the person but otherwise shall direct that search be made.

4. No female shall be searched by anyone except a female.

5. When an officer duly authorized under section 42 has reason to believe that it is not possible to take the person to be searched to the nearest Gazetted Officer or Magistrate without the possibility of the person to be searched parting with possession of any narcotic drug or psychotropic substance, or controlled substance or article or document, he may, instead of taking such person to the nearest gazetted officer or magistrate, proceed to search the person as provided under section 100 of the Code of Criminal Procedure, 1973.

6. After a search is conducted under sub-section (5), the officer shall record the reasons for such belief which necessitated such search and within seventy two hours send a copy thereof to his immediate official superior.

Section 52

Disposal of Persons Arrested and Articles Seized

1. Any officer arresting a person under section 41, section 42 section 43 or section 44 shall, as soon as may be, inform him of the grounds for such arrest.

2. Every person arrested and article seized under warrant issued under subsection (1) of section 41 shall be forwarded without unnecessary delay to the Magistrate by whom the warrant was issued.

3. Every person arrested and article seized under sub-section (2) of section 41, section 42, section 43 or section 44 shall be forwarded without unnecessary delay to –

   (a) The officer-in-charge of the nearest police station, or
   (b) The officer empowered under section 53.

4. The authority or officer to whom any person or article is forwarded under subsection(2) or sub-section (3) shall, with all convenient dispatch take such measures as may be necessary for the disposal according to law of such person or article.

Section 55

Police to Take Charge of Articles Seized and Delivered:

An officer-in-charge of a police station shall take charge of and keep in safe custody, pending the orders of the Magistrate, all articles seized under this Act within the local area of that police station and which may be delivered to him, and shall allow any officer who may accompany such articles to the police station or who may be deputed for the purpose, to affix his seal to such articles or to take samples of and from them and all samples so taken shall also be sealed with a seal of the officer-in-charge of the police station.

Section 57

Report of Arrest and Seizure

Whenever any person makes any arrest or seizure under this Act, he shall, within forty-eight hours next after such arrest or seizure, make a full report of all the particulars of such arrest of seizure to his immediate officer superior.

I. Guidelines for Investigating Officer

The IO should ensure to follow the following guidelines and make notes in writing (ruqqa):

1. Raiding party's constitution, departure with/without vehicle, arms and ammunition, route taken, the name of the driver as well as accompanying of the informer.

2. Numbers of independent public witness requested, their place, their background, i.e. whether they were passer-by, rickshaw pullers, residents, etc., and reasons for not joining.

3. Time must be noted for important aspects like:

   (a) Time of making DD entry

   (b) Constitution of raiding party

(c) Time of leaving police station

(d) Time of arrival of spot

(e) Time of briefing to the team

(f) Time of *nakabandi*

(g) Time of apprehending of suspect

4. Briefing of staff, area of nakabandi, how many parties put on nakabandi, who was standing where, position of the informer, etc.

5. Time and direction of arrival of the suspect, whether he was carrying something with him, his turnout, etc.

6. If anybody is accompanying the suspects, he must also be apprehended and interrogated thoroughly.

7. If any vehicle is used, its number, make and colour.

8. If the suspect spontaneously produces the contraband to the police, no need of notice u/s 50 NDPS Act.

9. Complete description of packing/wrappers/marking and the contraband must be described in the writing (ruqqa) as well as in the seizure memo.

10. The contraband must be checked through by field-testing kit.

11. Sampling should be done properly. Two representative samples be taken.

12. CFSL/FSL/CRCL form must be filled in instantaneously.

13. Case property must be properly sealed with standard seal and the seal used must be handed over to any of the witnesses. While taking the case property in his charge, the SHO should counter-seal it with his own seal. Every addition in the FSL/CFSL/CRCL form, etc., must be duly signed by the SHO.

14. If house search is to be conducted at night, reasons thereof must be recorded and sent to senior officers within 72 hours.

15. Accused's dossier must be prepared.

16. First remand must be taken from the Magistrate concerned.

17. In case, drug recovered is less than commercial quantity, the *challan* must be filed within 60 days whereas in case of commercial quantity, the *challan* may be filled in 90 days but the efforts should be to file the *challan* at the earliest.

18. Sample must be sent to the laboratory for chemical analysis at the earliest. It should be in the knowledge of the SHO and covered in his statement.

19. To maintain the sanctity of Diary Dispatch entries, they must be attested by a Gazetted Officer.

20. Site plan must be described, prepared and elaborated and every minute detail of the scene should be mentioned in it.

21. Previous involvements of the suspect in the drug trafficking, if any must be mentioned in the *challan* to enable the court for awarding enhanced punishment.

22. Written work is done in the vehicle. If there is no vehicle, then the place where written work was done should be mentioned in the statements. Who arranged for the stool or chair is also be known to the IO/witnesses.

23. A constable should not be allowed to make any search. It is prohibited in the NDPS Act.

24. Parcels should be signed by the witnesses.

25. The seizure should be weighed on the spot.

26. Details of weighing balance, from where arranged, number of weights must be noted carefully.

27. If vehicle is used, log book should be completed.

28. Who did the written work, should be known to the witness.

29. It should be mentioned in the writing (ruqqa) as to how many seals have been affixed.

30. The SHO/Addl.SHO/IOs must get an official seal and at the time of raid, they should get the seal issued officially.

31. There should be separate registers in the office of SHO, ACP and DCP in which date and time of dispatch and receipt of all reports should be mentioned.

II. Check List for Investigation of Offences under N.D.P.S. Act

1. **Recording of Information:** Whenever any information is received, it should be taken down in writing and forwarded to the higher authority in-charge of enforcement and necessary orders thereon obtained.

2. **Verification of Information**: A preliminary verification of the information through sources and by surveillance, whenever situation demands, has to be done.

3. **Planning of Operation**: The operation should be well planned so that it can be conducted efficiently in the least possible time. Deployment of responsibilities on various participating officers should be done after briefing on the objectives of the operation. Officers deployed for the search should carry their official identity cards.

4. **Equipments/Instruments etc., for Search:** It is necessary that the equipment's and the tools like screwdrivers, torches, spotlights, mirrors, walkie-talkie, camera, binocular, night vision arms and ammunitions handcuff etc. are checked and taken before starting the operation. It is also to be checked that the vehicles are in condition. The other things that need to be checked before moving out for operation are: search proforma, form of notice under Sec. 67 of the NDPS Act, arrest memo, test memo, envelopes, seal, sealing materials, writing paper, candles, matchsticks, weighing balance (a spring balance and a digital weighing machine) etc.

5. **Drug Identification/Test Kit:** The officers moving out for operation must not forget to take with them a drug identification kit. It is necessary to check before proceeding for search that the reagents are there in the bottles of the test kit and the test kit is in otherwise working.

6. **Entry into the Premises:** Before the commencement of the search, the officer should obtain an authorization for the search as per Sec. 41(2) of the NDPS Act. On searching the spot, the officers must immediately gear up for the strike. The entry and exit points must be manned properly and watch should be maintained on the windows and other opening so that nothing can be thrown from exit/verandah, etc.

7. All incoming telephone calls should be received by the officers only.

8. **Search Authorization:** If a place is to be searched based on personal knowledge or information taken down in writing, a copy of the grounds of belief or information (in form DR-I) is to be sent forthwith to his immediate official superior.

9. **Disclosure of Identity and Purpose of Search:** As entry into the premises is sought, the officers should disclose their identity and purpose and offer themselves to be searched. It is to be remembered that the purpose of search may be defeated if anybody is allowed to go out of the premises or make outside calls during the search. If a person is to be subjected to a personal search, he has the right to search the officer, if he so requires, such person has the right to take physical search of the officer conducting the search.

10. **Search in Presence of Independent Witnesses:** At least two independent and respectable witnesses of the locality are to be called and in their presence and the owner and the occupier or his representative, the search is to be conducted. Please remember that the witnesses are independent, not stock witnesses.

11. **Preparation of Search List (Mahazar/Panchanama):** After conclusion of the search, a search list is to be prepared. Drugs or things or documents if recovered and also the place of their recovery are invariably to be mentioned in the search list. A copy of the search list is to be handed over to the agent/owner/occupier of the premises. If any personal search is taken during the search of the premises, a separate search list mentioning the goods recovered from person so searched. In case of no recovery, NIL RECOVERY is to be mentioned in the search list. The search list should bear the signatures of the person, owner/owner's representative witnesses along with their name, addresses, etc. The copy should bear the dated signature of whom it has been served. Please check if a copy of the panchnama/ mahazar has been given to the owner.

12. **Drawal of Sample:** It is very important to draw and seal representative sample of narcotic drugs/psychotropic substances in the presence of the owner, occupier, agent and the witnesses. Seizing officer should be assigned the job of drawal of sample of required quantity and sealing it properly for being sent to the laboratory as soon as possible. Please check if the samples have been drawn, packed and sealed as per the instructions in force and the procedure mentioned in the mahazar. Samples should be sent to the laboratory within 72 hrs.

13. **Statements:** The next important step that is required to be taken is interrogation/examination of the suspects (accused) and the witnesses. Notice under Section 67 of the NDPS Act may be issued and statements about the identity of the person, address, background, education, occupation, involvement in the drug trade, etc., are to be recorded. This notice should be served under the signature of the concerned person. It must be ensured that the statement that is recorded is written in the language which is understood by the suspects/witnesses. The person making the statement and any correction made therein should be initialed by him. The officer in whose presence the statement is given should also put his signature. If the statement is not written by the person himself, the officer should keep a note that the statement was read out and explained to the person in the language known to him.

14. **Disposal of Persons Arrested and Articles Seized:** While arresting a person memo may be served to the person under his dated signature as a token of receipt of the same. The person being arrested should be informed of grounds for such arrest as per Sec. 52(1) of the NDPS Act. Other provisions of Section 52 have also to be complied with regard to arrested persons and seized article.

15. **Informing the Superior about Seizure and Arrest:** As per requirement of the Act, the immediate superior officer is to be sent a full report of all the particulars of an arrest. This requirement of law is not to be forgotten. Such report should be given within 48 hours of seizure or arrest in terms 57 of the NDPS Act.

16. **Deposition of the Goods and Documents:** Goods that are seized, including drugs, are to be kept in godown earmarked for this. Godown officer should be satisfied about the intactness of quantity and weight of the goods, etc., and it is to enter in the register of the godown.

17. **Filing of Remand Petition:** On arrest of a person, a petition for his suitable custody is to be made to the nearest Magistrate/Judge of Special Court. It is to be ensured that no person is unnecessarily kept in custody without order. The accused is required to be produced before the court without delay.

18. **Investigation:** Seizing officer immediately, after production of the accused before the jurisdictional Magistrate should go through the documents that are recovered and the statements that have been recorded for deciding the follow-up measures and the course of investigation that are to be taken up with appropriate agency and authorities regarding which the supervisory officer has to be informed in writing.

19. **Financial Profile of the Accused:** Financial profile of the accused in the prescribed performa should be prepared while statements are taken from them and also after the offence is investigated. An order for freezed illegally acquired property as per Section 68F (1) of the NDPS Act has to be issued and a copy of the said order has to be forwarded to the competent authority.

8.3 Types of Evidences in NDPS Cases



Figure 8.7: Powder in polythene packet

1. Powder of different colours (generally white, off white, grey, light brown) in polythene packets, liquid (like liquid hashish and opium dissolved in water) *as colour or dye may be added to the drug.*
2. Syringe, small quantity in puriyas, vials, spoon used by addicts.
3. Cardboard boxes containing some items along with polythene packets.
4. Sacks containing lime mixed with drug.
5. Pharmaceutical preparations in wrappers.
6. Brown black resinous material, opium or *charas*.
7. Illicitly manufacturing drug site: labelled or unlabelled bottle or containers containing chemicals, apparatus used in preparations of drugs or precursors.
8. Plant material: Poppy plant, *ganja*, cocaine leaves containing cocaine.
9. *Dhoopbatti* like sticks of *charas*.

Note: *Drug should not be tasted as it could be poison.*

8.4 Collection of Evidences

The samples must be drawn on the spot of recovery and in the presence of witnesses and the accused.



Figure 8.8: Drug packets

1. The contents of the package must be mixed very thoroughly from top to bottom to draw representative sample.
2. From one package, normally 2 samples are drawn which are termed as 'Original' and 'Duplicate' or Sample no.1 and 2 or A and B.
3. Same quantity should be taken for the 'Original' and 'Duplicate' samples.

Table 8.2: Quantity to be drawn for sampling

Sample	*Quantity*
Narcotic drugs and psychotropic substances	5 g.
Opium/*ganja* and *charas*/ *hashish*	24 g.

Source: Central Revenue Control Lab

Note 1: *If the seizure of NDPS is less than 5g., even then the small quantity of sample taken can be analyzed by the laboratory since the techniques used can detect and identify commonly encountered NDPS.*

Note 2: *The seized goods and samples are deposited in the Malkhana at the earliest after seizure and acknowledgement receipt must be obtained from the Malkhana-in-charge.*

8.5 Number of Samples to be Drawn in Each Seizure Case

1. **Single Package**

   The material should be removed from its container or wrappings and the net weight should be recorded.

2. **More Than One Package**

   (i) If there are less than 10 packages–all packages should be sampled.

   (ii) If there are 10–100 packages-randomly select 10 packages.

   (iii) If there are more than 100 packages—randomly select a number of packages equal to the square root of the total number of packages rounded to the next higher integer.

   If the material in all packages is found to be similar by visual examination, one of the following approaches may be allowed:

   (i) The contents of a number of packages may be combined and the combined bulk material may then be homogenized.

   (ii) Alternately, chemical testing may be applied to a number of each of the packages.

   When different types of material have been identified in various packages, each sub-group should be composited in an identical fashion.

3. Items Containing Bulk Aggregates

(i) If the aggregates can be easily reduced to small particles then this should be the approach.

(ii) If the material cannot be easily broken down, random samples should be drawn from atleast two different parts of the item.

4. Sampling Procedure For LSD

(i) LSD exhibits are either in paper, tablet or gelatin form.

(ii) For single container, determine the total number of dosage units and the average weight per dosage unit (du).

(iii) For sample sizes up to 10du—screen all dosage units.

(iv) For sample sizes from 11du to 27du—randomly select and screen ¾ of all dosage units, rounding upward to the next higher integer.

(v) For sample sizes from 28du—select randomly and screen ½ of all dosage units rounding upward to the next integer and selecting a minimum of 21du and a maximum of 50du.

(vi) In case of multiple containers having different contents, this should be segregated and subjected to separate analysis. Determine the square root of the total number of containers in each group. Randomly select a number of containers equivalent to the square root, rounded to the next highest integer.

8.6 Small and Commercial Quantity of Important Drugs

According to Section 2 of NDPS Act:

'Commercial quantity', in relation to narcotic drugs and psychotropic substances, means any quantity greater than the quantity specified by the Central Government by notification in the official gazette.

'Small quantity**',** in relation to Narcotic Drugs and Psychotropic Substances, means any quantity lesser than the quantity specified by the central government by notification in the Official Gazette**.**

Table 8.3: Small and commercial quality of drugs

Drug	*Small Quantity*	*Commercial Quantity*
Amphetamine	2 g.	50 g.
Buprenorphine	1 g.	20 g.
Charas/Hashish	100 g.	1 kg.
Cocaine	2 g.	100 g.
Codeine	10 g.	1 kg.
Diazepam	20 g.	500 g.
Ganja	1 kg.	20 kg.
Heroin	5 g.	250 g.
MDMA (Ecstasy)	0.5 g.	10 g.
Methamphetamine	2 g.	50 g.
Methaqualone (Mandrax)	20 g.	500 g.
Morphine	5 g.	250 g.
Poppy Straw	1 kg.	50 kg.

Source: NDPS Act 1985

Offences under commercial quantities are non-bailable U/S 37 NDPS Act 1985. However, if the court finds that the accused is not guilty of offence or is not likely to indulge in sale/ purchase of narcotic drugs, bail can be granted.

The punishment for many offences under **Sections 15–23 of NDPS Act** depends on the type and quantity of drugs involved—with three levels of punishments for small, lesser and immediate quantity, i.e. quantity more than small and lesser than commercial quantity. The punishment prescribed for different quantities is as follows:

1. Where the contravention involves small quantity, with rigorous imprisonment for a term which may extend to six months, or with fine which may extend to Rs. 10,000 or with both.
2. Where the contravention involves quantity lesser than commercial quantity but greater than small quantity, with rigorous imprisonment for a term which may extend to ten years and with fine which may extend to Rs. 1,00,000.
3. Where the contravention involves commercial quantity, with rigorous imprisonment for a term which shall not be less than ten years but which may extend to twenty years and shall also be liable to fine which shall not be less than Rs. 1,00,000 but which may extend to Rs. 2,00,000s.

Section 27 of NDPS Act: Punishment for Consumption of Any Narcotic Drug or Psychotropic Substance.

Whoever, consumes any narcotic drug or psychotropic substance shall be punishable,-

1. where the narcotic drug or psychotropic substance consumed is cocaine, morphine, diacetyl-morphine or any other narcotic drug or any psychotropic substance as may be specified in this behalf by the central government by notification in the Official Gazette, with rigorous imprisonment for a term which may extend to one year, or with fine which may extend to Rs. 20,000; or with both.

2. Where the narcotic drug or psychotropic substance consumed is other than those specified in or under clause (a), with imprisonment for a term which may extend to six months, or with fine which may extend to Rs. 10,000 or with both.

Section 31: Enhanced Punishment for Offences after Previous Conviction:

1. If any person who has been convicted of the commission of, or attempt to commit, or abetment of, or criminal conspiracy to commit, any of the offences punishable under this Act is subsequently convicted of the commission of, or attempt to commit, or abetment of, or criminal conspiracy to commit, an offence punishable under this Act with the same amount of punishment shall be punished for the second and every subsequent offence with rigorous imprisonment for a term which may extend to one-half of the maximum term of imprisonment and also be liable to fine which shall extend to one-half of the maximum amount of fine.

2. Where the person referred to in sub-section (1) is liable to be punished with a minimum term of imprisonment and to a minimum amount of fine, the minimum punishment for such person shall be one-half of the minimum term of imprisonment and one-half of the minimum amounts of fine.

3. Provided that the court may, for reasons to be recorded in the judgment, impose a fine exceeding the fine for which a person is liable.

4. Where any person is convicted by a competent court of criminal jurisdiction outside India under any corresponding law, such person, with respect of such conviction, shall be dealt with for the purposes of sub-sections (1) and (2) as if he had been convicted by a court in India.

8.7 Packaging Procedure of Evidences



Figure 8.9: Sample in heat plastic bag

(i) Solid samples should be kept in heat sealed plastic bags.

(ii) Plastic bag should be kept in paper envelope and must be properly sealed.

(iii) Liquid samples should be kept in leak proof plastic bottle.

(iv) Plastic bottle is further wrapped in clean piece of cloth.

(v) Mark the sealed envelopes as Original and Duplicate.

(vi) 'Original' and 'Duplicate' envelopes should bear the serial number of the package/ container for which the sample has been drawn.

(vii) Sample envelope will also have reference of test memo, i.e. case number, identification mark.

(viii) Keep sealed sample and test memos in another envelope, seal it and mark it as 'Secret Drug-Sample/Test Memo'.

8.8 Labelling and Sealing of Evidences



Figure 8.10: Sealed envelope (duplicate)

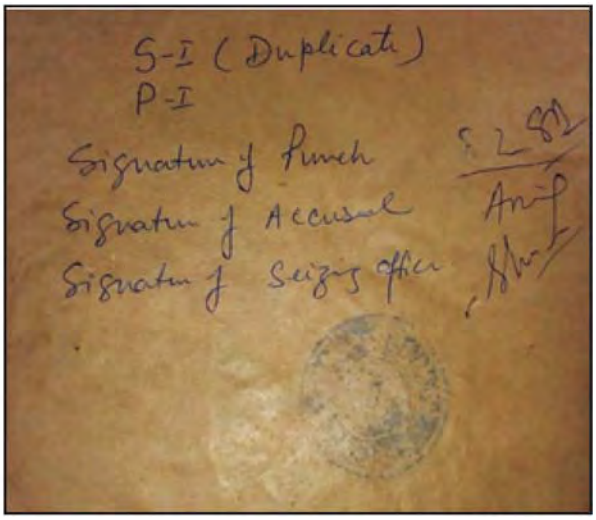


Figure 8.11: Details to be mentioned on envelope of duplicate sample

1. If drug seized is found in package/containers, each should be serially numbered for the purpose of identification.
2. If drug is found in loose form then it should be arranged to be packed in unit containers of uniform size and serial number should be assigned to each package/ container.
3. Following should be indicated on each package or on a cardboard label with a seal of seizing officer:
   - Gross weight (the total weight, including contents, packaging, etc.).
   - Net weight (the weight of the contents, not including any packaging, etc.).
   - Particulars of the drug
   - Date of seizure

   Preferably use electronic balance or balance of high accuracy.
4. When more than one sample is drawn, each should be serially numbered and marked as S-1, S-2, and S-3… on both original and duplicate samples.

5. Each sample should carry the serial number of the packages and marked as P-1, P-2, P-3 and so on.

6. Each sample must be drawn and sealed in the presence of the accused, *panchnama* witnesses, seizing officer and duly signed by all of them and also their name should be mentioned.

8.9 Forwarding of Evidences

1. The sample must be sent to the concerned laboratory for examination with sample seal.

2. The sample seal must bear the signatures with date of sealing authority.

3. In NCB and CBN, Superintendent of Police and in customs, Inspector is authorized to forward the sample.

8.10 Narcotic Drug Detection Kit

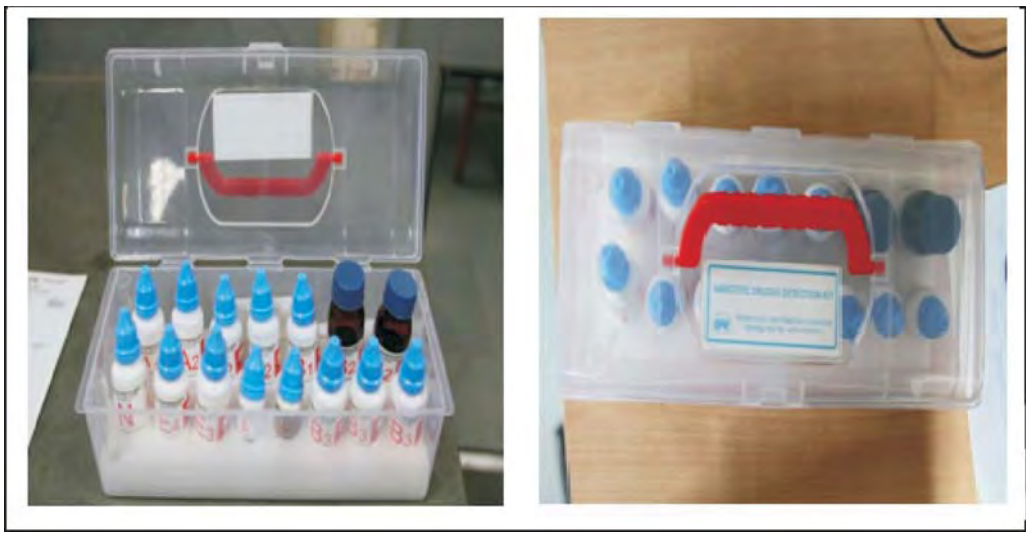
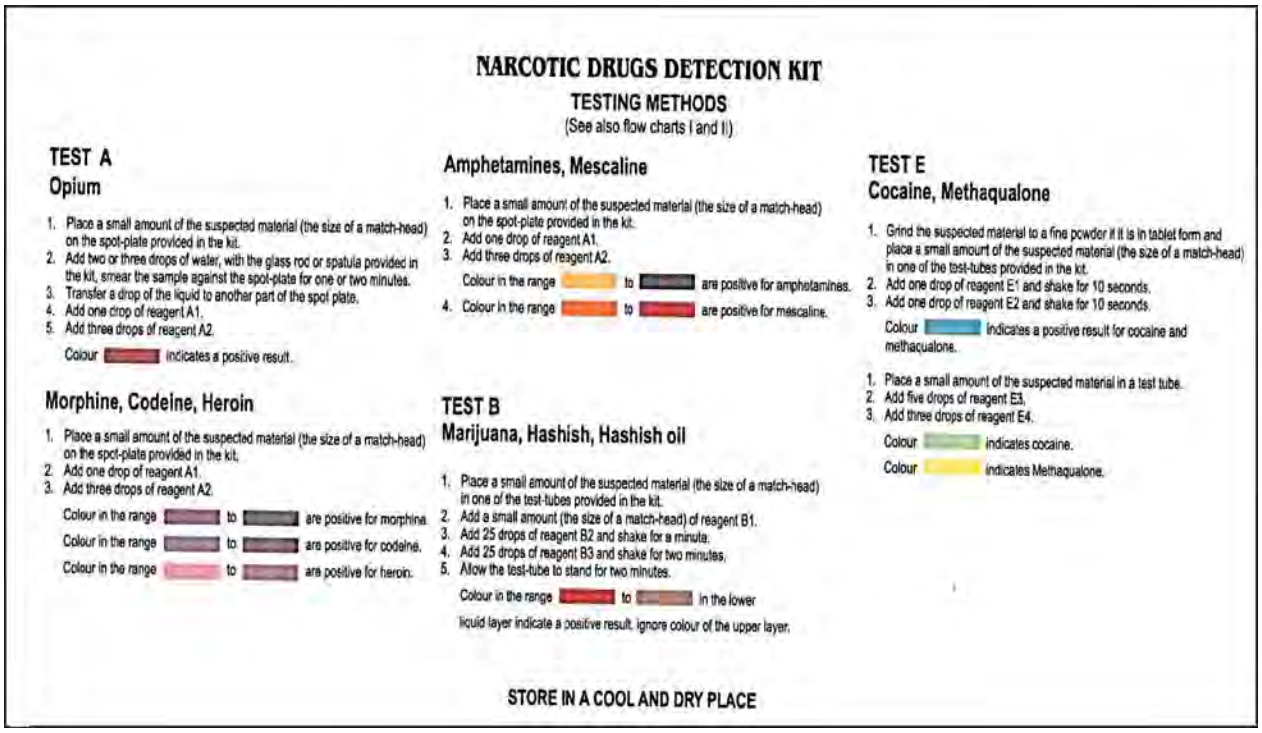


Figure 8.12: Narcotic drug detection kit



NARCOTIC DRUGS DETECTION KIT

TESTING METHODS

(See also flow charts I and II)

TEST A

Opium

1. Place a small amount of the suspected material (the size of a match-head) on the spot-plate provided in the kit.
2. Add two or three drops of water, with the glass rod or spatula provided in the kit, smear the sample against the spot-plate for one or two minutes.
3. Transfer a drop of the liquid to another part of the spot plate.
4. Add one drop of reagent A1.
5. Add three drops of reagent A2.

Colour indicates a positive result.

Morphine, Codeine, Heroin

1. Place a small amount of the suspected material (the size of a match-head) on the spot-plate provided in the kit.
2. Add one drop of reagent A1.
3. Add three drops of reagent A2.

Colour in the range to are positive for morphine.

Colour in the range to are positive for codeine.

Colour in the range to are positive for heroin.

Amphetamines, Mescaline

1. Place a small amount of the suspected material (the size of a match-head) on the spot-plate provided in the kit.
2. Add one drop of reagent A1.
3. Add three drops of reagent A2.

Colour in the range to are positive for amphetamines.

4. Colour in the range to are positive for mescaline.

TEST B

Marijuana, Hashish, Hashish oil

1. Place a small amount of the suspected material (the size of a match-head) in one of the test-tubes provided in the kit.
2. Add a small amount (the size of a match-head) of reagent B1.
3. Add 25 drops of reagent B2 and shake for a minute.
4. Add 25 drops of reagent B3 and shake for two minutes.
5. Allow the test-tube to stand for two minutes.

Colour in the range to in the lower liquid layer indicate a positive result, ignore colour of the upper layer.

TEST E

Cocaine, Methaqualone

1. Grind the suspected material to a fine powder if it is in tablet form and place a small amount of the suspected material (the size of a match-head) in one of the test-tubes provided in the kit.
2. Add one drop of reagent E1 and shake for 10 seconds.
3. Add one drop of reagent E2 and shake for 10 seconds.

Colour indicates a positive result for cocaine and methaqualone.

1. Place a small amount of the suspected material in a test tube.
2. Add five drops of reagent E3.
3. Add three drops of reagent E4.

Colour indicates cocaine.

Colour indicates Methaqualone.

STORE IN A COOL AND DRY PLACE

Figure 8.13: Chart for comparision of colour tests of NDPS drugs

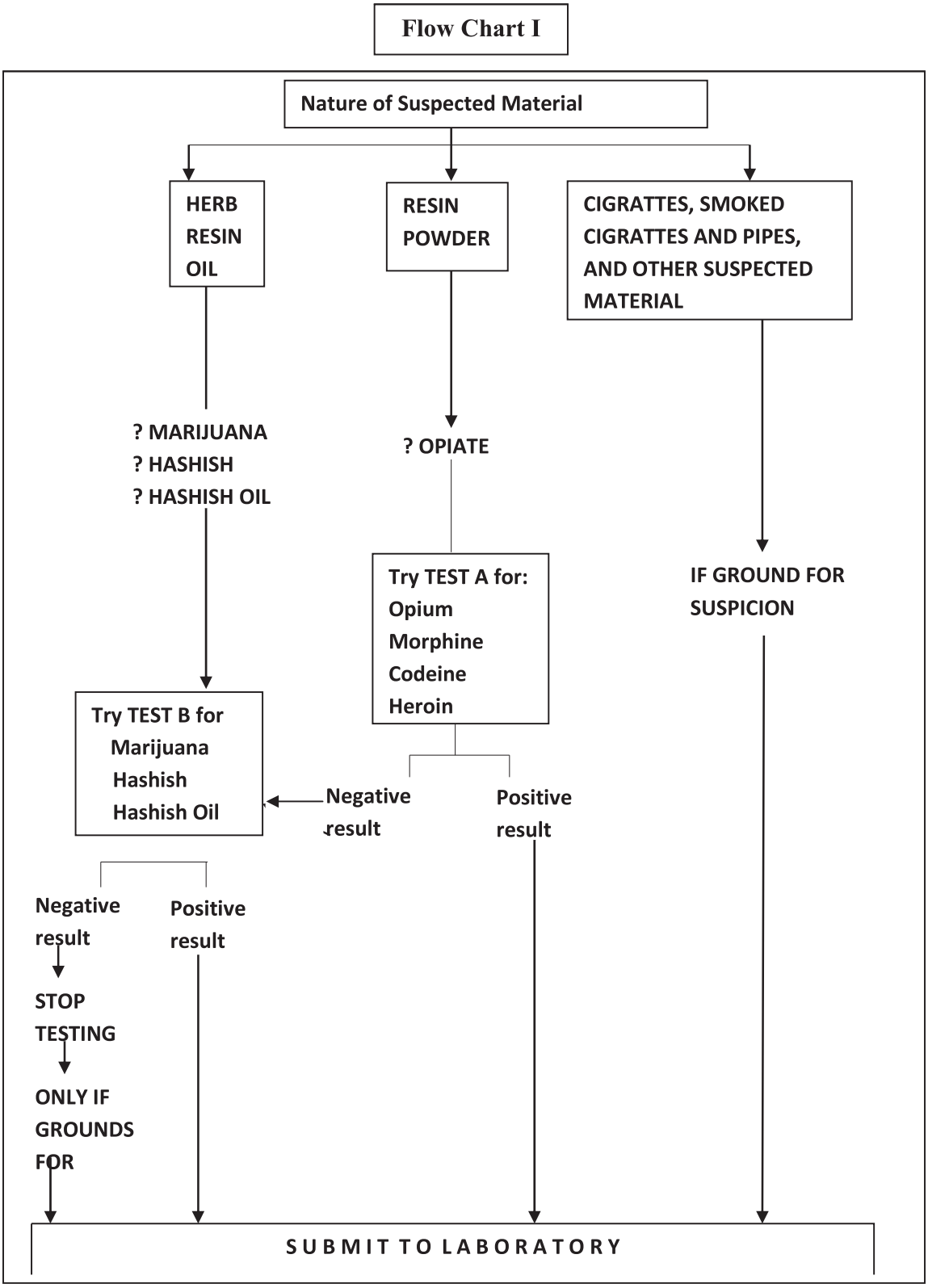


Figure 8.14: Screening of suspected NDPS Drug

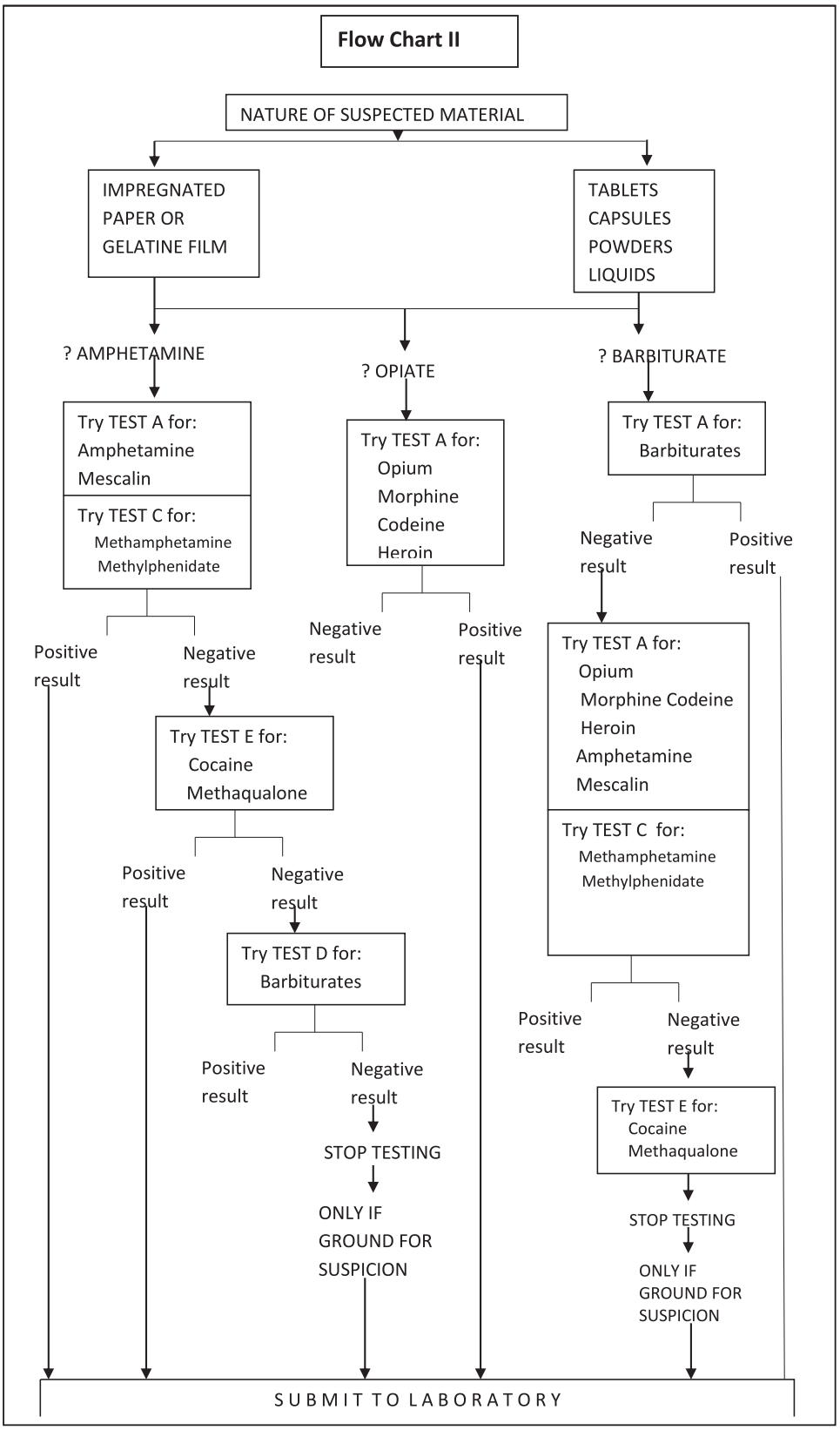


Figure 8.15 Screening of suspected NDPS Drug

Take small quantity of the suspected material and add reagents as mentioned in the testing method of the Narcotic Drug Detection Kit and compare the colour with the chart as follows:

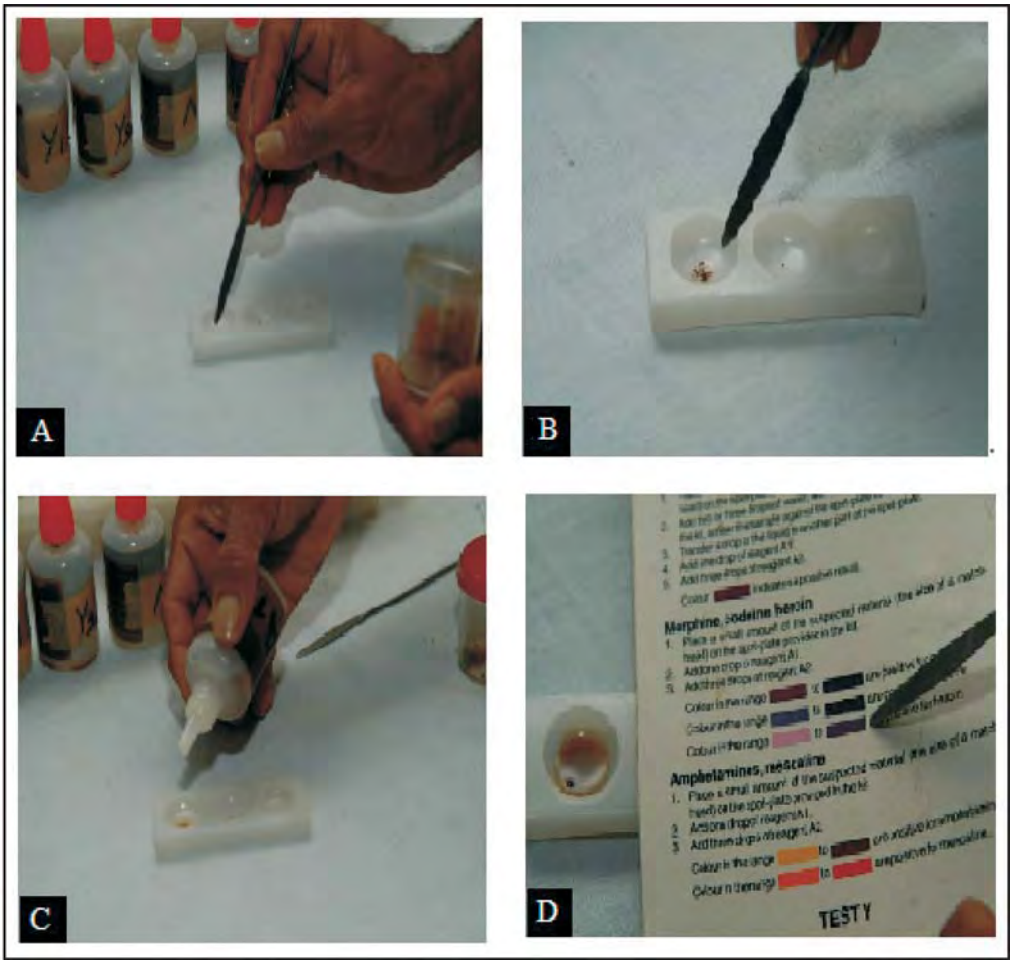


Figure 8.16: Steps for carring out spot test for drugs

1. Test by kit is only a presumptive/preliminary test and need further confirmation and for which the sample is to be sent to a laboratory.

Caution: *As this report is not accepted in the court, the sample is to be sent to FSL/CFSL/CRCL.*

2. Kit does not contain test for all NDPS substances. If test kit is negative, it does not mean that no NDPS drug is present.

Suppliers of NDPS Drug Detection Kit

A. Drug Detection Kit is supplied free of cost by the Narcotic Control Bureau.

B. Some firms also supply imported kit having provision of testing more drugs.

Note:

1. *After getting report from FSL/CFSL/CRCL, the result of the report to be interpreted vide notification of S.O. 1055(E) dated 19-10-2001 – In exercise of the powers conferred by clauses (viia) and (xxiiia) of Section 2 of the NDPS Act, 1985. NDPS Substances mentioned in the corresponding entry in the column 2 to 4 of the said table, as the small quantity and commercial quantity respectively for the purpose of the said clauses of that section.*

2. *The Gazette of India, Extraordinary Part-II- Subsection (II) published by the Ministry of Finance(Department of Revenue) Notification dated 18th November 2009. 'The quantity shown in column 5 and column 6 of the table relative to the drug shown in column 2 shall apply to the entire mixture or any solution or anyone or more narcotic drug of psychotropic substances of that particular drug in doses form or isomers, esters and salt of these drugs, including salt of esters, ethers and isomers wherever existence of such substances possible and not just its pure drugs contents'.*

8.11 Precursor Detection Kit

According to Section 2 of NDPS Act:

'Controlled Substances(Precursors)'means any substance which the Central Government may, having regard to the available information as to its possible use in the production or manufacture of narcotic drugs or psychotropic substances or to the provisions of any international convention, by notification in the official gazette, declare to be a controlled substance.

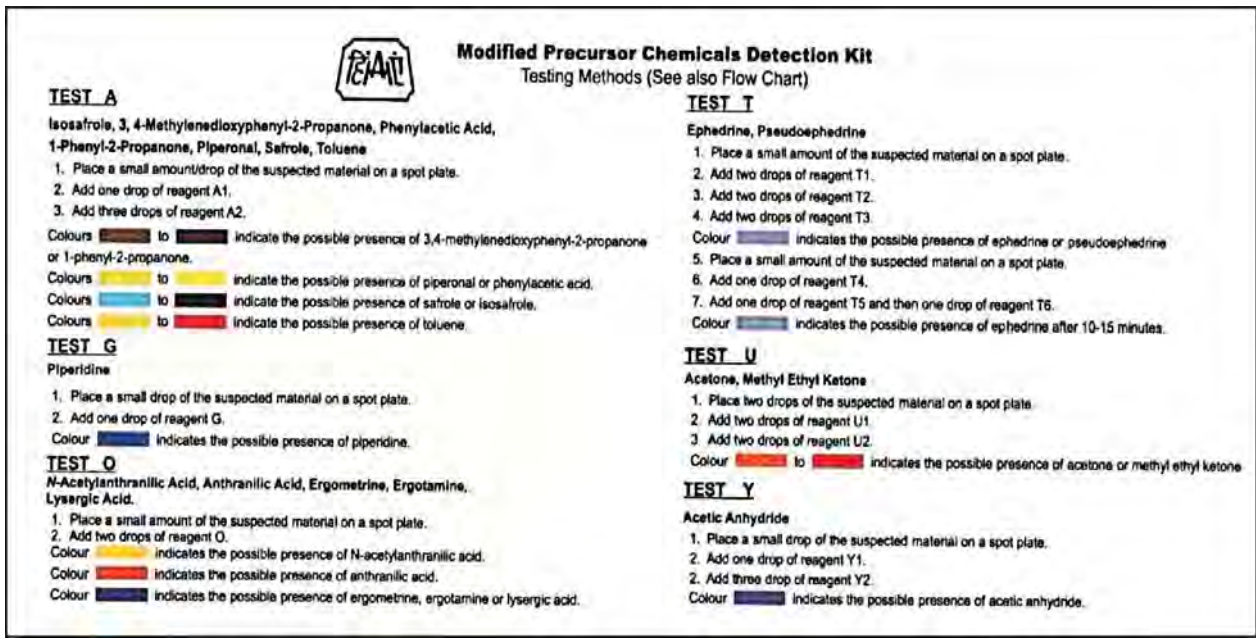


Figure 8.17: Colour Chart for detection of Precursor

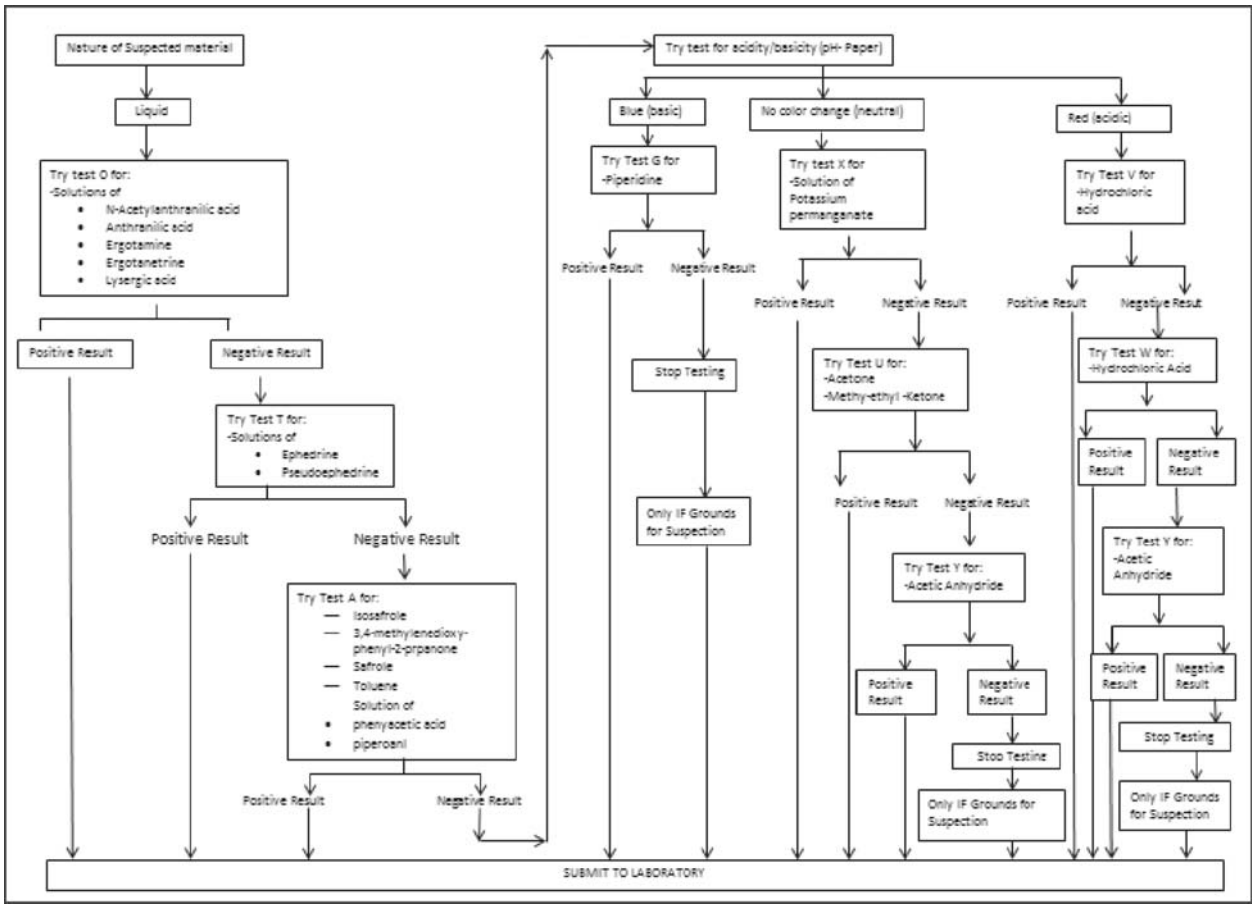


Figure 8.18: Screening method for precursor chemicals or drugs

8.12 Precursor Chemicals

Table 8.2: Precursor chemicals

Table I substances			
S.No		*S.No*	
1	N-acetyl anthranilic acid	8	3,4- methylene- dioxyphenyl-2propanone
2	Acetic anhydride	9	Norephedrine
3	Ephedrine	10	1-phenyl-2propanone
4	Ergometrine	11	Piperanol
5	Ergotamine	12	Potassium permanganate
6	Isosafrole	13	Pseudoephedrine
7	Lysergic acid	14	safrole

Table II substances			
S.No		*S.No*	
1	Acetone	6	Phenyl acetic acid
2	Anthranilic acid	7	Piperidine
3	Ethyl ether	8	Sulphuric acid
4	Hydrochloric acid	9	Toluene
5	Methyl ethyl ketone		

8.13 Checklist for Investigation of Drug Related Offences

1. Addicts

(a) Name, age and sex.

(b) Educational background.

(c) Educational details—university/institution.

(d) Details about the family members.

(e) Income of the family.

(f) Earning members.

(g) Economic status.

(h) Commitments of the family (financial).

(i) Physical and mental conditions.

(j) Details about physical problem.

(k) Nature of abuser—quiet/irritable/violent.

(l) Nature and type of drug abused.

(m) Method of administration.

(n) Source of procurement of drug.

(o) Past history of the abuser about other drugs.

(p) Initiation of drug abuse.

(q) Duration of abuse.

(r) Frequency of intake.

(s) Details about other abusers.

(t) Friend circle of the addict.

(u) Source of money to purchase drug.

(v) Criminal history of the abuser.

(w) Family atmosphere.

(x) Attitude of family members including guardians.

(y) Recent history of crime/violence in the family.

2. Place of Abuser

(a) Details of drug recovered including its form and quantity.

(b) Paraphernalia recovered.

(c) Details of the money recovered.

(d) Stolen articles recovered.

(e) Phone numbers, diaries, address books.

(f) Other materials used for taking drugs such as cigarette paper, metal foil, matchboxes, cotton, bloodstained cotton, tourniquets, etc.

(g) Collection of samples of drugs, paraphernalia used and other materials such as spoon, cotton, etc.

(h) Collection of blood and urine samples of the abuser by the doctor (control samples).

(i) Packaging and forwarding of the samples of drugs and control samples.

(j) Recording of statements of the addicts and members of the family.

(k) Raiding the drug den.

(l) Arrest of the accused person.

(m) Medical examination of the addict.

(n) Counseling/treatment/rehabilitation of the addict.

3. Drug Den

(a) Name, age, social and economic background of the person(s) and associates running the den.

(b) Types of drugs sold and their forms.

(c) Criminal history of the accused person.

(d) Time since when the accused was running the den.

(e) Details of the person visiting the den.

(f) Source of procurement of drugs.

(g) Search of the den.

(h) Search of the persons.

(i) Details of the hiding places.

(j) Collection of sample of different types of drugs, precursor chemicals, and related materials.

(k) Results of spot test.

(l) Collection of materials such as paraphernalia used by the addicts, empty capsules, machines for making tablets, packets etc.

(m) Money recovered from the accused persons.

(n) Financial history and transactions.

(o) Details of the other members of the gang.

(p) Details about other criminal activities.

(q) Statements of the accused persons.

(r) Taking the addicts into custody and sending them to doctor for medical examination and collection of blood and urine samples.

(s) Arresting the accused person.

4. Search of a Suspected Vehicle Carrying Drugs

(a) Type and make of vehicle, chassis number, engine number, colour, registration number and the issuing authority, driving license and the issuing authority, insurance details.

(b) Identification of driver and other occupants.

(c) Weapons recovered, if any.

(d) Search of the persons.

(e) Search of the vehicle.

(f) Use of sniffer dogs.

(g) Part/portion in which the drug is hidden.

(h) Quantity and form of drug.

(i) Result of spot test.

(j) Whether the materials are precursor chemicals.

(k) Interview of the suspects.

(l) Details about their criminal history and involvement in the drug trade.

(m) Details about procurement of contraband.

(n) Their contact persons.

(o) Their destinations.

(p) Collection of samples of suspected materials, packaging and forwarding for analysis.

(q) Seizure of vehicle.

5. Search of a Suspected Premises

(a) Location, address and other descriptions of the house including the ownership and relevant papers.

(b) Search of inmates of the house.

(c) Search of the house.

(d) Recovery of drugs, precursor chemicals and other related materials.

(e) Result of spot test.

(f) Collection, packaging and forwarding of samples of drugs.

(g) Socioeconomic status of the owner.

(h) Source of income and earning members.

(i) Details of property and financial transactions.

(j) Source of drugs.

(k) Other partners in the trade.

(l) Places to which the drugs are supplied.

(m) Details of the addicts, if found.

(n) Criminal history of the occupants.

(o) Recovery of weapons, communication equipment, etc.

(p) Any vehicle used in the transportation of drugs.

(q) Modus operandi.

(r) Search of vehicle and collection of samples of drugs.

6. Clandestine Laboratory

(a) Location and other descriptions of the laboratory, whether isolated house, house in a congested urban area, rural area, flat in a multi storey building or a mobile unit.

(b) Details of the persons running and working in the laboratory.

(c) Their criminal history and modus operandi.

(d) Collection of samples of drugs in various forms, precursor chemicals and other related materials.

(e) Result of the spot test.

(f) Details of machineries recovered.

(g) Collection of samples of drugs, etc., from the machineries.

(h) Other chemicals used in the manufacturing of drugs.

(i) Details about import of chemicals, raw materials, precursor chemicals and other materials.

(j) Details about the supply.

(k) Recovery of money.

(l) Seizure of records showing details about drug trade including financial transactions.

(m) Details about bank deposits.

(n) Details about other properties.

(o) Details about vehicle used in transportation of materials related to manufactured drugs and collection of samples.

(p) Criminal history of persons arrested.

(q) Statement of the persons.

(r) Arrest of the persons and other relevant legal formalities.

8.14 Details of Seizure of Drugs for the Years 2011, 2012, 2013 and 2014

Table 8.3: Details of seizure of drugs

Drugs		*2011*	*2012*	*2013*	*2014*
Opium	Seizure	2,365	3,625	2,166	417
	Cases	892	876	813	61
Morphine	Seizure	53	263	7	9
	Cases	147	140	99	55
Heroin	Seizure	528	1033	1401	387
	Cases	2,944	3,155	4,165	417
Ganja	Seizure	122,711	711,149	91,608	26,825
	Cases	4,174	4,468	4,581	828
Hashsish	Seizure	3,872	3,385	4,397	720
	Cases	2,263	2,031	2,402	585
Cocaine	Seizure	14	44	47	3
	Cases	80	72	78	14
Methaqualone	Seizure	72	216	3,205	0
	Cases	5	14	30	2
Ephedrine	Seizure	7,208	4,393	6,655	503
	Cases	20	17	66	15
LSD(in Grams)	Seizure	6	21	2	26
	Cases	5	5	3	5
Acetic Anhyderide	Seizure	62	363	243	22
	Cases	3	3	7	1

8.15 Do's: Search, Field Testing and Seizure

1. Was the information recorded in writing by him? (If he has received some information- Section 42 (1) of the NDPS Act)

2. Were his belief and the ground that search authorization cannot be obtained without affording opportunity for concealment of evidence or facility for escape of the offenders, recorded in writing by him? (If he is proceeding to search premises without search authorization between sunset to sunrise, Proviso to Section 42 (1) of the NDPS Act)

3. Was a copy of the said documents as at 1 or 2, as applicable, sent to his official superior within 72 hours? (Section 42(2) of the NDPS Act)

4. Were the copy of Search Authorization shown and signatures of two independent local witnesses and the owner/occupier available in the premises obtained at the time of search? (In case, the search of premises is carried out on the strength of a search authorization)

5. Did the search team offer their own personal search by the owner/occupier of the premises before beginning the search of the premises?

6. Was a written notice under section 50 of the NDPS Act served to the occupants of the premises or on the person who is intercepted at a public place (This is a must if a person is given a body search and is not necessary if only the premises is searched or if the bag, brief case, etc. in the possession of the person is only searched)? Was the response to such a notice recorded in writing?

7. Was a lady officer present in the search team to ensure that a female has searched a female? (Section 50(4) of the NDPS Act)

8. Was there sufficient reason to believe that the person about to be searched will part possessions of drug and other incriminating articles and, hence, could not be taken to senior officers, and if yes, whether it was recorded in writing? (The person about to be searched for suspected drugs and other incriminating articles can exercise his legal right to be searched before a Magistrate or a Gazetted Officer, as provided in Section 50(1) of the NDPS Act)

9. Was the copy of the documents, as at serial No. 8, sent to his immediate superior within 72 hours? (Section 50(6) of the NDPS Act)

10. Were all recovered suspect substances field tested with Drug Detection Kits/Precursor Testing Kits and the matching colour resulted to show presence of NDPS or CS (Control Substances) and was it all documented?

11. Were all the recovered documents, articles or things scrutinized/examined to determine their relevance to the commission of offence and importance to the inquiries under the Act?

12. Were all recovered and relevant items liable to seizure and confiscation entered carefully in an inventory and documented in the Panchnama?

13. Were all the goods, documents, articles, things and assets found relevant to the commission of offence and subsequent investigations, recovered during search, seizure and the fact of seizure documented in the Panchnama?

Drawal of Samples

1. Was a set of two representative samples drawn from each package or lot (if bunching was made into lots of 40 in case of ganja and hashish and 10 in case of other drugs) of the suspects seized substances on the spot?

2. Was it ensured that the representative samples are of specified weights? (24 g. each in case of opium, ganja and charas and 5 g. each in case of all others). Less than 5g. may also be sent.

3. Were all the packages including the representative samples properly packed, marked and sealed?

4. (For easy reference, the parent package or lot can be marked as P1 and L1 and the two sets of samples as SOI and SDI and so on. Samples should be kept in heat sealed plastic pouches which may be kept in paper envelopes before marking and sealing).

5. Was Test Memo prepared in triplicate on the spot and the facsimile imprint of the seal, used in sealing the sample envelopes, affixed on the Test Memo?

6. Was the Panchanama/seizure memo/mahazar drawn carefully on the spot, correctly indicating sequence of events including start and end time of the search proceeding?

7. Was it ensured that the Panchanama and all the recovered/seizure documents/article/ things bears signature of the person whose premises was searched or from whom the recovery was made. Two independent witnesses, the IO and the lady officer are to be present if a lady was searched?

8. Was a notice to examine the owner/occupants and recovery witnesses under Section 67 of the Act issued and their statements recorded by the IO?

8.16 Chain of Custody of Seized Drugs and Precursors

1. Were the seized goods and samples deposited in the *malkhana* at the earliest opportunity after seizure, and acknowledgement receipt obtained from the *Malkhana*-in-Charge?

2. Were the samples sent to the notified laboratory for analysis and report within 72 hours of seizure?

8.16.1 Laboratories to which samples may be sent:

The seizing officers of the Central Government departments, viz., Customs, Central Excise, Central Bureau of Narcotics, D.R.I, etc., should dispatch samples of the seized drugs to one of the laboratories of the Central Revenues Control Laboratory nearest to their offices depending upon the availability of test facilities. The addresses of the Central Revenues Control Laboratories are given below:

1. Director, Central Revenues Control Laboratories, Pusa, IARI campus, New Delhi–110012.
2. Joint Director, Govt. Opium and Alkaloid Works, Ghajipur (UP).
3. Chemical Examiner, Govt. Opium and Alkaloid Works, Neemuch (MP).
4. Joint Director, Customs, House Laboratory, Customs House, Chennai–600001.
5. Joint Director, Chemical Laboratory, Customs House, Kolkata–1.
6. Joint Director, New Customs House, Ballard Estate, Mumbai–38.
7. Joint Director, Jawahar Customs House, NhevaSheva (Raigarh).
8. Chemical Examiner, Customs House Laboratory, Customs House, Cochin–9.
9. Chemical Examiner, Customs C. Ex. Laboratory, YashKamal Bldg., 8th Floor, Baroda–5.
10. Chemical Examiner, Customs House Laboratory, Vishakhapatnam (AP).
11. Chemical Examiner, Customs House Laboratory, Customs House, New Kandla (Gujarat).
12. Chemical Examiner, Customs House Laboratory, Sada, Marmagua, Goa–403803.
13. Chemical Examiner, Customs House Laboratory, Assam Oil Refinery, Digboi (Assam).
14. Chemical Examiner, Customs House Laboratory, Barauni Oil Refinery, Barauni, Begusarai.
15. Chemical Examiner, HPLC Refinery, Corridor Road, Trombay, Mumbai–400074.

The other Central Agencies like B.S.F, C.B.I and other central police organizations may send such samples to the Director, Central Forensic Laboratory, New Delhi/CFSL, Chandigarh/ Hyderabad/Kolkata.

All state enforcement agencies may send samples of seized drugs and psychotropic substances to the Director/ Dy. Director/Assistant Director of their respective state forensic science laboratories.

8.16.2 The addresses of state forensic science laboratories are given below:

1. Director, Forensic Science Laboratories, Govt. of Bihar, Patna–800023.
2. Director, Police Forensic Science Laboratory, Rajasthan, Nehru Nagar, Jaipur–302006.
3. Director, Forensic Science Laboratories, Mini Punjab Sector, Plot no. 2, Sector 9A, Chandigarh.
4. Director, State Forensic Science Laboratory, Rasulgarh, Bhubaneswar (Orissa).
5. Director, Forensic Science Laboratory, Haryana, Madhuban (Karnal).
6. Director, Forensic Science Laboratory, Andhra Pradesh, Red Hills, Hyderabad–4.
7. Director, Forensic Science Laboratory, Trivandrum–10.
8. Director, State Forensic Science Laboratory, West Bengal, Balgachia Road, Kolkata–37.
9. Director, Forensic Science Laboratory, 5-Miller Road, Om MehalBldg., Banglore–560052.
10. Director, Forensic Science Laboratory, Assam, Kahitapara, Guwahati–19.
11. Director, Forensic Science Laboratory, KamaragarSalai, Mylapore, Chennai–4.
12. Director, Forensic Science Laboratory, Gujarat, New Mental Corner, Ahmedabad–380016.
13. Director, Forensic Science Laboratory, Maharashtra, Santa Cruz (East), Mumbai–400098.
14. Director, Forensic Science Laboratory, Civil Lines, Sager (M.P.) –470001.
15. Director, Forensic Science Laboratory, Mahanagar, Lucknow (U.P.).
16. Director, Forensic Science Laboratory, New Delhi.
17. Assistant Director, Forensic Science Laboratory, Junagarh (Gujarat).
18. Chemical Examiner of U.P. Govt., Agra (U.P.).
19. Director, Forensic Science Laboratory, Opposite C.D. Hospital, Sri Nagar (J.K.).

8.16.3 Follow Up

1. Was the investigation case file put up before superior officers to inform them of the progress in the case on a regular basis (at least once in a week/fortnight) for their instructions, monitoring and guidance?

2. Was the test report received from the laboratory in time before filing complaint? If not, is it being followed up?

3. Was the investigation completed on time, at least two weeks before the time to file complaints? (Complaint has to be filed within 180 days (see Section 36 A (4) of NDPS Act, 1985 as amended) for large quantity cases and 60 days for other cases. The IO should have adequate time to compile and collate all evidence and obtain department opinion of the counsel before filing it in the court)

4. Is the complaint complete in all respects and includes all materials, facts and evidence collected during investigation, details of all the witnesses in the memo and is accompanied by all the original documents at the time of filing the complaint in the court?

8.17 Common Reasons for Acquittal

1. Don't forget to send a copy of the reasons to immediate superior officer under section 42 (2) of the Act. It's non-compliance is fatal to the prosecution.

2. Don't forget to give option of being searched by Gazetted Officer/a Magistrate to the accused under section 50 of the Act. It's non-compliance is fatal to the prosecution.

3. Don't forget to reduce in writing the information received about some narcotic drug/ psychotropic substance illegally kept/concealed. Send copy of information to superior officer. Non-compliance of section 42 is fatal for prosecution.

4. Don't forget to get the search of female offender made by a female constable under section 50 (4) of the Act. Non-compliance is fatal to the prosecution.

5. Don't forget to draw and seal the sample and residue substance.

6. Don't forget to hand over the seal to independent witness till the case property is sent for analysis.

7. Seizure memo, arrest memo, spot memo, etc., must be attested by witnesses.

8. Don't forget to disclose the ground of arrest to the accused and his family/friends.
9. Case property must be produced before the Magistrate for attestation for pre-trial disposal. The inventory must be prepared and photographs taken in compliance with Section 52A (2) of the Act.
10. Don't forget to join independent witness in investigation.
11. Don't forget to file the challan within the time frame prescribed by law.

8.18 Seizure List

1. Prepare list of evidence material collected from the scene.
2. List should be signed by two public witnesses giving their full details including permanent and temporary addresses.
3. The packets/parcels containing evidence material should be labelled giving description of its contents (exhibits), case reference and should be signed by the IO.
4. Forwarding memo should be filled up giving brief history of the case, details of the parcels and their contents, nature of examination required and certificate authorizing the Director, Forensic Science Laboratory for examination of the exhibits.

8.19 End of Search

Before leaving the crime scene the IO should ensure that:

1. The crime scene search has been done thoroughly.
2. All evidence collected at crime scene is properly packed, labelled and sealed.
3. All memos are duly filled in and all other formalities in respect of procedures mandated by the law are completed.

8.20 Scrutiny of Evidence Collected from Crime Scene

A thorough scrutiny of the evidence collected from a crime scene provides highly relevant and useful information for the purpose of investigation including crucial information about:

1. Accused–identity of accused, information about other accused involved.
2. Crime–items and/or description of items used for commission of crime, modus operandi.

8.21 Questionnaire

1. Whether the recovered substance is covered under NDPS Act or not?
2. Whether the given substance contains the entire mixture or any solution or anyone or more narcotic drugs or psychotropic substances of that particular drug in doses, forms or isomers, esters, ethers, and salts of these drugs, including salt of esters, ethers and isomers, wherever existence of such substances is possible and not just its pure drug content?
3. Whether the substance identified is synonymous to any other substance mentioned in NDPS Act?

8.22 Case Study

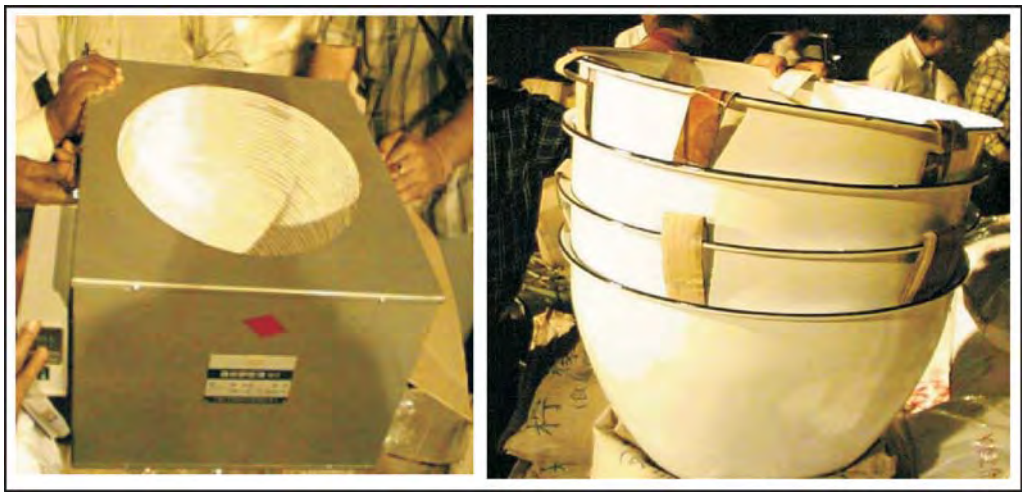
Case study 1	
Attempt to establish clandestine methamphetamine lab by a foreign syndicate have come to the notice of Law Enforcement Agencies in India in the past. However, it is very difficult to detect clandestine methamphetamine lab as it is generally established in the garb of shop detergent powder manufacturing unit. However, a typical indicator of such clandestine Methamphetamine lab is round bottom two neck glass flask,	highly temperature resistant thermometer (showing 1200 degree temperature), glass reflex condenser, bucket sieve, which have no role to play in shop manufacturing units. Some of these items which are seized by Narcotics Control Bureau at Calcutta Port in November, 2006, are given below to give an idea. For further assistance in investigation, one should approach Narcotic Control Bureau.



(a) Buchner funnel



(b) Buchner Flask



(c) Heating Mantle (d) Glass Dish



(e) Glass Column

Figure 8.19: Equipments and glassware recovered from a container which was brought by ship at Calcutta harbour.

Case Study 2	
A passenger travelling in 4518 DN Unchahar Express consumed a biscuit offered by a fellow passenger and fell unconscious. The suspect eventually arrested by the police was identified by victim as one of his fellow passengers in the train. The police recovered a packet containing nine cream biscuits from the suspect. These cream biscuits were sent to FSL. Upon examination, it was found that the peripheral grooves of four out of these nine biscuits were filled with a paste looking like the cream of the biscuits.	When these biscuits were opened apart, it was observed that the layer of cream filled between the two biscuits had no continuity with the paste filled in the peripheral grooves, thus, indicating the extraneous origin. The peripheral grooves were subjected to chemical analysis and lorazepam, a tranquiliser was detected in the paste filled in the peripheral grooves, of the biscuits, thus, establishing the use of tranquilizer by the criminal in perpetrating this crime.

Source: Case reported by FSL Haryana

References

1. A.K. Bapuly, *Forensic Science*: *Its Application in Crime Investigation*, Hyderabad, 2006.

2. B.R. Sharma, *Forensic Science in Criminal Investigation and Trials*, Bombay, 2012.

3. Justice K. Kannan.Karunalaran Mathiharan, ed., *Modi*: *A Textbook of Medical Jurisprudence and Toxicology*,rpt, Allahabad Central Law Agency, 2013.

4. *The Narcotic Drugs and Psychotropic Substances Act*, 1985.

9 EXPLOSIVE SUBSTANCES

Explosives are chemical compounds or mixtures which on application of an external stimulus such as heat, shock, friction or ignition undergo a rapid chemical decomposition. The chemical reaction results in sudden release of large amount of energy due to liberation of gas and high temperature. The pressure thus generated is thrust out equally in all directions. Explosion is derived from the explosive.

An explosion is defined as a sudden release of gas and pressure so as to cause loud noise. When high explosive detonates, it releases gas of volume 12,000 to 15,000 times of original volume, temperature around 3,000°c to 4,000°c and pressure 40 TS.

According to the **Explosives Act, 1884 Section 4(d)**, 'Explosives mean gunpowder, nitroglycerine, nitroglycol, gun-cotton, di-nitro-toluene, tri-nitrotoluene, picric acid, di-nitro-phenol, tri-nitror-resorcinol (styphnic acid), cyclo-trimethylenetrinitramine, penta-erythritol-tetranitrate, tetry1, nitroguanidine, lead azide, lead styphynate, fulminate of mercury or any other metal, diazo-di-nitro-phenol, coloured fires or any other substance whether a single chemical compound or a mixture of substances, whether solid or liquid or gaseous used or manufactured with a view to produce a practical effect by explosion or pyrotechnic effect; and includes fog-signals, fireworks, fuses, rockets, percussion caps, detonators, cartridges, ammunition of all descriptions and every adaptation or preparation of an explosive as defined in this clause'.

According to Government of India, Ministry of Commerce & Industry, Department of Industrial Policy and Promotion Notification GSR 553(E) 11 July 2012, ammonium nitrate has been included in the Explosives Act. Ammonium nitrate means the compound having the chemical formula NH_4NO_3 and includes any mixture or compound having 45 per cent ammonium nitrate by weight including emulsions, suspensions, melts or gels (with or without inorganic nitrates) but excluding emulsion or slurry explosives and non-explosives emulsion matrix and fertilisers from which the ammonium nitrate cannot be extracted by any physical or chemical process.

According to Government of India, Ministry of Commerce & Industry, Department of Commerce, Udyog Bhawan Notification No. 34 (RE–2013)/2009-2014, New Delhi, 14 August, 2013: Import of ammonium nitrate having the chemical formula NH_4NO_3 or any combination containing more than 45 per cent of ammonium nitrate by weight including emulsions, suspensions, melts or gels (with or without inorganic nitrates), and classified as explosive under Explosives Act, 1884, is subject to license from the Chief Controller of Explosives under the Ammonium Nitrate Rules, 2012.

According to **The Explosives Rules, 1983 Section 2 (7)**, 'Detonator' means a small tube of aluminium or copper or other materials approved by the Chief Controller:

(a) one end of which is closed and the other–

  (i) left open of the insertion of safety fuse for the purpose of initiating explosion within the tube; or

  (ii) fitted with wires or other device for that purpose and sealed;

(b) which is loaded with a charge of initiating explosives, the charge being so designed as to produce an explosion that would communicate to other tube similarly constructed and charged.

According to **The Explosives Rules, 1983 Schedule 1** explosives are divided into 8 classes as follows:

(i) Class 1: Gunpowder

(ii) Class 2: Nitrate-mixture

(iii) Class 3: Nitro-compound

(iv) Class 4: Chlorate-mixture

(v) Class 5: Fulminate

(vi) Class 6: Ammunition

(vii) Class 7: Fireworks

(viii) Class 8: Liquid Oxygen Explosives

Section 435, IPC

Mischief by fire or explosive substance with intent to cause damage to amount of one hundred or (in case of agricultural produce) ten rupees.—Whoever commits mischief by fire or any explosive substance intending to cause, or knowing it to be likely that he will thereby cause, damage to any property to the amount of one hundred rupees or upwards or (where the

property is agricultural produce) ten rupees or upwards, shall be punished with imprisonment of either description for a term which may extend to seven years, and shall also be liable to fine.

Section 436, IPC

Mischief by fire or explosive substance with intent to destroy house, etc.—Whoever commits mischief by fire or any explosive substance, intending to cause, or knowing it to be likely that he will thereby cause, the destruction of any building which is ordinarily used as a place of worship or as a human dwelling or as a place for the custody of property, shall be punished with imprisonment for life, or with imprisonment of either description for a term which may extend to ten years, and shall also be liable to fine.

Types of explosives:

The speed at which explosives decompose varies greatly from one another. The explosives are classified as Low Explosive and High Explosive:

I. **Low Explosives:** They do not show shattering effects, but have deflagration effect, i.e. high speed burning. They are used as a medium to carry flame to explosive charge and in safety fuse, e.g. Black powder, smokeless powder, flash powder.

II. **High Explosives:** These explosives detonate and have shattering effects.

(a) Primary High Explosives: Lead azide, lead styphnate, mercury fulminate, etc., are ultrasensitive to heat, shock and friction and they detonate violently instead of burning.

(b) Secondary High Explosives: Burn as well as detonate.

(i) Boosters: PETN (Pentaerythritol Tetranitrate), RDX/ Cyclonite

(ii) Main Charge: Dynamite, Water Gels, Emulsions, TNT (Trinitrotoluene), ANFO (Ammonium Nitrate and Fuel Oil), Ammonium Nitrate in combination with RDX, PETN.

Improvised Explosive Devices (IEDs)

An IED can be almost anything with any type of material and initiator. It is a “homemade” device that is designed to cause death or injury by using explosives alone or in combination with toxic chemicals, biological toxins, or radiological material. IEDs can be produced in varying sizes, functioning methods, containers, and delivery methods. IEDs can utilize commercial or military explosives, homemade explosives, or military ordnance and ordnance components.

An IED consists of:

(i) **Explosive substance**- RDX, TNT, PETN, etc.

(ii) **Detonator-** Electrical or Non-electrical

(iii) **Power source-** 1.5 V, 6V, 9 V batteries

(iv) **Switches**

(v) **Mechanism**

- **Anti-handling Mechanism** (Lift, move, open, pressure, pressure-release, tilt, variation, etc.)
- **Delayed Mechanism-** Clock (Mechanical or electronic), Watch, Thermal, Collapsing circuit, Chemical, etc.
- **Ambient Mechanism-** Smoke or Gas, Sound (acoustic), Atmospheric pressure, Atmospheric temperature
- **Remote control Mechanism-** Wire control, Radio wave control or FM transmission control, laser beam, etc.

IEDs generally fall into following categories:

(i) **Package type IED**

Package type IEDs can be of different forms and sizes, containing explosive substance, projectiles, switch mechanism, power source, detonator, wire and insulating tapes. Common household objects/containers such as card board boxes, tiffin box, ghee tin, pressure cookers and milk canes are chosen for this type of IEDs so that they can be planted easily and at the same time do not attract much attention.

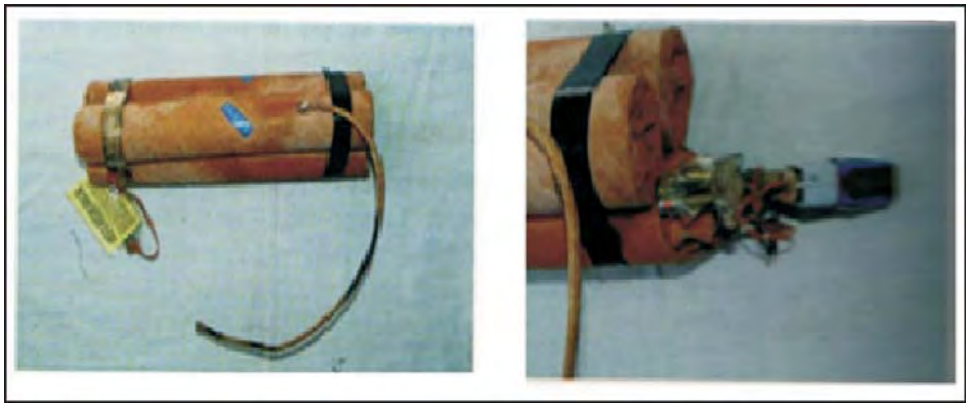


Figure 9.1: Package-type IEDs

(ii) **Vehicle-borne IED**

Vehicle borne IEDs (VBIEDs) are devices that use a vehicle as the package or container of the device. These IEDs come in various shapes and sizes which vary by the type of vehicles used– cycle, small car to large cargo trucks, generators, bullock carts, ambulances, etc.

Larger vehicles enable larger amounts of explosive that can be used, resulting in a greater effect. Functioning of devices can vary depending upon the type of mechanism used and can have the same common characteristics or indicators as other IEDs.



Car before explosion



After explosion

Figure 9.2: Vehicle–borne IEDs

(iii) **Suicide bomber IED**

A person on suicidal mission, usually employs high-explosive IED bomb and uses a command detonation mechanism, some sort of switch or button which the person activates by himself. Explosives can be contained in a vest, belt, or clothing that is specifically modified to carry this material in concealed condition. A vehicle-borne suicide bomber employs the same method, using a command detonation initiation mechanism.





Figure 9.3: Milk container used as an IED. Encircled is pressure release switch.

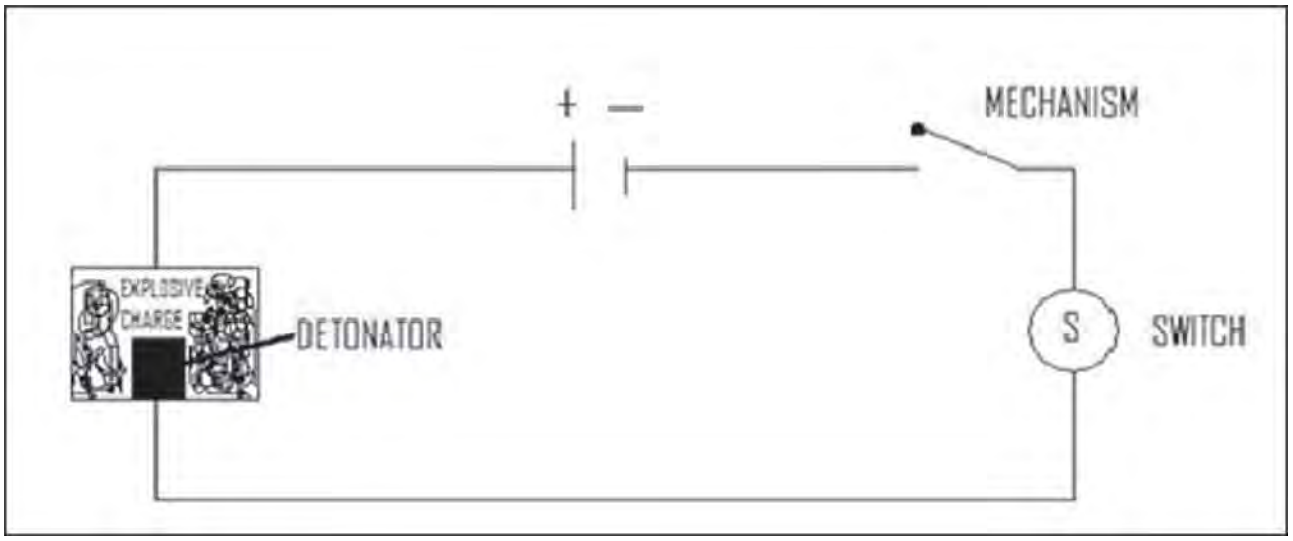


Figure 9.4: Sketch diagram of an IED

Formula for Volume Calculation of Crater

$$V=KW^{1.4}$$

V- Volume of crater

W- Weight of explosive (in pounds)

K- Constant=0.4

Formula for Calculation of Diameter of Crater

$$D^3=16W$$

D- Diameter of the crater in meter

W-Weight of explosives in Kg

9.1 Pre-Search Planning and Preparation by IO

(i) Make a clear assessment about the place of occurrence (house, shop, factory, open area, etc.) where explosion has occurred.

(ii) Collect all possible, relevant and authentic information for planning and preparation.

(iii) Constitute the team required for carrying out search at the crime scene.

(iv) Make detailed planning and preparation as per circumstances of the case.

(v) IO should have information about the extent of damage to property and lives.

(vi) IO should arrange for ambulance/medical assistance to take the injured to the hospital.

List of Kits and Tools Required

A. Explosives Detection Kit (EDK)



I. Procedure for TNT/PETN, RDX/ Nitrate Identification Field Test Kit

(i) Remove sampler from the top of the test unit.

(ii) Apply sampler's adhesive tip to suspected substance to be tested.

(iii) Return sampler to the test unit and press firmly to lock.

(iv) With the thumb and forefinger, press Chamber 1 firmly until ampoule breaks. Gently shake test unit for 2–3 seconds.

(*A brown-violet colour indicates the presence of TNT. A green colour indicates the presence of DNT*).

Warning: Do not proceed to the next step until sampler is completely locked into place.

(v) If no colour develops, then, firmly press Chamber 2 with the thumb and forefinger until ampoule breaks. Gently shake test unit for 2–3 seconds.

An orange/red/violet colour indicates the presence of RDX (C –4), PETN, SEMTEX, Dynamite, NG or smokeless powder.

(vi) If no colour develops, firmly press Chamber 3 with the thumb and forefinger until ampoule breaks. Shake test unit vigorously.

An orange/pink/violet colour indicates the presence of nitrate salt –potassium nitrate (black powder), ammonium nitrate (ANFO) or urea nitrate. Proceed to urea nitrate and/or ammonium nitrate tests to complete identification of the ammonium, urea or potassium nitrate salt.

II. Procedure for Chlorate/Bromate Identification Field Test

(i) Remove sampler from the top of the test unit.

(ii) Apply sampler's adhesive tip to suspected substance to be tested.

(iii) Return sampler to the test unit and press firmly to lock.

(iv) With the thumb and forefinger, press Chamber 1 firmly until ampoule breaks. Gently shake test unit for 2–3 seconds.

Warning: Do not continue to the next step until sampler is completely locked into place.

(v) With the thumb and forefinger, press Chamber 2 firmly until ampoule breaks. Gently shake test unit for 2–3 seconds.

(*A blue colour indicates the presence of chlorate or bromate ion*). A vigorous chemical reaction may occur if you proceed to the next step without waiting for 5 minutes.

(vi) Press Chamber 3 firmly until ampoule breaks and shake gently for acid neutralization.

III. Procedure for TATP/HMTD Identification Field Test

(i) Remove sampler from the top of the test unit.

(ii) Apply sampler's adhesive tip to suspected substance to be tested.

(iii) Return sampler to the test unit and press firmly to lock.

(iv) With thumb and forefinger, press Chamber 1 firmly until ampoule breaks. Gently shake test unit for 1 minute.

Warning: Do not proceed to the next step until sampler is completely locked into place.

(v) With the thumb and forefinger, press Chamber 2 firmly until ampoule breaks. Gently shake test unit for 2–3 seconds.

(vi) Once the solution is in the reaction chamber, tilt the casing 90 degrees, so that the solution flows into Chamber 3 and gently shake the solution in the Chamber for 4–5 seconds.

(vii) Tilt the test unit back so that the content from Chamber 3 returns into the reaction chamber. If a green colour develops, this indicates the possible presence of chlorate ion. Proceed to chlorate ion detection.

(viii) If no colour develops, press Chamber 3 firmly with the thumb and forefinger until ampoule breaks. Tilt the casing 90 degrees, so that the solution flows into the chamber 3. Gently shake the solution in the Chamber for 10–15 seconds, then tilt casing so that liquid flows into the reaction chamber.

(*If a green colour develops in the reaction chamber, this indicates the presence of TATP or HMTD*).

Note: *Green colour becomes deeper with time.*

IV. Procedure for Ammonium Nitrate Identification Field Test

Note: *The test for TNT/PETN, RDX/NITRATE should be performed prior to this test. If that test result is positive for the presence of nitrate, this test and/or the Urea Nitrate test should be run.*

(a) Remove sampler from the top of the test unit.

(b) Apply sampler's adhesive tip to suspected substance to be tested.

(c) Return sampler to the test unit and press firmly to lock.

(d) With thumb and forefinger, press Chamber 1 firmly until ampoule breaks. Gently shake test unit for 2–3 seconds.

Warning: Do not proceed to the next step until sampler is completely locked into place.

(An orange-brown precipitate indicates the presence of ammonium nitrate).

If ammonium nitrate is not present, the test for urea nitrate should be run.

If the tests for urea nitrate and ammonium nitrate are negative, the presence of potassium nitrate is indicated.

V. Procedure for Urea Nitrate Identification Field Test

The test for TNT/PETN, RDX/NITRATE should be performed prior to this test. If that test result is positive for the presence of nitrate, this test and/or the ammonium nitrate test should be run.

(i) Remove sampler from the top of the test unit.

(ii) Apply sampler's adhesive tip to suspected substance to be tested.

(iii) Return sampler to the test unit and press firmly to lock.

(iv) With the thumb and forefinger, press Chamber 1 firmly until ampoule breaks. Gently shake test unit for 2–3 seconds.

Warning: Do not continue to the next step until sampler is completely locked into place.

(A bright-reddish colour within 1 minute indicates the presence of urea nitrate).

If urea nitrate is not present, the test for ammonium nitrate should be run. If the tests for urea nitrate and ammonium nitrate are negative, the presence of potassium nitrate is indicated.

B. Fingerprint kit

(a) Fingerprint powders (black, grey, anthracene, magnetic, fluorescent).

(b) Brush (camel hair, ostrich hair, magnetic).

(c) Light source.

(d) Adhesive tape.

(e) Fingerprint lifting cards.

(f) Gloves.

C. Footprint kit

(a) Footprint lifters.

(b) Electrostatic footprint lifting device.

(c) Plaster of Paris.

(d) Machine oil.

(e) Talcum powder.

(f) Spirit.

(g) Shellac solution.

(h) Wire mesh.

(i) Frame for preparing plaster cast.

(j) Magnetic compass.

(k) Glass sheet (35X20 cm).

(l) Transparency sheet/tracing paper.

(m) Fine tip permanent marker.

D. Evidence collection kit

(a) Cotton gauze cloth.

(b) Forceps.

(c) Gloves disposable.

(d) Paper envelopes (6x6 cm., 15x10 cm.).

(e) Airtight Plastic/Glass Containers and tin containers.

(f) Polythene Bags.

(g) Scalpel.

(h) Scissors.

(i) Evidence tag.

(j) Marking cloth bag.

(k) Sealing wax bar.

(l) Candle.

(m) Matchbox.

(n) Metallic seal of IO.

(o) Lights (e.g. flashlights, spotlights).

(p) Barrier tape.

(q) Spades.

E. Digital Camera of good quality (min. 16 MP)

F. Explosives detector

G. Land Mine detector

H. Hand held metal detector

I. Non Linear Junction Detector (NLJD)

J. Search mirror

K. Powerful search light

L. Portable X-Ray scanner

M. Bomb suit/bomb/blanket/jacket

N. Wire-mesh/sieves

9.2 Team required for Handling Crime Scene

Prepare a list of persons to be associated with:

(i) Bomb disposal team to detect and defuse unexploded bombs.

(ii) Protection of scene.

(iii) Sketching of crime scene with necessary measurements.

(iv) Detailed photography of crime scene.

(v) Searching the scene.

(vi) Identification and collection of evidences by or with the help of forensic experts.

(vii) Collection of chance fingerprints.

(viii) Information gathering.

(ix) Evidence custodian.

(x) Specially trained canine for detection of explosives.



Figure 9.5: A suspected briefcase being sniffed by explosive detection dog

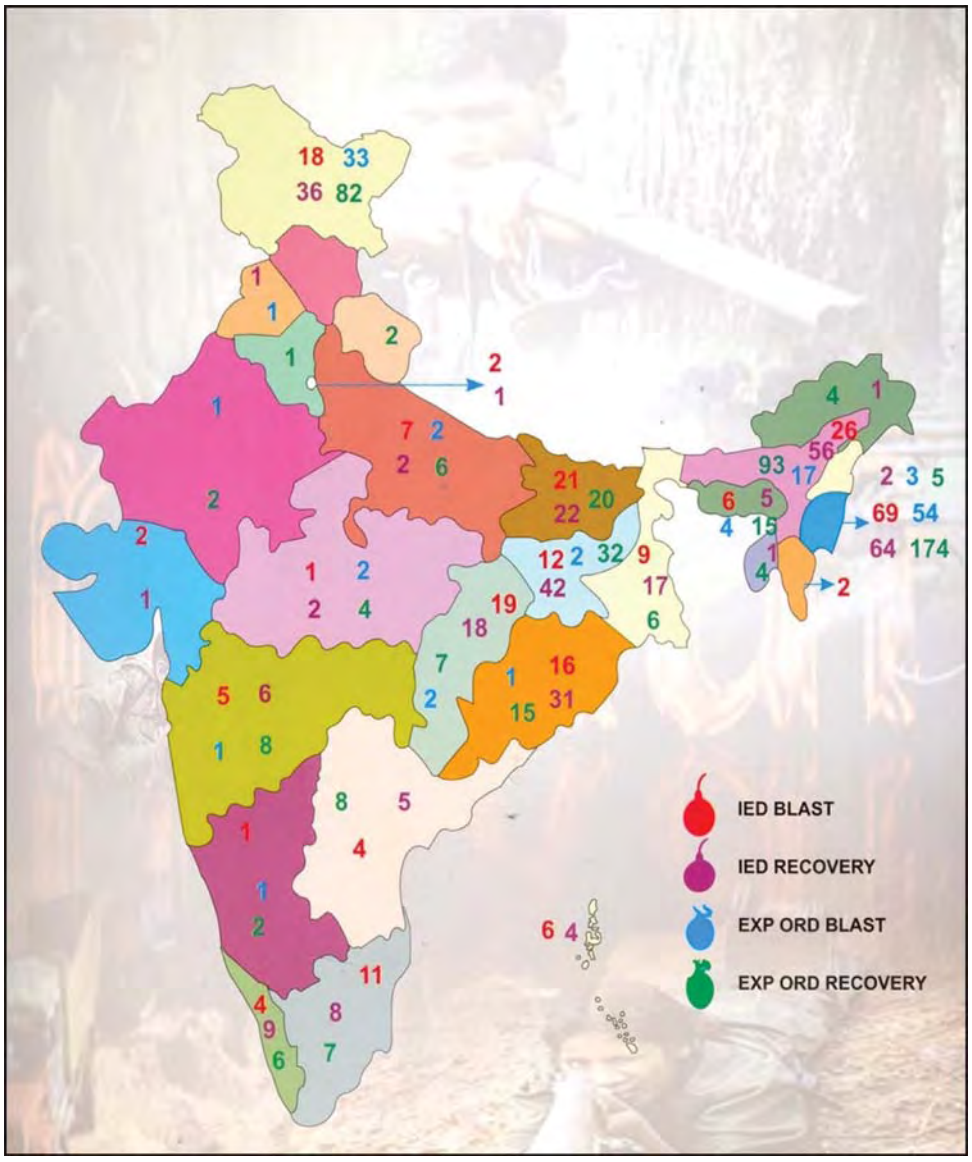


Figure 9.6: Bombing Incidence in India: 2012

Source: National Security Guard

9.3 Crime Scene Investigation

A. Protection of the crime scene:

The crime scene must be protected from entry by any persons so that physical evidence is not to be altered, shifted, destroyed, lost or contaminated and to avoid any injury to any person due to explosion effect or weak structure of the scene of crime.

The following points should be kept in mind:

1. Cordon off the area as quickly and as effectively as possible up to the point where projectiles and splinters are found and the surrounding area, as some unexploded devices may be present.
2. If injured/burnt body shows any sign of life, provide immediate medical help and transport the body to the hospital, taking precaution to disturb the scene to the minimum extent.
3. All unauthorized persons (relatives, friends, onlookers, photographers, etc.) should be evacuated from the scene.
4. Officer-in-charge of the case should determine when, why and who should enter the scene.
5. Police officer should not leave the scene unguarded.
6. The witnesses, suspects and informants should be detained for further details.
7. Officer should not add any foreign material, like cigarette ends, foot or footwear marks, fingerprints, etc. to the scene of crime.
8. During examination, the original condition of doors, windows, stair-case, lighting, routes of entry/exit should be preserved to the maximum extent.
9. Do not shift anything from its place. It has to be described and located by sketches and photographs.
10. Scene should not be cleaned till thoroughly examined.

B. Photography of the crime scene

Photographs of following should be taken:

1. The entire explosion scene from different angles.
2. All relevant objects at the scene of crime viz. vehicle, transistors, pressure cooker, toys, suitcase, etc.
3. The crater formed, if explosion took place on ground.
4. Places where the maximum damage has taken place.
5. IEDs/unexploded material/explosive.

6. Possible route of approach of criminal.
7. Points of entry and exit.
8. The location of dead bodies or injured, if any.
9. Evidence left by criminal at the scene (cigarette butts, fingerprints, foot/footwear marks, etc.).
10. If possible, videography at crime scene should be done.
11. Presence of any foreign matter (bottle, match stick, cigarette, burnt rope, etc.).
12. Before defusing any live bomb, take photograph from safe distance using tele lens, binocular to identify the label.

C. Sketching of the crime scene

Sketches are to be drawn by an expert/investigating officer and the following are to be included in the sketch:

1. The entire area where explosion has taken place.
2. Place, date and time when the sketch was made.
3. Name of persons assisting in taking measurements.
4. Directions (east, west, north and south).
5. Sketch of nearby/surrounding areas.
6. Inter-distances between relevant objects and evidences.

D. Crime scene search

Investigating officer should make a note of the following upon reaching the explosion site and after evacuation of the injured to the hospital:

1. Crater formed at the site/point of explosion.
2. Damages caused.
3. Whether the explosion caused fire or not.

The crime scene should be searched thoroughly and carefully. The following points should be kept in mind:

(i) Establish the perimeters of the scene and it should be properly documented with the help of photographs and sketches.

(ii) Ascertain legal basis for the search prior to any seizure of evidence.

(iii) Establish method of search based on investigative theory, size of area to be searched, and other factors. The following search methods are common:

(a) *Zonal method*- Area to be searched is divided into squares/sectors. An officer is assigned to each zone.

(b) *Spiral method*- Also called circle method and is effective in a small area. Searcher can begin from the center or the perimeter and moves in a circular path.

(c) *Wheel method*- The searcher gathers at the center of the scene and moves radially outwards. Drawback is the possibility of running over the evidence when gathering at the center and ever increasing distance between searchers as the examination moves outwards.

(iv) Search the entire scene thoroughly for any land mine/bomb planted and if found, it should be defused first.

(v) Search the surrounding/nearby area for detection of bomb fragments and live bomb.

(vi) In case of use of high explosives, physical evidences get scattered to a great distance, so areas surrounding the explosion scene should also be searched thoroughly.

(vii) Start search from the seat of explosion (crater).

(viii) Do not cut wires or pour water on any suspected device.

(ix) Do not use wireless communication system, mobile phone and do not light a cigarette.

On locating a suspicious object

(i) Do not handle or touch it.

(ii) Report location with accurate description of the object to warden/control centre, who would call police/bomb squad/rescue.

(iii) Place sand bags around it and do not cover it.

(iv) Identify danger area and block it up to at least 300 ft (area below, above and sides).

(v) Keep all doors/windows open.

(vi) Adopt evacuation procedures.

9.4 Search for Evidences

High explosives on detonation result in shattering effect due to which physical evidences are scattered to a great distance and are disintegrated into small pieces and may be completely or partially burnt. Sometimes, low explosives are used which may cause damage associated mainly with burning and pushing effect and relatively lesser shattering effect. The following evidence materials may be searched at the scene of crime:

I. Outer casing

(a) Cotton thread

(b) Cloth

(c) Paper

(d) Jute string

(e) Adhesive tape

(f) Pieces of plastic/metallic container

II. Explosive residues

(a) Blackening smoke deposits

(b) Yellow/orange deposits

(c) Small particles of partially burnt chemicals on the surrounding objects at the seat of explosion and other adjoining areas

III. Projectiles

(a) Broken glass pieces

(b) Iron nails/pieces

(c) Stone pieces

(d) Metallic bolts and balls

(e) Lead pieces of irregular shape and different sizes

(f) Fragmented container, pieces of the IED

IV. Initiation devices

(a) Fragments of detonators

(b) Safety fuses

(c) Fragments of initiation mechanism, viz., primer device, battery, flexible wire, switches, etc.

V. Other material

(a) Metallic tube, switches

(b) Wrapper/container used to carry explosive substance

(c) Debris from the seat of explosion

VI. CCTV footage, mobile phones and email ids

VII. Defused unexploded/ live bomb

VIII. Land mines

IX. Body parts of victim(s)

X. Subsequently search the house and work place of suspect for chemicals and equipments used for preparation of explosives and explosive devices. Search also clothes, shoes and hand of accused and look for footprint near the site of explosion

XI. Take swab by rubbing cotton on floor, walls and other suspected objects of the room where explosive is being prepared



Figure 9.7: Different types of projectiles/splinters

9.5 Collection of Evidences

The investigating officer should take help from forensic scientist while collecting the evidences.

Call bomb disposal squad if live bomb and live explosive device is expected.

(a) Exhibits should be collected only after wearing hand gloves.

(b) Search the site of explosion thoroughly and look for any unexploded material left, if found, it must first be rendered safe. A bomb should never be moved from where it was found because it may detonate/explode. This should only be conducted by a qualified bomb technician.

(c) Look for fingerprints on the unexploded material.

(d) Locate the seat of explosion or crater and collect all the relevant materials like soil and other debris present in the interior of the crater.

(e) Look for evidences like metal pieces, detonators, switches, timer devices.

(f) Use wire-mesh/sieves for collecting relevant evidences from the debris.

(g) Collect swabs/explosive residue samples from near the seat of explosion.

(h) Collect materials projected away from the site of explosion.

(i) Collect swab samples from all relevant materials lying near the site of explosion.

(j) Collect swab samples and other embedded objects from the bodies of victims of the explosion for the presence of components of bomb and explosive residues.

(k) Collect explosive residues and minute bomb components from carpets, floors, etc., by vacuum cleaner. This should be done only after the scene has been cleared of the larger debris.

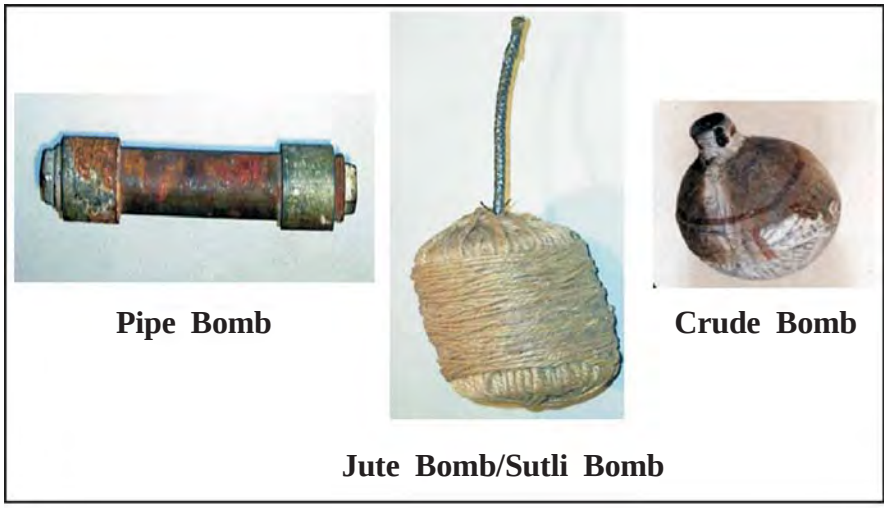
(l) Collect CCTV footage from shops or camera installed near the site of explosion.

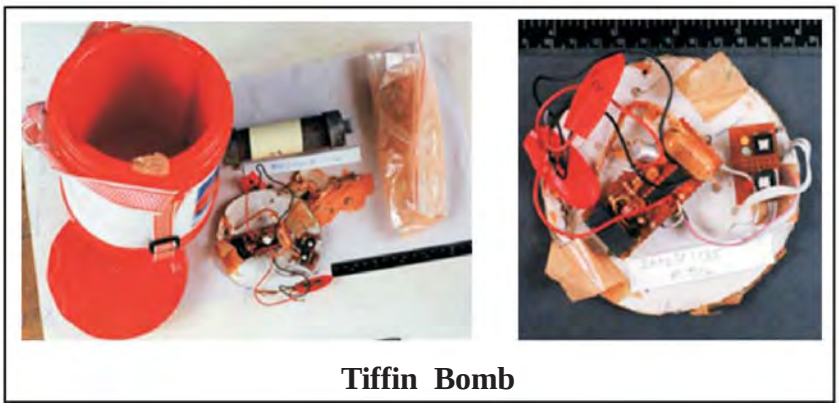
(m) The house, work place of the suspect should be searched for chemicals and equipments used for preparation of explosive and explosive devices.

(n) Use vapour detector, metal detector, canines and kit for spot test for collection of explosive samples



Figure 9.8: Crater formed at the site of explosion





Tiffin Bomb



Pipe Bombs with Fuse Wire

Pipe Bombs with a Projectile

Figure 9.9: Different types of IED/bombs



Figure 9.10: Different types of IED/bombs

9.6 Packaging and Forwarding of Evidence

(i) Depending upon its type, the evidence should be packed in a suitable container as listed below:

Table 9.1: Types of evidences and types of containers

Types of Evidence	*Types of Containers*
Components not requiring residue testing	Polyethylene zip-top bag
Materials requiring residue testing (swabs, etc.)	Nylon zip-top or heat sealed bag, non-corrosive plastic or glass container
Liquid samples	Glass container or non-corrosive plastic container
Soil, loose materials	Interlocking-type polythene bag or plastic container
Unconsumed explosives (low and high)	Interlocking-type antistatic polyethylene bag
Dried clothing or cloth containing dried blood stains	Paper bag, polythene bag
Gas samples	Airtight glass bottles/containers



Polythene Zip-top bag **Paper Bag**

Figure 9.11: Types of containers

(ii) Label each container of evidence with information like FIR no./Crime no., police station, date and time of collection, place of collection, etc., along with proper numbering of containers.

(iii) Initiating and detonating devices should be packed separately with cotton packings.

(vi) All the fragments/parts of bomb/IEDs should be packed separately in tight cotton from all sides in a plastic container with a transparent lid.

(v) In case the explosive material is suspected to be mercury fulminate or lead azide, Explosive Expert should be summoned at the explosion scene and such explosives should never be sent for analysis to the laboratory.

(vi) Live bombs should be defused before sending to the laboratory and bomb defusion certificate should be sent along with the defused bomb**.**

(vii) All the exhibits collected above must be sealed properly.

(viii) All the sealed exhibits must finally be forwarded to FSL/CFSL for analysis along with sample seal.

Note*: Plastic Bags should not be used for packing evidence suspected of containing explosive residues since some explosives may seep through the plastic.*

9.7 Seizure List and Forwarding Memo Preparation

(i) Prepare list of evidence material collected from the scene.

(ii) List should be signed by two public witnesses giving their full details including permanent and temporary address.

(iii) The packets/parcels containing evidence material should be labelled giving description of its contents (exhibits), case reference and should be signed by the investigating officer.

(iv) Forwarding memo should be filled up giving brief history of the case, details of the parcels and their contents, nature of examination required and certificate authorizing the Director, Forensic Science Laboratory for examination of the exhibits.

9.8 Dealing with Law and Order at Crime Scene

Keeping in view the circumstances at the scene, investigator should make requisition for additional men power for protection of the scene, safety of the investigating team members and public as well as shifting the injured person to hospital for medical examination and treatment.

9.9 End of Search

Before leaving the crime scene, the IO should ensure that:

(i) The crime scene search has been done thoroughly.

(ii) All evidences collected at the crime scene are properly packed, labelled and sealed.

(iii) All memos are duly filled in and all other formalities in respect with procedures mandated by the law are completed.

(iv) Detailed photographs of the explosion scene should be taken.

(v) Photographs of all the evidences should also be taken.

(vi) All the nearby/surrounding areas should be photographed from different angles.

9.10 Queries

(i) Whether the given substance is an explosive.

(ii) Identify the type of explosive/chemical nature of the explosive.

(iii) Whether the given device is an explosive device.

(iv) Type of IED.

(v) Type of initiation device/mechanism used in IED.

(vi) Type of projectiles/splinters used in the IED.

(vii) Amount of explosive used in the IED.

(viii) Whether the bomb was factory-made/improvised/crude type.

(ix) Type of container used for IED.

(x) Whether the bomb was thrown from outside or whether the explosion took place inside the building.

(xi) At which place was the bomb planted?

(xii) Type of power source used in the IED.

(xiii) What is the level of expertise used in manufacturing bomb?

(xiv) Whether the explosion was accidental or intentional.

(xv) What was the vehicle used for transportation of IED/explosive material?

9.11 Case Studies

Delhi Serial blasts 2005

Case Study 1	
Three serial bomb blasts took place in different parts of Delhi on October 29, 2005. First explosion killed 16 persons and injured 108 persons. In second explosion, a bag suspected to contain bomb was left in a bus, injuring 12 persons.	In third explosion, the bag containing bomb exploded resulting in blast of gas cylinder and causing fire in a nearby clothes shop thus, killing 43 persons. Special cell of Delhi Police registered three FIRs and the suspects were arrested.

Source: http://www.indiankanoon.org/doc/138377871

Delhi High Court Blasts 2011

Case Study 2	
Bomb blast took place on September 7, 2011 near the reception counter of Delhi High Court, where a suspected briefcase was kept thus, killing 15 persons and injuring 76. FIR was registered by Delhi Police and further investigation was carried out by National Investigating Agency. According to investigation, two kilograms of explosive was used.	Upon examination, it was identified to be a mixture of ammonium nitrate and PETN. National Investigating Agency arrested the suspected persons, framed charges against them and the case is in progress in the court of law.

Source: http://www.indiankanoon.org/doc/142208179

References

1. T.V. Narayanan, *Modern Techniques of Bomb Detection and Disposal*, New Delhi, 1996.
2. James T Thurman, *Practical Bomb Scene Investigation*, Boca Raton, 2006.
3. Barry Fisher, *Techniques of Crime Investigation*, New York, 1993.
4. Max M. Houck and Jay A. Siegel, *Fundamentals of Forensic Science*, USA, 2011.
5. Andre Moenssens & Allan Jamieson, *Wiley Encyclopedia of Forensic Science*, vol. 1, United Kingdom, 2009.

6. M.B. Rao, *Case Histories in Crime Investigation*, Sardar Vallabhbhai Patel National Police Academy, Hyderabad.

7. A.K. Bapuly, *Forensic Science-Its Applications in Crime Investigation*, Hyderabad, 2006.

8. Handbook of Forensic Science, CFSL-CBI, New Delhi, 2009.

9. The Bombshell, National Security Guard, volume XXIII, Gurgaon, 2013

10. Technomaxx Securities, Faridabad, Haryana.

10 FIRE AND ARSON

Fire is the rapid oxidation process with release of heat, light, and various reaction products.

Figure 10.1 is a Fire Triangle that represents the 3 elements needed for fire to occur: Heat, fuel and oxygen are all essential elements for a fire to occur.

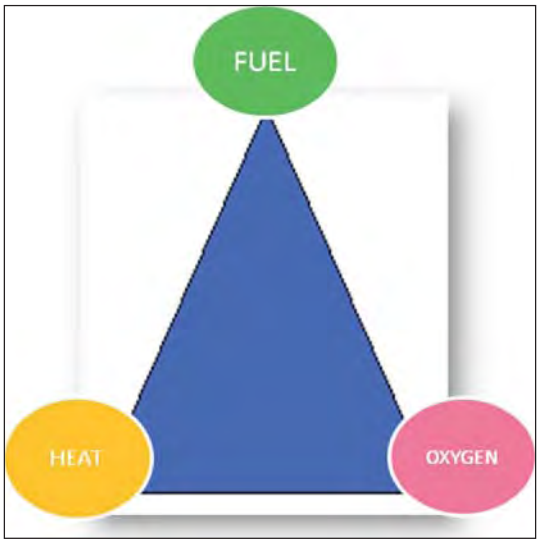


Figure 10.1: Fire Triangle

1. **Fuel** can be any combustible material in any state of matter-solid, liquid, or gas such as furniture, paper, kerosene, diesel, petrol, alcohol, turpentine oil, etc.
2. **Oxygen** is available from the atmosphere.
3. **Heat** is the energy necessary to increase the temperature of the fuel to a point where sufficient vapors are given off for ignition to occur.

Flammable liquids are those that have a flash point below 100^0F.

Combustible liquids are those that have a flash point above 100^0F.

Types of Fire:

(a) Natural fire-forest fires, lightning strike may damage structures and result in a fire.

(b) Accidental fire-electrical short circuit, excessive heating of machinery, burning cigarette/*bidi*, heating appliance kept near combustible material, spark generator for welding may cause a fire.

(c) Intentional fire-using accelerants such as petrol, kerosene, alcohol, acetone, turpentine oil, etc., and mixing of chemicals such as glycerine and potassium permanganate could also result in a fire.

(d) Spontaneous fire.

Arson is the crime of intentionally and maliciously setting fire to buildings, wild land areas, vehicles or other property with the intent to cause damage. Arson often involves fire deliberately set to the property of another or to one's own property so as to collect insurance compensation. Arson is also called incendiary fire.

Motives for Arson:

(i) **Revenge**: Personal or professional vendetta

(ii) **Vandalism**: Crime of opportunity

(iii) **Profit**: Monetary gain by claiming insurance

(iv) **Crime Concealment**: Destroying evidence to cover another crime

(v) **Excitement**: Sense of power or seeking recognition

(vi) **Extremism**: Social protests against governments or corporations

10.1 Relevant IPC Sections

(a) Section 285, IPC:

Whoever does, with fire or any combustible matter, any act so rashly or negligently as to endanger human life, or to be likely to cause hurt or injury to any other person, or knowingly or negligently omits to take such order with any fire or any combustible matter in his possession as is sufficient to guard against any probable danger to human life from such fire or combustible matter, shall be punished with imprisonment of either description for a term which may extend to six months, or with fine which may extend to one thousand rupees, or with both.

(b) Section 435, IPC

Whoever commits mischief by fire or any explosive substance intending to cause, or knowing it to be likely that he will thereby cause, damage to any property to the amount of one hundred rupees or upwards or where the property is agricultural produce ten rupees or upwards, shall be punished with imprisonment of either description for a term which may extend to seven years, and shall also be liable to fine.

(c) Section 436, IPC

Whoever commits mischief by fire or any explosive substance, intending to cause, or knowing it to be likely that he will thereby cause, the destruction of any building which is ordinarily used as a place of worship or as a human dwelling or as a place for the custody of property, shall be punished with imprisonment for life, or with imprisonment of either description for a term which may extend to ten years, and shall also be liable to fine.

(d) Section 113B, Indian Evidence Act

Presumption as to dowry death-When the question is whether a person has committed the dowry death of a woman and it is shown that soon before her death such woman has been subjected by such person to cruelty or harassment for, or in connection with, any demand for dowry, the Court shall presume that such person had caused the dowry death. Explanation.—For the purposes of this section, ''dowry death'' shall have the same meaning as in section 304B, of the Indian Penal Code (45 of 1860).

Table 10.1: Building Bye Laws

S.No.	*Ht. of the building up to*	*Exterior open spaces to be left out on all sides (front, rear and sides in each plot)*
1.	10 m.	3 m.
2.	15 m.	5 m.
3	18 m.	6 m.
4	21 m.	7 m.
5	24 m.	8 m.
6	27 m.	9 m.
7	30 m.	10 m.
8	35 m.	11 m.
9	40 m.	12 m.
10	45 m.	13 m.
11	50 m.	15 m.
12	55 m. and above	16 m.

Crime Data

According to NCRB, Annual Report 2013, 9357 cases of arson have been reported, which accounts to 0.4 per cent of total IPC crimes and crime rate of Arson is 0.8 per cent. Charge-sheeting rate of arson cases is 64.2 per cent and conviction rate is 16.2 per cent.



Figure 10.2: Fire fighters advancing hose lines into a burning structure and applying water directly to fire, removing one leg of the fire triangle and extinguishing the blaze**.**

10.2 Pre-search Planning and Preparation

(i) Make a clear assessment of the place of occurrence (house, shop, factory, open area, vehicle, train, petrol pump, etc.) where fire has occurred.

(ii) Collect all possible, relevant and authentic information for planning and preparation.

(iii) Constitute the team required for carrying out search at the crime scene.

(iv) Make detailed planning and preparation as per circumstances of the case.

10.3 List of Equipments Required

(i) Digital camera (minimum 16 mp.)

(ii) Personal protective equipment

(iii) Flashlight and spot light

(iv) Writing materials

(v) Multipurpose tools (screwdrivers, wire cutters, knives)

(vi) Rubber gloves

(vii) Shovel or other hand tools

(viii) AC voltage tester

(ix) Tape recorder/voice recorder

(x) Portable equipment for detection of hydrocarbon vapour buried under debris.

(xi) Evidence collection kit

(a) Barrier Tape and tape for measurement

(b) Forceps

(c) Gloves and cotton gauge

(d) Paper envelopes (6×6 cm., 15×10 cm.)

(e) Airtight metal (tin) containers of various sizes and cardboard box

(f) Magnifying glass

(g) Scissors, screw driver, wire cutter

(h) Evidence tag

(i) Mark in cloth, needle and thread

(j) Match box, candle and sealing wax bar

(k) Marking pen

(l) Standard metallic seal of IO

I. **Footprint kit**

(a) Footprint lifters

(b) Electrostatic footprint lifting device

(c) Plaster of Paris

(d) Machine oil

(e) Talcum powder

(f) Spirit

(g) Shellac solution

(h) Wire mesh

(i) Frame for preparing plaster cast

(j) Magnetic compass

(k) Glass sheet (35×20 cm.)

(l) Transparency sheet/tracing paper

(m) Fine tip permanent marker

II. **Fingerprint kit**

a. Fingerprint powders (black, grey, anthracene, magnetic, fluorescent)

b. Brush (camel hair, ostrich hair, magnetic)

c. Light source

d. Adhesive tape

e. Fingerprint lifting cards

f. Gloves

10.4 Team Required for Handling a Crime Scene

Prepare a list of persons to be associated with:

(i) Protection of scene

(ii) Searching the scene

(iii) Identification and collection of evidence

(iv) Fingerprint and forensic expert

(v) Photography of crime scene

(vi) Sketching of crime scene

(vii) Information gathering

(viii) Evidence custodian

10.5 Crime Scene Investigation

Protection of the crime scene

The crime scene must be protected from entry by any unauthorized persons so that physical evidence could not be altered, moved, destroyed, lost or contaminated and to avoid any injury to any person due to fire/weak structure of the building. Following points should be kept in mind:

(i) Safeguard the location as quickly and as effectively as possible.

(ii) If injured/burnt body shows any sign of life, provide immediate medical help and transport the body to the hospital, taking caution so as to disturb the scene to the minimum extent.

(iii) All unauthorized persons (relatives, friends, onlookers, photographers, etc.) should be excluded from the scene.

(iv) Officer-in-charge of the case should determine when, why and who should enter the scene.

(v) Police officer should not leave the scene unguarded till scientific examination is completed.

(vi) The witnesses, suspects and informant should be detained for further details.

(vii) Crime scene should not be altered; it should be barricaded, enclosing a larger area then smaller one so that no clues are left out.

(viii) Officer should not introduce any material, like cigarette ends, foot or footwear marks, fingerprints, etc.

(ix) During examination the original condition of doors, windows, stair-case, lighting, routes of entry/exit should be preserved.

(x) Do not move anything from its place. It has to be described and located by sketches and photographs.

(xi) Scene should not be cleaned till thoroughly examined.

Photography of the Crime Scene

Photographs of the following should be taken:

(i) The entire fire scene from different angles

(ii) Places where fire caused damages

(iii) Place where the maximum damage has taken place

(iv) Smoke on walls, roof and burnt patterns

(v) Suspected electrical short circuit in wires, fuse box, switches, etc.

(vi) Burnt wires

(vii) Possible route of approach of criminal

(viii) Points of entry and exit

(ix) The location of buried/dead body

(x) Evidence left by criminal at the scene (cigarette buds, fingerprints, foot/footwear marks, etc.)

(xi) If possible, videography at the scene should be done

(xii) Presence of any foreign matter (bottle/container, matchstick, cigarette/bidi, burnt rope, etc.)

(xiii) Burnt electrical appliance and surrounding

(xiv) Close up photographs to cover site of fire and to cover important points and evidences



Figure 10.3: Fire patterns are visible or measurable physical effects that remain after a fire, as seen on this exterior door. A fire was set directly in front of the door causing visible damage.



Sketching of the Crime Scene

Sketches are to be drawn by an expert/IO and following are to be included in the sketch:

(i) The entire area where fire was put up

(ii) Inter-distances between relevant objects and evidences

(iii) Location of seat of fire

(iv) Place, date and time when the sketch was made

(v) Name of persons assisting in taking measurements

(vi) Directions (east, west, north and south)

Crime Scene Search

(i) To find out the seat of fire

(ii) To find out Cause of fire

(iii) Who is the perpetrator?

(iv) Is fire a case of Arson?

(v) Motive of Arson

10.5.1 General Guidelines for Searching a Fire Scene

(i) If the fire scene is a building or a closed area then start the investigation from the exterior of the building and work towards the point of origin inside the building.

(ii) If the fire scene is a forest or any open area then start investigation from outside the damaged area towards the area of origin of fire.

(iii) All visible details should be observed and described before dusting anything for latent fingerprint. During initial search, each possible item of evidence should be measured from fixed location.

(iv) Ascertain legal basis for the search prior to any seizure of evidence.

(v) The IO should collect information about the time of fire, the type of smoke, smell, time taken to extinguish fire, mode of extinguishing the fire, place from where the fire started, magnitude of fire, height of the flame from the following persons :

- Fire-fighting Officer
- Witnesses
- Neighbours
- Occupants/Property Owners

(vi) Ask for any initial photographs taken by fire officer/media personnel/onlooker, etc.

(vii) IO should:

- Observe areas of damage
- Observe burn patterns

- Compare observations to statements
- Examine and remove debris
- Evaluate systems (gas, electrical)
- Observe for indicators of arson
- Try to ascertain the direction in which fire spread

10.5.2 Exterior Search

(a) Note the weather conditions as it plays a role in the outbreak of fire like temperature, humidity, direction and speed of wind.

(b) The suitable perimeter of the fire scene should be established. The size of the perimeter should be large enough to include the entire scene, any relevant adjacent areas, any remote locations that may include evidence or other materials relevant to the investigation.

(c) Locate the footprints/latent fingerprints at the point of entry before any item is touched or moved and the IO should direct the fingerprint expert indicating the areas to be examined.

(d) The details of location and pattern of smoke or heat damage to the structure should be noted. Exterior look of the structure, the smoke and heat damage or patterns may give a general indication about the origin of fire.

(e) Search the nearby areas including lawns, parking areas, or other places that could possibly contain items related to the scene.

(f) Look for any items or materials that do not appear to belong to the area or seem to be out of place.

10.5.3 Interior Search

(viii) Start the search in a manner that follows the fire from the area of least damage to the area of maximum damage. This will help the IO to locate the point of origin of fire since fire burns for the longest period of time at its point origin.

(ix) Identify the fuel(s) involved in the fire and check the ventilation in that area so as to relate that to the damage observed. Note the position of the circuit breakers or condition of the fuses in case of potential electrical fire.

(x) The debris within the scene must be carefully layered by hand, examined and then removed from the fire scene.

(xi) While systematically removing the fire debris, damage to all building materials, furnishings, electrical devices and other contents should be documented and put aside the relevant items for further examination.

(xii) The IO should scrutinize the fire patterns within this area in order to fully identify fire progression, i.e. the direction in which the fire moved.



Figure 10.4: Fire put on the couch and it burns upwards

10.6 Search for Evidences

The nature of the evidences in arson cases vary from one case to another, depending on the technique applied by the arsonist and the extent of damage, destruction caused.

10.6.1 Different fire cases could be:

(a) Fire in automobiles and trains

(b) Fire in school functions, marriage functions and exhibitions

(c) Cinema halls

(d) Fire due to leakage of flammable material

(e) Fire in an industry

(f) Fire in a building

(g) Fire in a godown

(h) Fire in a forest or field



Figure 10.5: One of the fire cases (burnt train)

10.6.2 Indicators of Arson

(a) Use of accelerants.

(b) Multiple points of origin.

(c) Trailers of gasoline or paper to move fire rapidly from one place to the other.

(d) Arrangement of materials and furniture.

(e) Ignition devices ranging from candle to time delay devices.

(f) Holes in walls, floors, ceilings.

(g) Fire protection devices disabled/tampered.

(h) Forced entry.

(i) Fire in a portion where files of enquiry were kept.

(j) Person is murdered and then burnt to conceal the crime and identity the person.

(k) Presence of containers carrying accelerants.

(l) Irregular shaped burnt pattern of floor.

(m) Fire in godown where stock received shown in huge quantity but magnitude of fire shows presence of quite less stock. Intention was to claim huge amount of insurance.

10.6.3 The IO should Observe and Collect the Following Evidences from the Scene of Fire/Arson:

(a) Combustible materials (e.g. piles of newspapers, furniture, cloth/ garments, grass, dry leaves, plastic/rubber material, etc.).

(b) Shoe prints/foot prints/tyre marks.

(c) Fingerprints on the leftover articles by the culprit at the point of entry and exit, doors knobs and handles, window panes and not consumed by fire like bottle, etc.

(d) Indications of forced entry (tools and tool marks).

(e) Broken and open safe, cupboards (in case of theft followed by setting of fire).

(f) Any foreign matter.

(g) Check document records and previous history of insurance claims.

(h) Check the chemicals and materials used in manufacturing and if there was any negligence in storage of chemicals that resulted in fire such as keeping inflammable material near heating devices.

(i) Broken glass pieces in case of Molotov cocktail which contains sulphuric acid and petrol separated by a partition.

10.6.4 Evidences to be Looked for in Case of a Vehicular Arson/Fire:

(a) Incendiary/ignition/explosive devices (e.g. lighters, matchstick, candle, timing devices).

(b) Inflammable liquids/accelerants (e.g. petrol, kerosene, diesel, etc.).

(c) Container with traces of flammable liquid.

(d) Seeped fuel found in the earth underneath the automobile, in the debris or in the upholstery if the vehicle is not fully consumed.

(e) If there is any prior removal of small gadgets and accessories.

(f) Gas/fuel leakage in car and starting up of the engine.

(g) Over-heating of engine or catalytic converter.

(h) Electric short circuit.

10.6.5 Evidences to be Looked for in Case of an Electrical Short Circuit

(a) Electrical short circuit wire ends.

(b) Fuses.

(c) Heating appliances like stove, electric heater, electric iron, etc.

(d) Unburnt portions of chemical and electronic devices that may be left behind.

(e) In case of fire due to electric short circuit the fuse wire will be found of thick conductor. The fuse may not have blown or if it is blown, the fuse wire is

found broken with bead formation. The broken fuse wire area will be blackened in case of electric short circuit. Fuse wire broken in case of over loading will have bead formation but blackening will not be present.

(f) In case of electric short circuit, the rise in temperature of electric conductor will burn the insulation from inside, i.e. the portion in contact with the conductor. It will cause sleeve formation of the insulation. In case of fire due to outside source, the insulation will melt and stick to the conductor. The fire due to electric short circuit will spread due to the burning of insulation.

10.6.6 Point of Origin of Fire:

(a) Fire tends to move in upward direction and probable point of origin is closest to lower point that shows the maximum damage.

(b) Presence of V-shaped pattern on the wall.

(c) Soot indicate point of origin (first smoke deposits and then that area burns).

(d) Presence of accelerators, ignition devices such as timer or trace evidences.

(e) Spalling of plaster or concrete: Destruction of surface (plaster due to more heat).

(f) Material distortion-glass/metal may melt or distort due to heat.

10.7 Collection of Evidences

The IO should take help from forensic scientist while collecting the evidences.

(i) Exhibits should be collected only after wearing hand gloves.

(ii) Ascertain the probable or multiple origins of fire (i.e. where the maximum damage has taken place) and collect debris from there.

(iii) Collect burnt matchstick, cigarette, and container containing traces of inflammable liquid, if any.

(iv) Collect wire ends, switch boards, fuses, etc., in case of electrical short circuiting.

(v) Along with sample from point of origin, a control sample should be collected (material from a different room/location).

(vi) Heating appliances and surrounding burnt/partially burnt combustible materials.

(vii) Burnt/partially documents in connection with false claim of insurance.

(viii) Collect samples of upholstery, drywall, plaster, wood, or other material that may have been penetrated by flammable liquids.

(ix) Collect samples of soil that may have been penetrated by flammable liquids.

(x) Trace evidence possibly left by the arsonist such as hair, clothing fibers, matchstick, etc.

(xi) Clothing worn by the suspect at time of crime, including shoes.

(xii) Collect footprints/shoe prints from the scene.

(xiii) Collect uncontaminated control sample from other areas of the scene of fire.

(xiv) Look for traces of inflammable liquid residues by Portable Vapor Detector which sucks the air around it.

(xv) Take help of trained sniffer dogs which detect the vapors of hydrocarbons.

(xvi) Time delay mechanism (presence indicates arson) which enabled the perpetrator to escape from the area before fire started.

10.8 Packaging and Forwarding of Evidences

(i) The evidence container should have the following qualities:

- Made of metal normally unused paint cans made of tin (as shown in Figure 10.6).
- Air tight so that there is no loss due to evaporation.
- Highly resistant to breakage, easy for transportation.
- Prevents cross-contamination.
- Good integrity seal.



Figure 10.6: Evidence Container

(ii) Glass container with metal cap can be used for collection of smaller amount of sample.

(iii) Polythene envelope/bag, plastic container and paper bags should *never* be used for packing exhibits in case of suspected inflammable material.

(iv) Collect two to three quarts of ash, soot and debris from point of origin of fire.

(v) Fill up only half or two-thirds of the container with the evidence leaving space on the top.

(vi) The burnt material like wood, furniture, cloth, etc., should be packed in an airtight container with proper labelling.

(v) Liquid samples/fuel found in open bottle should be placed in an unused sealable glass container to prevent any loss of fluid.

(vi) In case of electrical short circuit, electrical wire ends and burnt/partially burnt wires should be kept in thermocol sheet and packed in a cardboard/plastic box.

(vii) Electrical appliances like, electric fan, heater, electric iron, air conditioner, etc., should be packed in a cardboard box. In case of refrigerator and other big machinery difficult to transport, ask expert to examine at crime scene.

(viii) Cast of footprint/shoeprint should be properly packed and labelled.

(ix) All the exhibits should be carefully sent to FSL for analysis.

10.9 Seizure List

(i) Prepare list of evidence material collected from the scene.

(ii) List should be signed by two public witnesses giving their full details including permanent and temporary address.

(iii) The packets/parcels containing evidence material should be labelled giving description of its contents (exhibits), case reference and should be signed by the IO.

(iv) Forwarding memo should be filled up giving brief history of the case, details of the parcels and their contents, nature of examination required and certificate authorizing the Director, Forensic Science Laboratory for examination of the exhibits.

10.10 Dealing with Law and Order at Crime Scene

Keeping in view the circumstances at the scene, investigator should make requisition for additional men, power for protection of the scene, safety of the investigating team members and public as well as shifting the injured person to hospital for medical examination and treatment.

10.11 End of Search

Before leaving the crime scene the IO should ensure that:

(i) The crime scene search has been done thoroughly.

(ii) All evidences collected at crime scene are properly packed, labelled and sealed and sample seal is also to be sent.

(iii) All memos are duly filled in and all other formalities with respect to procedures mandated by the law are completed.

(iv) Final photograph of the fire scene should be taken.

(v) The scene should remain cordoned and protected because IO might have to revisit the scene.

10.12 Queries

From Fire Brigade Officer

(i) Where is the origin of fire?

(ii) What is the extent of affected area due to fire?

(iii) Whether the fire is accidental or man-made?

(iv) How was the fire extinguished?

(v) What was the colour of flame and smoke?

From FSL/CFSL

(i) What is the nature of accelerant and inflammable material used?

(ii) Identification of burnt body by carrying out DNA analysis from hair or blood.

From Medico-legal Expert

(i) Whether injuries on identified or unidentified dead bodies are ante-mortem or post-mortem.

(ii) Whether samples of hair and blood are preserved for DNA analysis in cases of unidentified/disputed dead bodies.

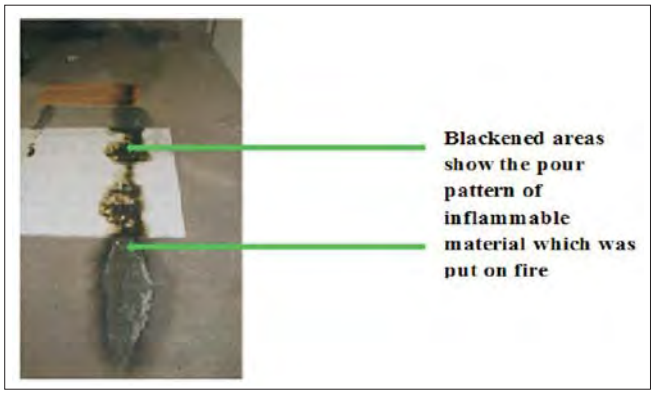


Figure 10.8: Irregular burnt pattern

10.13 Case Studies

Case Study 1	
Uphaar Cinema at Green Park Extension Shopping Centre, New Delhi, comprised a cinema auditorium on the first floor besides a balcony on the second floor. The ground floor of the building comprised a parking lot besides three separate rooms on the western side, one of which was used for placing a 500 KVA electric transformer that supplied electric energy to the cinema theatre while the other was used for housing a 1000 KVA transformer that was installed and maintained by the Delhi Vidyut Board. It is common ground that the second transformer even though located within the cinema premises, did not supply electricity to the cinema but rather to some of the tenants occupying parts of the commercial complex that formed a part of the building and some other consumers from the locality. On the early morning of 13th June, 1997, the bigger of the two transformers installed and maintained by DVB on the round floor of the Uphaar Cinema building caught fire. Inspection of the transformer by the Superintendent of the DVB and his team revealed that three of the low tension cable leads of the transformer had been partially burnt. The transformer was repaired by the electricians. The repairs, it appear, were carried out with the help of a dye and hammer without the use of a crimping machine. The transformer was recharged for resumption of electric supply by noon on 13th June, 1997. The repairs conducted on the transformer were unsatisfactory and resulted in loose connections that	caused sparking which led to the loosening of one of the cables of the transformer which eventually came off and started dangling loose along the radiator and burnt a hole in the radiator fin. Through this hole the transformer oil started leaking out which, on account of the heat generated by the loose cable touching against the radiator, ignited the oil. Since the transformer did not have an oil soak pit as required under the regulations and the standard practice, the oil that spread out of the enclosure continued leaking and spreading the fire to the adjacent car parking lot. The result was that all the cars parked in the parking area on the ground floor of the cinema hall were ablaze. The northern bound smoke encountered a gate which was adjacent to a staircase leading to the cinema auditorium on the first floor. Due to chimney effect, the smoke gushed into the stairwell and eventually entered the cinema auditorium through a door and through the air conditioning ducts. The southward bound smoke similarly travelled aerially through another staircase and into the lower portion of the balcony of the auditorium from the left side. All this happened while a large number of people were seated in the auditorium enjoying the matinee show of 'Border'. Suddenly the people in the auditorium started choking because of smoke and carbon monoxide released by the burning oil and other combustible material. The owner of the cinema hall was found guilty and was punished.

Source: http://www.Indiankanoon.org/doc/186390713/

Case Study 2	
In 2006, a consumer show was organized at Victoria Park, Meerut, but, on the last day, it became a mute spectator to a devastating fire inside the covered premises of the brand show. The fire was said to have been caused by a circuit. The fire left 64 persons dead and more than hundreds were injured. Some, who were fortunate to escape death, suffered serious injuries, and some minor injuries. The contemporaneous history records it as the Great Meerut Fire Tragedy. After the tragedy at the Victoria Park, a First Information Report was lodged against the accused persons under **Sections 304A, 337, 338** and **427** of	Indian Penal Code. Court has taken note of the submission of learned defense prosecutor and observed hereinbefore that it will address the issue of maintainability of the writ petition after submission of the report. The organizers had not obtained a No-Objection Certificate from the fire department, but had duly conveyed the Chief Fire Officer in writing, as required. In course of hearing court observed that the organizers were asked to deposit a sum of Rs. 30 lakhs before the Registry of this court within a period of two months. Final judgement is awaited.

Source: http://www.Indiankanoon.org/doc/182012411/

References

1. Jose R. Almirall & Kenneth G. Furton, *Analysis and Interpretation of Fire Scene Evidence*, 1st edn., London, 2004.

2. Max M. Houck & Jay A. Siegel, *Fundamentals of Forensic Science*, 2nd edn., USA, 2001.

3. B.R. Sharma, *Forensic Science in Criminal Investigation and Trials*, 4th edn., Delhi, 2007.

4. *National Building Code of India* (*Fire and Life Safety*), Bureau of Indian Standards, New Delhi, 2005.

11 PETROLEUM AND ADULTERATION

Petrol, kerosene and diesel are petroleum products obtained from fractional distillation of crude oil in refineries. These contain different compounds of carbon and hydrogen called hydrocarbons. From refinery, they are transported to a supply point normally by pipeline and then to petrol pumps by tankers.

In order to fetch undue profit, petrol and diesel are adulterated with cheaper solvents despite strict government restrictions. Sometimes, fake petrol and diesel are prepared by mixing cheaper solvents with dye and other ingredients. Kerosene meant for public distribution is specially coloured with blue dye. Colouring of kerosene serves double purpose: first, to differentiate it from normal kerosene and, second, if used for adulteration, the colour of the petrol and diesel will change, thus, making adulteration difficult. However, people have developed the method of removing the blue dye of kerosene and then, using it for adulteration.

The other way of fetching undue high profit is to give short delivery by manipulating in dispensing unit of petrol pump. Recently, it has come to the knowledge that some petrol pumps are using some chip and manipulating the mother board fitted in the dispensing machine. It can be operated by remote control device to give short supply.

Adulteration can be done at the following points:

(i) While transporting the petroleum products from supply point to retailer by tanker lorry driver and his associates.

(ii) By the retail dealer after receiving supply and mixing in tank.

Petroleum and petroleum products are covered under Section 2 (a) (viii) of Essential Commodities Act of 1955, amended from time to time. All orders and notifications are issued by the Ministry of Petroleum and Natural Gas in exercise of powers conferred by Section 3 of the said Act.

Section 7 of Essential Commodities Act 1955 prescribes the penalties as:

(1) If any such person contravenes any order made under Section 3,-

(a) He shall be punishable,-

(i) In the case of an order made with reference to clause (h) or clause (i) of sub-section (2) of that section, with imprisonment for a term which may extend to one year and shall also be liable to fine, and

(ii) In the case of any other order, with imprisonment for a term which shall not be less than three months but which may extend to seven years and also be liable to fine: Provided that the court may, for any adequate and special reasons to be mentioned in the judgment, impose a sentence of imprisonment for a term of less than three months;

(b) Any property in respect of which the order has been contravened shall be forfeited to the government;

(c) Any package, covering or receptacle in which the property is found and any animal, vehicle, vessel or other conveyance used in carrying the commodity shall, if the court so orders, be forfeited to the government.

(2) If any person to whom a direction is given under clause (b) of sub-section (4) Section 3 fails to comply with the direction, he shall be punishable with imprisonment for a term which shall not be less than three months but which may extend to seven years and shall also be liable to fine:

Provided that the court may, for any adequate and special reasons to be mentioned in the judgement, impose a sentence of imprisonment for a term of less than three months.

(2A) If any person convicted of an offence under sub-clause (ii) of clause (a) of sub-section (1) or under sub-section (2) is again convicted of an offence under the same provision, he shall be punishable with imprisonment for the second and for every subsequent offence for a term which shall not be less than six months but which may extend to seven years and shall also be liable to fine:

Provided that the court may for any adequate and special reasons to be mentioned in the judgment impose a sentence of imprisonment for a term of less than six months.

(2B) For the purposes of sub-sections (1), (2) and (2A), the fact that an offence under sub-clause (ii) of clause (a) of sub-section (1) or under sub-section (2) has caused no substantial harm to the general public or to any individual, shall be an adequate and special reason for awarding a sentence of imprisonment for a term of less than three months, or six months, as the case may be.

(3) Where a person having been convicted of an offence under sub-section (1) is again convicted of an offence under that sub-section for contravention of an order in respect of an essential commodity, the court by which such person is convicted shall, in addition to any penalty which may impose on him under that sub-section, by order, direct that person that shall not carry on any business in that essential commodity for such period, not being less than six months, as may be specified by the court in the order.

As per the **order GSR 729(E) dated 19 December, 2005 of Ministry of Petroleum and Natural Gas:**

(i) **High Speed Diesel** means any hydrocarbon oil, excluding mineral colza oil and turpentine substitute, which meets the requirements of Bureau of Indian Standards, specification no. IS1460 and is suitable for use as fuel in compression ignition engines.

(ii) **Motor Spirit** means any hydrocarbon oil, excluding crude mineral oil, which meets the requirements of Bureau of Indian Standards specification no. IS 2796.

(iii) **Adulteration** means the introduction of any foreign substance into motor spirit or high speed diesel illegally or unauthorizedly with the result that the product does not conform to the requirements of the Bureau of Indian Standards specification no. IS 2796 and IS no. 1460 for motor spirit and high speed diesel, respectively or any other requirement notified by the central government from time to time.

(iv) **Malpractices** shall include the following acts of omission and commission in respect of motor spirit and high speed diesel:

(a) Adulteration,

(b) Pilferage,

(c) Stock variation,

(d) Unauthorized exchange,

(e) Unauthorized purchase,

(f) Unauthorized sale,

(g) Unauthorized possession,

(h) Over-charging,

(i) Sale of specification product,

(j) Short delivery

As per the **order GSR 518(E) dated 5 June, 2000 of Ministry of Petroleum and Natural Gas:**

Naphtha is liquid hydrocarbon with 90 per cent volume distillation, by ASTM D-86 distillation method, of 190 degrees centigrade or less.

As per the **order GSR 584(E) of 1993 of Ministry of Petroleum and Natural Gas:**

Kerosene means a middle distillate mixture of hydrocarbons meeting BIS specification no. IS 1459 of 1974 with important characteristics of flash point at a minimum of 35 °C and smoke point at a minimum of 18mm.

Subsidised kerosene sold through public distribution system (PDS) is blue in colour while the market priced kerosene is colourless.

Common adulterants of petrol

(i) Kerosene

(ii) Naphtha

(iii) Special boiling solvents

(iv) Mineral turpentine oil, etc.

Common adulterants of diesel

(i) Kerosene

(ii) Used lubricating oil



Figure 11.1: Colour of petrol (93 octane), normal petrol and diesel

Power of Search and Seizure:

According to the Ministry of Petroleum and Natural Gas **order GSR 729 (E) dated 19 December, 2005**:

(1) Any gazzetted officer of the central or the state government or any police officer not below the rank of Deputy Superintendent Police duly authorized, by general or special order of the Central Government or the State Government, as the case may be, or any officer of an oil company, not below the rank of sales officer, may, with a view to securing compliance with the provision of this order, or for the purpose of satisfying himself that this order or any order made there under has been complied with or there is reason to believe that all or any of the provisions of this order have been and are being or are about to be contravened-

(a) enter and search any place or premises of a dealer, transporter, consumer or any other person who is an employee or agent of such dealer or transporter or consumer;

(b) stop and search any person or vehicle or receptacle used or intended to be used for movement of the product;

(c) take samples of the product and seize any of the stocks of the product and the vehicle or receptacle or any other conveyance used or suspected to be used for carrying such stocks and thereafter take or authorize the taking of all measures necessary for securing the production of stocks or items so seized before the Collector or District Magistrate having jurisdiction under the provisions of the Essential Commodities Act, 1955 and for their safe custody pending such production;

(d) inspect, seize and remove with, such aid or assistance as may be necessary, books, registers, any other records or documents of the dealer, transporter, consumer or any other person suspected to be an employee or agent of the dealer, transporter or consumer;

(2) While exercising the power of seizure provided under above sub-clauses (c) and (d) the authorized officer shall record in writing the reasons for doing so and a copy of such recording shall be provided to the dealer, transporter, consumer or any other concerned person, as the case may be.

(3) The provisions of section 100 of the Code of Criminal Procedure, 1973 (2 of 1974), relating to search and seizure shall, as far as may be, apply to searches and seizures under this order.

According to the Ministry of Law and Justice (legislative department) order **dated 14 January, 2010 The Legal Metrology Act, 2009 (No. 1 of 2010)**:

'**Legal Metrology Officer**' means Additional Director, Additional Controller, Joint Director, Joint controller, Deputy Director, Deputy Controller, Assistant Director, Assistant Controller and Inspector appointed under sections 13 and 14.

11.1 List of Equipments required

Sampling equipment for taking sample from retail outlet and tank lorry:



Figure 11.2: (left to right): Rectangular aluminium container, wooden box for packing, circular aluminium container

1. **Aluminium container**-for sampling from retail outlets
   - (a) Leak-proof, airtight lid, capacity 1 litre.
   - (b) Container could be circular or rectangular.
   - (c) Closures for containers; only screw caps should be used for metal cans to provide a vapour tight closure seal.
2. **Tube sampler-** for sampling from drums and cans
   - (a) Wooden box for packing.
   - (b) Standard plastic seal and sealing wire.
   - (c) Calibrated density measuring apparatus (hydrometer for MS and HSD).
   - (d) Set of filter paper and dropper.
   - (e) Plier (used for twisting and cutting of sealing wire).
   - (f) 5 litre standard measuring can.

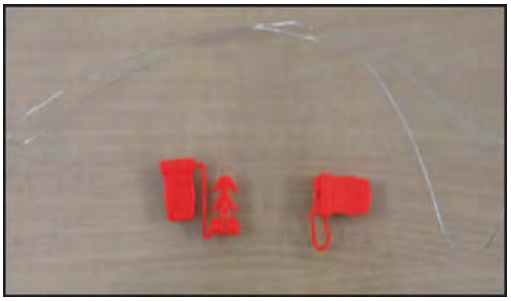


Figure 11.3: Standard plastic seal and sealing wire

Filter Paper Test

(i) Filter paper test is done on MS samples to detect contamination/adulteration with other higher boiling fractions, i.e. SKO or HSD, etc.

(ii) 2 drops of MS are poured on a good quality filter paper and observation is recorded after 2 minutes.

(iii) An oily stain left on filter paper indicates the presence of higher boiling petroleum fractions in MS.

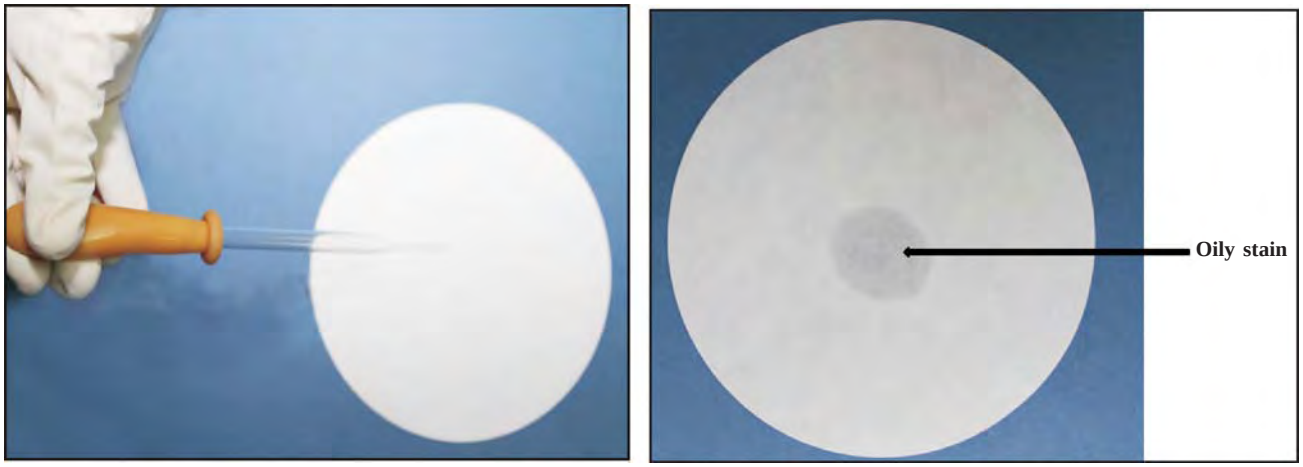


Figure11.4: Filter paper test

Weight and Measurement:



Figure 11.5: W&M certified standard 5 litre container

In addition to adulteration, undue profit can be earned by giving short supply, i.e. in place of 5.0 litre, delivering only 4.50 litres by manipulation in the delivery system. Fuel pumps are sealed after calibration to prevent adjustment of calibration and fraudulent practices. They are required to operate within a tight prescribed tolerance.The Legal Metrology (general) Rules, 2010 have empowered and entrusted the Legal Metrology Officers in India to take many measures to prevent fraudulent practices in digital dispensing pumps.

According to the Ministry of Law and Justice (Legislative Department) **order dated 14 January, 2010 The Legal Metrology Act, 2009 (No. 1 of 2010):**

Penalty for use of non-standard weight or measure: Whoever uses or keeps for use any weight or measure or makes use of any numeration otherwise than in accordance with the standards of weight or measure or the standard of numeration, as the case may be, specified by or under this Act, shall be punished with fine which may extend to Rs. 25,000 and for the second or subsequent offence, with imprisonment for a term which may extend to six months and also with fine.

Penalty for alteration of weight and measure: Whoever tampers with, or alters in any way, any reference standard, secondary standard or working standard or increases or decreases or

alters any weight or measure with a view to deceiving any person or knowing or having reason to believe that any person is likely to be deceived thereby, except where such alteration is made for the correction of any error noticed therein on verification, shall be punished with fine which may extend to Rs. 50,000 and for the second and subsequent offence with imprisonment for a term which shall not be less than six months but which may extend to one year or with fine or with both.

Short delivery of products:

Weight and measurement (W&M) department seals metering unit (display) and totalizer unit with sealing wire and lead seal which is embossed by W&M inspector. In the following cases seal may be treated as tampered:

(i) The embossed seal of W&M is changed.

(ii) Sealing wire is found broken and rejoined.

(iii) Change in fitting/gear inside the dispensing unit with the intention of manipulating delivery.

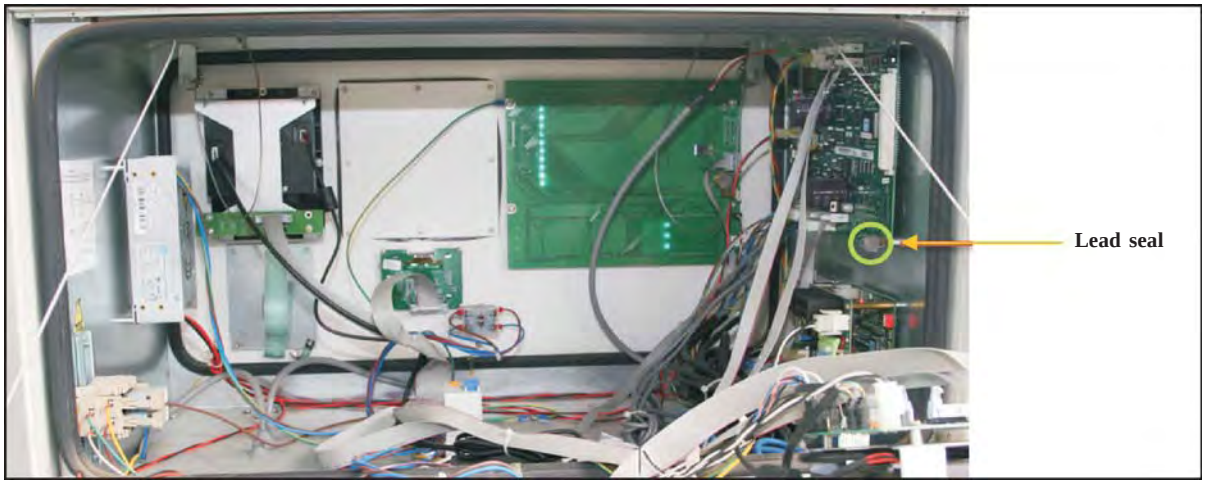


Figure 11.6: Metering (display) unit sealed with lead seal and sealing

Methods of manipulation/tampering in software/chip:

(i) Changing E-prom program or software by way of setting preset keypad

(a) E-prom chip is a very important component and is located on the motherboard. As it controls display and discharge, the short delivery can be manipulated by setting preset-keypad.

(b) Preset-keypad is used to control various parameters like price, delivery setting, etc. Hence, it can be used to change E-prom program.

(ii) Tampering with E-prom chips and cards by replacing them with spurious chips/cards available in the market:

E-prom chips or the cards are available in the market and they can be replaced in place of the original one in order to manipulate the discharge. A second E-prom chip can also be added parallel to the original one which may be activated by a dual switch while de-activating the original.

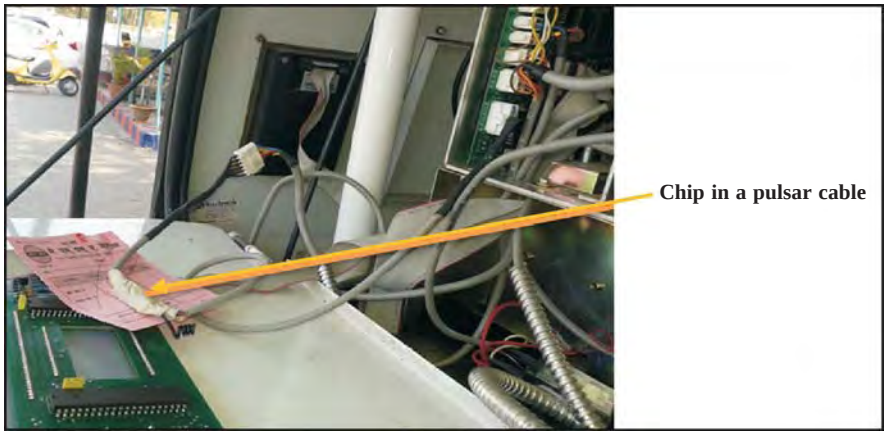


Figure 11.7: Chip covered in a pulsar (white) cable

(i) Disconnecting the digital totalizer for adulteration

(a) The pump can easily be manipulated for adulteration by way of disconnecting the digital totalizer to manipulate the stock in the tank.

(b) For example, in10000 litre petrol, 1000 litre naphtha is added. The totalizer should show the delivery of 11000 litre, but by manipulation by disconnecting the totalizer, the delivery can be shown as 10000 litre.

(ii) Scrapping the history of calibration and manipulation

In digital pump, in some software the complete history of calibration and manipulation is not traceable so that manipulated adjustment in software could not be detected. In such cases, the evidence of manipulation is lost.

(iii) Altering the K factor without tampering the seal

In some digital imported pumps, K factor can be altered without tampering the seal. K factor is altered to change the synchronization between discharge and display for manipulating the delivery without being caught by enforcement authorities, i.e. Legal Metrology.

(iv) Use of duplicate motherboard

In digital pumps, duplicate mother board can easily be fitted along with original one or in place of original for manipulation of short delivery of fuel.

(v) Pulse rate manipulation

As the digital pumps are working on the basis of pulse rate, the delivery can be manipulated by modifying the pulses rate.

(vi) Modifying the disk with more holes for manipulation of short delivery

By modifying the disk (where the disk and proximity switches are used as the primary transducer) with more holes than the original one, the delivery can be manipulated.

In all above cases the short delivery can be manipulated without breaking the seal of Legal Metrology.

Note: *In case of suspected above manipulations and tampering, officer from Weight and Measurement Department should be called, who would check for manipulations and take further necessary action.*

11.2 Drawl of Samples

Samples from retail outlets can be drawn in case of stock variation beyond permissible limits, density failure (if difference of density variation is more than 0.003 kg/m^3 when compared with the record of receiving supply), filter paper test failure and also during special drives/ campaigns or in case of specific complaint against the retail outlets or suspected to give short deliveries.

Samples are to be drawn from nozzle (s) of the dispensing units from all tanks of both MS and HSD by authorized officer of oil companies and other departments.

All the inspecting officials shall bring their own aluminium containers and plastic seals and sealing wire with wooden boxes for drawing samples. They will pay for the cost of samples collected by them and obtain cash memo for the same.

Procedure to be followed is as under:

Motor Spirit/Gasoline/Petrol

Six samples of 1 litre each from each tank of the retail outlet should be collected.

(i) Two samples are to be retained by the dealer or transporter or concerned person under acknowledgement with instructions to preserve the sample in his safe custody till the testing or investigations are completed.

(ii) Two samples are to be retained by the concerned oil company or department.

(iii) Two samples are sent to the laboratories authorized for testing.

Wherever the laboratory is not equipped for the testing of Octane number, then the second sample should be sent to the laboratory where CFR engine is available for Octane number test.

High Speed Diesel

Three samples of 1 litre each from each tank of the retail outlets should be collected.

(i) One sample is to be retained by the dealer or transporter or concerned person under acknowledgement with instructions to preserve the sample in his safe custody till the testing or investigations are completed.

(ii) One sample is to be retained by the concerned oil company or department.

(iii) One sample is to be sent to the laboratory authorized for testing.

Note: *In case there is requirement of finding Cetane number then one additional sample is to be collected. Thus, in such a case, four samples of 1 litre each should be collected.*

Drawl of sample of MS/HSD from tank lorry:

Initially 20 litre of the bottom fuel of each chamber of the tank lorry is removed and then the sample from each chamber is collected.

(i) If the density of sample from each chamber is found to be same then all the samples are mixed and 6 samples of 1 litre each for MS, 3 samples of 1 litre each for HSD and kerosene are collected.

(ii) If the density of sample from each chamber is found to be different then sample from each chamber is collected separately and 6 samples of 1 litre each for MS from each chamber, 3 samples of 1 litre each for HSD and kerosene from each chamber are collected.

Drawl of sample of kerosene from tank lorry suspected to be transporting kerosene unauthorizedly or on fake document for the purpose of adulteration of petrol (MS) or HSD:

Collect three samples of 1litre each as mentioned under MS/HSD from tank lorry.

Search of site:

(i) Preparing fake MS and HSD: Collect all the chemicals and solvents used in preparation of fake MS and HSD and pack each of them in separate packet and container.

(ii) Processing conversion of PDS blue coloured kerosene into colourless kerosene: Collect three samples of 1litre each and separately collect chemicals used in making kerosene colourless.

Precautions to be taken while drawing samples:

(i) Samples should only be drawn by an authorized officer(s).

(ii) Sample containers should be rinsed twice with the product before drawl of sample.

(iii) Container for drawing sample should be filled with the material to be sampled and allowed to drain at least once before drawing the sample.

(iv) Sample containers should never be filled completely with the product and sufficient space should always be left to allow for expansion.

(v) Sample containers should be closed immediately after taking the sample.

(vi) After sampling and sealing, the container should be inverted and checked for any leaks.

(vii) Sample should not be drawn in plastic containers because they are not tamper-proof and also not recommended.

(viii) Care should be taken to avoid breathing petroleum vapors while sampling.

(ix) Sample containers of volatile products should be stored upside down to prevent loss of low boiling constituents. Periodical examinations should be made for leakage.

(x) When samples are required from various levels in a tank, the order of sampling should be from the top downwards so that each sample is obtained before the liquid at that level is disturbed.

11.3 Packaging and Forwarding of Samples

Sealing of sample

(i) Sealing of the sample containers may be done with ISI marked stainless steel wires. Aluminium containers as well as the wooden box (used for safe transportation of aluminium containers) should be properly sealed.

(ii) Random numbered plastic seals, sealing wire (both can be obtained from oil companies) and pliers are to be used for sealing of all sample containers.

(iii) Details of seal (seal no. and colour) should be indicated on sample label as well as on forwarding letter.

(iv) While applying sealing wax, naked flame should be kept away from the petroleum vapors.

(v) DCP type fire extinguisher should be kept at easy access.

(vi) Facsimile of the seal should be indicated on sample label as well as on forwarding letter.



Figure 11.8 (left to right): Method of sealing the sample container

Labelling of sample

(i) Clearly label all the sample containers

(ii) Tie on labels are preferred

(iii) Use indelible markings on the labels

(iv) The sample label should be jointly signed by the authorized officer who has drawn the sample and the dealer or transporter or concerned person or his representative (with their names below the signature).

(v) The sample label should contain the following information:

(a) Product's name (MS/HSD)

(b) Name and address of retail outlet

(c) Name of the oil company

(d) Quantity of sample



Figure 11.9: Aluminum container sealed and labelled

(e) Date of sample collection

(f) Time of sample collection

(g) Name of authorized officer

(h) Name of the dealer or transporter or concerned person or his representative

(i) Plastic seal number on aluminium container

(j) Plastic seal number on wooden box

(k) Signature of witnesses

Dispatch of sample

The authorized officer shall forward the sample of the product taken within 10 days to any of the laboratories mentioned below or to any other such laboratory when it may be notified by the government in the official gazette for this purpose, for analyzing with a view to checking whether the density and other parameters of the product conform to the requirements of Bureau of Indian Standard specifications No. IS 2796 and IS 1460 for motor sprit and high speed diesel, respectively.

The laboratories mentioned below shall furnish the test report to the authorized officer within twenty days of receipt of sample at the laboratory for appropriate action.



Figure 11.10: Wooden box containing aluminium container sealed and labelled to be forwarded to an

According to Ministry of Petroleum and Natural Gas Order GSR 729(E) dated 19 December 2005, Laboratories for testing of petroleum product samples (as listed in Schedule III) are listed below:

(A)Marketing and Refinery Laboratories of Oil Companies

(i) All the marketing (including mobile laboratories) and refinery laboratories of Bharat Petroleum Corporation Limited, Hindustan Petroleum Corporation, Indian Oil Corporation Limited and IBP Co. Limited;

(ii) Bongaigaon Oil Refinery Ltd., Refinery Laboratory, P.O. New Bongaigaon dist. Kokrajhar, Assam;

(iii) Chennai Petroleum Corpn. Ltd., Refinery Laboratory, Manali, Chennai-600019, Tamil Nadu;

(iv) Kochi Refinery LTD., Refinery Laboratory, Post Ambalamugal, Kochi-682302, Kerala;

(v) Mangalore Refinery and Petrochemicals Ltd. Refinery Laboratory, Kuthethoor, P.O. Katipalla, Moodapadav, P.B. no. 2, Mangalore 574149, Karnataka;

(vi) Numaligarh Refinery Limited, refinery Laboratory, Numaligarh, Assam; and

(vii) Reliance Petroleum Ltd., Refinery Laboratory, Moti Khavdi (Vill.), Digvijaygram (PO) Jamnagar (Dist)-361140, Gujrat.

(B) Government Laboratories

(i) Director of Airworthiness, Civil Aviation Dept. Laboratory, Block II/III East, R.K. Puram, New Delhi 110066;

(ii) National Test House, 11/1, Judges Court Road, Alipore, Calcutta-700027;

(iii) National Physical Laboratory, Pusa, New Delhi-110012;

(iv) Chemical testing and Analytical Laboratory, Industries and Commerce Department, Government of Tamil Nadu, Guindy.

(C) Defence Laboratories

(i) Chief Controlrate of Materials, Controlrate General of Stores Laboratory, IGS Kanpur, P.B. No. 229, Kanpur;

(ii) Inspectorate General of Stores Laboratory (I.G.S.L.), DGI Complex, Chennai-6000114;

(iii) Inspectorate General of Stores Laboratory, DGI Complex, Hastings, Calcutta-700022;

(iv) Inspectorate General of Stores Laboratory, DGI Complex, Vikhroli, Mumbai-400083.

(D) Other Laboratories

(i) Central Power Research Institute, Bangalore;

(ii) Fuel testing Laboratory, Society for Petroleum Laboratory, B-14, Sector 62, Noida, U.P.;

(iii) Indian Institute of Petroleum, Dehra Dun 248005;

(iv) Indian Institute of Technology, Guindy, Chennai;

(v) Indian Institute of Technology, Hauz Khas, New Delhi;

(vi) Indian Institute of Technology, Powai, Mumbai;

(vii) Indian Institute of Technology, Kharagpur;

(viii) Regional Research Laboratory, Uppal Road, Hyderabad-500007;

(ix) Ramdev Baba Engineering college, Kalol Road, Nagpur 440013, Maharashtra;

(x) Lakshmi Narayan Institute of Technology, Amravati Road, Nagpur 440010, Maharashtra.

(E) All Forensic Laboratories in the States/Union Territories

11.4 Queries

From Forensic Science Laboratory/Central Forensic Science Laboratory/other authorized laboratories:

For Petrol/Gasoline/Motor Spirit (MS)

(i) Whether the sent sample is petrol.

(ii) If petrol, whether is it adulterated.

(iii) If petrol is adulterated, what is the adulterant(s) present?

(iv) If petrol is fake, give the name of the chemical(s) used.

For Kerosene

(i) Whether the sample sent is kerosene.

(ii) Whether it is PDS kerosene or kerosene or whether PDS blue kerosene is converted to colourless kerosene.

For High Speed Diesel (HSD)

(i) Whether the sample sent is HSD.

(ii) Whether the sample is adulterated or fake.

(iii) If HSD is adulterated, what is the nature of adulterant(s)?

(iv) If HSD is fake, give the name of the chemical(s) used in preparing it.

Comparison of two samples

Whether the samples taken from drum and tanker have the same source.

11.5 Case Studies

Case study 1	
Samples of Motor Spirit were collected from a reputed petrol pump of Bharat Petroleum Pvt. Ltd. and sent to laboratory for examination. According to the laboratory report, Motor Spirit sample was found to be adulterated. The dealership of the petrol pump was terminated. Dealer of the petrol pump filed writ petition alleging that termination of dealership is illegal in first instance. Defence Lawyer pointed following short comings: 1. Dealership was terminated without notice. 2. Police Officers, who collected samples in collaboration with the representatives of the Oil Company, were below the rank of Deputy Superintendent of Police. 3. According to provision of control order/Essential Commodities Act 1955, six samples of Motor Spirit are to be collected from each	tank/nozzle but, in this case only two samples were collected and no sample was given to the dealer which is contravention to control order/Essential Commodities Act 1955. 4. Samples were collected in plastic containers in place of aluminium/glass containers. 5. In first instance of adulteration, punishment is fine of Rs. 1 lakh along with suspension of sale and supply for 45 days. In second instance of adulteration, license is terminated. Thus, here the search and seizure was bad in law and in contravention of the mandatory provisions of Essential Commodities Act 1955. Court came to the conclusion that dealership was terminated on irrelevant and non-existent causes and thus, set aside Bharat Petroleum Pvt. Ltd. order of terminating dealership of the appellant.

Source: www.indiankanoon.org/doc/19098275/

Case study 2	
A sample of petrol and diesel were taken from a petrol pump and were sent to Forensic Science Laboratory. The diesel sample was found adulterated with kerosene and FIR was lodged by the Supply Inspector under sections 3/7 Essential Commodity Act and Sections 406, 417, 419, 420 of IPC. Petitioner filed writ petition in High Court of UP and the learned counsel alleged to what extent was the diesel sample found adulterated and that the exact quantity of adulteration was not given. So, the lodged FIR should be quashed. Defense Counsel put up the fact that kerosene, diesel and petrol are transported from the same pipeline and the chances of the presence of kerosene in diesel could be due to it. Court studied the various parameters of BIS and control orders. Learned Counsel put up the argument that density is the only parameter for checking adulteration but, this was rejected by the court saying that other parameters mentioned in BIS are also required. Since density can be manipulated by addition of one or more adulterants, Court held that being a law, the provision of control orders cannot be altered or amended or varied by means of administrative or executive instructions. The state government has issued directions for not lodging FIR under sections 3/7 Essential Commodity Act against traders and businessmen and withdrawal of prosecution cases.	Thus, the FIR lodged in this case may be quashed but, the plea was rejected. Petitioner requested for re-examination of diesel sample found adulterated by the Forensic Science Laboratory as there is a provision in Food Adulteration Act but, the plea was not accepted as there is no provision in control order. According to control order, adulteration means the introduction of any foreign substance into motor spirit or high speed diesel illegally or unauthorizedly with the result that the product does not conform to the requirements of the Bureau of Indian Standards specification no. IS 2796 and IS 1460 for motor spirit and high speed diesel, respectively or any other requirement notified by the Central Government from time to time. In the present case, sample of diesel was adulterated with kerosene and the exact quantity of kerosene is not the requirement of control order but, mere detection of adulterant is sufficient. If kerosene is mixed with diesel, it may amount to breach of provision of kerosene (restriction on use and fixation of ceiling price) Order, 1993 and selling of diesel mixed with kerosene also amounts to cheating, which is punishable under section 420 IPC. Report of analysis shows that diesel has been mixed with kerosene. The petitioner has therefore committed breach of control order as well as offence under section 420 IPC.

Source: www.indiankanoon.org/doc/80120/

References

1. *Essential Commodities Act 1955*, Delhi, 2005.

2. Marketing Discipline Guidelines for RO/SKO Dealerships of Public Sector Marketing Companies, 2013.

3. Ministry of Petroleum and Natural Gas order GSR 729(E), Controller of Publications, Delhi, 19 December, 2005.

4. Ministry of Petroleum and Natural Gas order GSR 518(E), Controller of Publications, Delhi, 5 June, 2000.

5. Ministry of Petroleum and Natural Gas order GSR 584(E), Controller of Publications, Delhi, 1993.

6. Ministry of Law and Justice order dated 14 January, 2010 The Legal Metrology Act, 2009 (No. 1 of 2010), Controller of Publications, Delhi.

12 TRAP CASES

Trap means nabbing a public servant for demanding and accepting illegal gratification (say bribe). The term 'public servant' is defined in **Section 2(c) of Prevention of Corruption Act of 1988**. To prevent corruption, a trap is laid to apprehend public servant red-handed while demanding and accepting bribe.

Illegitimate trap is the one of the traps where money is not demanded but he/she is only suspected to be habitual of taking bribe and is tempted with bribe just to verify (M.S. Mohiudin AIR 1952 Mad 561, (1952) 2 MLJ 11).

For accepting bribe, a case is registered under **Sections 7, 11, 13(1) (a) and 13(1) (b) of PC Act, 1988.**

Section 7: Public servant taking gratification other than legal remuneration in respect of an official act.

Section 11: Public servant obtaining valuable things, without consideration from a person concerned in proceeding or business transacted by such public servant.

Section 13(1) (a): A public servant is said to commit the offence of criminal misconduct if he habitually accepts or obtains or agrees to accept or attempts to obtain from any person for himself or for any other person any gratification other than legal remuneration as a motive or reward such as is mentioned in Section 7 of the PC Act.

Section 13(1) (b): A public servant is said to commit the offence of criminal misconduct if he habitually accepts or obtains or agrees to accept or attempts to obtain from any person for himself or for any other person, any valuable thing without consideration or for a consideration which he knows to be inadequate from any person whom he knows to have been, or to be, or to be likely to be concerned in any proceeding or business transacted or about to be transacted by him, or having any connection with the official functions of himself or of any public servant to whom he is subordinate, or from any person whom he knows to be interested in or related to the person so concerned.

Section 13(1) (e): A public servant is said to commit the offence of criminal misconduct if he or any person on his behalf, is in possession or has, at any time during the period of his office, been in possession for which the public servant cannot satisfactorily account, of pecuniary resources or property disproportionate to his known sources of income.

Against a bribe giver, the case can be registered under Section 12 of PC Act, 1988.

Section 12: (Reverse trap): Punishment for abetment of offences defined in Section 7 or 11.

A case is registered against a tout under Sections 8 and 9 of PC Act, 1988.

Section 8: Taking gratification, in order by corrupt or illegal means, to influence public servant is punishable with imprisonment for a term which shall be not less than six months, but which may extend to five years and shall also be liable to fine is punishable with imprisonment for a term which shall be not less than six months but which may extend to five years and shall also be liable to fine.

Section 9: Taking gratification, for exercise of personal influence with a public servant is punishable with imprisonment for a term which shall be not less than six months, but which may extend to five years and shall also be liable to fine.

Section 17: Persons authorized to investigate

Notwithstanding anything contained in the Code of Criminal Procedure, 1973, no police officer below the rank:

(a) In the case of the Delhi Special Police Establishment, of an Inspector of Police;

(b) In the metropolitan areas of Bombay, Calcutta, Madras and Ahmadabad and in any other metropolitan area notified as such under sub-section (1) of section 8 of the Code of Criminal Procedure, 1973, of an Assistant Commissioner of Police;

(c) Elsewhere, of a Deputy Superintendent of Police or a police officer of equivalent rank, shall investigate any offence punishable under this Act without the order of a Metropolitan Magistrate or a Magistrate of the First Class, as the case may be, or make any arrest thereof without a warrant:

Provided that if a police officer not below the rank of an Inspector of Police is authorized by the State Government in this behalf by general or special order, he may also investigate any such offence without the order of a Metropolitan Magistrate or a Magistrate of the First Class, as the case may be, or make arrest therefore without a warrant:

Provided further that an offence referred to in clause (e) of sub-section (1) of section 13 shall not be investigated without the order of a police officer not below the rank of a Superintendent of Police.

Section 18: Power to inspect bankers' books.

Section 19: Previous sanction necessary for prosecution.

No court shall take cognizance trapping of an offence punishable under section 7, 10, 11, 13 and 15 alleged to have been committed by a public servant, except with the previous sanction from the competent authority.

Methods of Trap

There are different methods of trap but phenolphthalein and sodium carbonate is most commonly used

(i) Phenolphthalein powder (which is colourless) is smeared on currency notes provided by the complainant and these are handed over to the bribe taker by the complainant on demand.

(ii) Trap team catches the public-servant for taking bribe red-handed when the currency notes are delivered to the accused public servant by the complainant on specific demand.

(iii) *According to Locard's principle, when two materials come in contact with each other, there is always some transfer of material.* Phenolphthalein powder gets transferred from currency notes to the hands of the accused upon handling the currency notes or transferred to other items which come in contact with currency notes such as drawer, file, table, briefcase, pocket, etc.

(iv) Hands of the accused are then washed in 2–3per cent of sodium carbonate solution. Sodium carbonate solution colour changes from colourless to pink when phenolphthalein is present.

12.1 Pre-trap Preparation

(i) Complainant is first asked to lodge a written complaint mentioning the money demanded, the date, time and place of demand and the motive/reward for demanding bribe by the public servant.

(ii) Complainant is not willing to pay the demanded bribe and requests the police authorities to take legal action against the suspected public servant. Then after verification of demand of bribe as motive/reward by the public servant, a FIR is lodged to set the law in motion in order to catch the public servant red-handed while accepting the demanded bribe amount.

(iii) Two independent witnesses are arranged, who ordinarily must not be from the same department to which the accused belongs. The complainant is asked to arrange the Government Currency (GC) notes which are to be delivered to the accused public servant as bribe. The independent witnesses are introduced with the complainant by the Trap Laying Officer (TLO). The facts of the complaint are also narrated to the witnesses by the TLO.

(iv) The trap kit is bought from the Malkhana of the ACB branch. Phenolphthalein powder is also brought separately.

(v) Demonstration of the use of phenolphthalein powder and the reaction of such item smeared with phenolphthalein powder when it comes in contact with sodium carbonate is given by a police officer. The solution which turned to pink in colour and the cotton swab is thrown away/destroyed.

(vi) Denominations and serial numbers of government currency notes produced by the complainant are noted down. Then such government currency notes are smeared with phenolphthalein powder by the same police officer and then these tainted notes are kept in an empty pocket of the complainant by the same officer. The excess of powder is removed so that the powder is not visible on currency notes. It may be added that before keeping the said tainted notes, the personal search of the complainant is carried out by one of the witnesses and descriptions of minimum articles carried by him are also noted down. Phenolphthalein powder is immediately returned to Malkhana and stored in safe custody.

(vii) The police officer who gives demonstration should not be a member of the trap team and he/she should remain in the office.

(viii) Complainant is asked to meet public servant with the shadow witnesses for delivering the demanded bribe. A micro tape recorder having a brand new cassette is also placed before the person of the complainant in a concealed manner so that the conversation between the accused and the complainant about the demand, acceptance and motive/ reward for such bribe is recorded.

(ix) The TLO gives directions to the shadow witness to over-hear the conversation between the complainant and the accused public servant. He also briefs the complainant to give the specific signal as decided (like wiping his mouth with handkerchief, combing hair with hands, giving missed call, etc.). He also briefs the team for taking position nearby the spot in a discreet and scattered manner.

(x) The team should wash its hands with soap before leaving.

(xi) A pre-trap memorandum/*panchnama* narrating the sequence of events is prepared which is duly signed by the *panch* witnesses, complainant and other trap team officers.

12.2 Trap Kit

A trap kit should contain:

(i) Sodium carbonate-laboratory/analytical grade.

(ii) Currency notes smeared with phenolphthalein powder. The denomination and serial numbers of GC notes are already noted down in a pre-trap *panchnama*.

(iii) Bottle containing distilled/mineral water (2×500 ml.).

(iv) Tea spoon, beakers (2×500 ml.).

(v) Glass bottles with leak-proof lids (minimum150 ml.).

(vi) Paper envelopes for keeping currency notes and marking cloth for sealing exhibits.

(vii) Labels for sticking on bottles, carbon paper, paper, candle and match box.

(viii) Laptop.

(ix) Cotton roll and disposable gloves.

(x) Sealing wax and seal of the IO.

(xi) Equipments for video recording and voice recorder.

(xii) TLO should carry a mobile phone with him for videography / photography.

(xiii) One set of (free size) clothes for the accused depending on whether male/female.

12.3 Team Required for Handling a Crime Scene

(i) TLO is leader of the team, i.e. Deputy Superintendent/Assistant Commissioner/ Inspector of Police and other police personnel.

(ii) Complainant and two independent witnesses.

(iii) If the suspect is female, then female witnesses to be arranged.

(iv) One or two teams with independent witnesses should be kept as standby in ACB office or in the vicinity of the residential premises of the accused public servant so that immediately after the acceptance of the demanded bribe amount, search can be conducted which may result into registration of a separate offence, i.e. disproportionate assets case against such public servant.

12.4 Actual Trap/Post Trap *Panchnama*/Memorandum

(i) After reaching the spot, the complainant along with shadow witness, i.e. Panch No. 1 goes to the office of the accused public servant. Simultaneously, the TLO along with Panch No. 2 takes position in a scattered and discreet manner in the vicinity of the office premises of the accused public servant and waits for a pre-decided signal regarding acceptance of bribe amount by the accused public servant.

(ii) On receiving the pre-decided signal from the complainant, the TLO along with Panch No. 2, i.e. recovery witness and other team members rush towards the office of the accused public servant. Then the TLO introduces himself, witnesses, etc., to the accused public servant. He challenges the accused public servant for having demanded and accepted the bribe money from the complainant. His reaction/explanation/conduct is noted down. His hands are caught hold of from the wrists by the team members. Both the hands are washed one by one and the wash of each hand is collected separately. The solution, which was otherwise colourless, turns to pink colour. It is kept in separate glass bottles, duly labelled and sealed, under the signatures of both the Panch witnesses and the TLO.

(iii) The tainted bribe amount is recovered from the accused or from the place he kept the same in the presence of the recovery witnessess. The denomination and serial numbers of the same are tallied with those mentioned in a pre-trap *panchnama* and noted down in recovery memo which is part of the post trap *panchnama*. Tainted GC notes are kept and sealed in a separate envelope under the signatures of both the *panch* witnesses and the TLO.

(iv) The narrations of the complainant and the shadow witnesses are also noted down one by one in the post trap *panchnama* about the events that took place after they met the accused public servant.

(v) The cassette recorder is also taken out and the recorded conversation is listened to by playing the recorder and the relevant gist (if feasible, complete conversation) of the same is mentioned in the *panchnama*. Then, the cassette is sealed in a separate envelope under the signature of the *Panch* witnesses.

(vi) The concerned file for which bribe was demanded and accepted, if found, in the office of the accused, should be seized on the spot vide post trap *panchnama* or separate seizure memo.

(vii) The site plan of the scene of offence/office of the accused is prepared on the spot under the signatures of both the *panch* witnesses and the TLO.

(viii) The facsimile of the seal used for sealing the exhibits during trap proceedings should also be taken on a separate sheet on the spot under the signatures of both the *panch* witnesses and the TLO. The seal should be given to one of the two witnesses for safe custody under proper acknowledgement.

(ix) The accused should be arrested vide separate arrest cum personal search memo by following the guidelines as described in the D.K. Basu Case.

(x) The controlling officer of the arrested public servant should also be informed about the events.

(xi) The post trap *panchnama* should contain the 'chain of events' right from reaching the spot until the team leaves the spot for office/police station. These events are relevant and admissible under Sections 6 and 157 of the Indian Evidence Act. The conduct/ reaction of the accused should be specifically mentioned in the *panchnama* which would be relevant and admissible under Section 8 of the Indian Evidence Act.

12.5 Search for Evidences

(a) GC notes-their denomination and serial number are again noted down. The TLO should be satisfied that the currency is genuine.

(b) Hand wash of bribe taker on which phenolphthalein got transferred.

(c) Wash of pocket of shirt/pants/coat/other clothes in which currency notes are kept.

(d) Wash of table/drawer of table, file or paper on which GC notes are kept.

(e) Videography, voice recorder for recording of conversation between the accused and the complainant on the day of the trap and before the time of trap.

12.6 Collection of Evidence

(i) Use fresh disposable hand gloves while collecting each individual evidence to avoid any contamination so that the accused should not take this defence in trial.

(ii) Wash both the hands of the accused separately in 2–3 per cent sodium carbonate solution prepared in distilled/mineral water. The colourless solution changes to pink colour due to presence of phenolphthalein powder. Note down whether the hand wash is of left or right hand which was otherwise colourless has turned to pink colour or faint pink.

(iii) The pink solution is transferred to a transparent glass bottle and labelled under the signatures of both the witnesses.

(iv) The GC notes smeared with phenolphthalein are recovered and taken in possession from the place where the same are kept by the accused like in the pocket of a shirt/coat, drawer/briefcase/file paper of a drawer or table wherein contact has taken place.

(v) Voice recording of details of conversation of accused with the complainant at the time of demanding money and at the time handing over the money should be videographed, if feasible.

(vi) The traces of phenolphthalein from the suspected surface may be lifted using a cotton swab soaked in sodium carbonate solution, squeeze out the solution in a clean glass bottle and put the swab in the same bottle duly sealed.



Figure 13.1: Hand wash of the accused being taken in sodium carbonate solution; pink colour developed showing the presence of phenolphthalein residues

(vii) Photographs may also be taken.

(viii) Control/specimen voice sample of accused should be taken as early as possible before he consults with any advocate because he cannot be compelled to give his specimen voice.

(ix) The sealed cassette having questioned voice of the accused and complainant along with the specimen/sample voices of both the accused and the complainant duly sealed along with the facsimile of the seal, questionnaire should be sent to CFSL/FSL within one week or as early as possible.

(x) The premises (office and residence) of the accused should be thoroughly searched for assets and incriminating documents.



Figure 13.2: Swab being taken from the place where the currency notes were kept by the accused; Pink colour developed indicates the presence of phenolphthalein

12.7 Packaging and Forwarding of Evidences

(a) The above solutions of hand, wash, pocket wash clothes and swab taken in sodium carbonate solution are transferred separately into narrow-mouthed leak proof bottles of glass labelled with description as given below-name of accused, date, time and place, police station, crime number, name and signature of witnesses, complainant and TLO along with the colour of the solution.



Figure 13.3: Small window showing the colour of the solution

(b) First, cover the bottles completely with white cloth and then seal properly while leaving a small window to see pink coloured solution. Write all the description again on the cloth.

(c) The currency notes are sealed properly in a paper envelope, labelled with descriptions as above and their serial numbers, denomination and total amount is noted.

(d) The cloth/coat/*kurta*/shirt or their pockets where the currency notes were kept is marked, packed in good quality polythene packets and the package is sealed in a cloth and a detailed description is written on it.

(e) Briefcase/file paper of a drawer or the table on which currency notes were kept are packed properly and sealed while properly maintaining the 'chain of custody'.

(f) The bottles containing the hand wash/pocket wash are properly sealed, labelled and are sent to laboratory for chemical analysis along with package of cloth and the envelope containing the currency notes.

(g) Voice recording with control sample of voices are kept in box, labelled and sealed.

(h) *All the exhibits must be sent for analysis within 72 hours of seizure or as early as possible in order to get the best evidence.*

12.8 Seizure List

(i) Pink coloured hand wash of the bribe taker in sealed bottle **(**minimum 150 ml.**).**

(ii) Pink coloured solution of pocket of clothes **(**minimum 150 ml.).

(iii) Briefcase/file paper of a drawer or on table where currency notes are kept.

(iv) Envelope containing currency notes.

(v) Clothes of accused from which GC notes are recovered.

(vi) Briefcase in which GC notes were kept.

(vii) File/paper on table or from drawer on which notes were kept.

(viii) Voice recording and standard sample/specimen of voice.

(ix) Video recording of trap on date, time and place.

(x) Relevant documents relating to the case pending with accused public servant or in his office for which he has demanded and accepted bribe as a reward or motive.

(xi) File/document such as appointment/posting letter in order to prove his official position.

12.9 Queries from Forensic Laboratory

(a) Whether phenolphthalein and sodium carbonate are present in the hand wash of the accused.

(b) Whether phenolphthalein and sodium carbonate are present in the wash from the pocket of the cloth.

(c) Whether phenolphthalein powder is present on the currency notes and on the file/paper sheet submitted for examination.

(d) Whether traces of phenolphthalein are present in the pockets of coat/shirt/pant and briefcase when the wash is not taken and these are directly sent for examination.

(e) Whether the writing material matches with the standard writing of the accused.

(f) Whether voice recorded is identical with standard samples/specimen of voice of accused, complainant and witness.

(g) Whether any residue of phenolphthalein is present on other exhibits.

12.10 Do's and Don'ts

Do's	Don'ts
Entire operation should be kept as a secret and should be shared with the concerned officers on need basis.	Never use sodium bicarbonate, lime, sodium hydroxide, baking powder, bleaching powder, calcium carbonate because color is less stable in these.
Check the chemicals before the trap and ensure mixing of sodium carbonate and phenolphthalein that gives pink color.	To avoid contamination, same spoon should never be used for taking phenolphthalein and sodium carbonate.
The hand wash/pocket wash of the accused should be collected in the presence of two witnesses, who should be a respectable person or a government employee and *not* a stock witness/pocket witness.	Never use water with high chlorine content as the pink color of solution fades away.
Always use laboratory/analytical grade phenolphthalein and sodium carbonate.	Seal of coin, button, etc., should not be used.
If the suspect is a lady, trap should be conducted in the presence of two lady witnesses.	Don't shake hands with the accused. He should be caught by the wrists.
Seal used should be a standard one which should be handed over to one of the witnesses at the time of concluding the proceedings for safe custody on the spot under proper acknowledgement.	Don't manhandle the accused and if he becomes violent and throws away the money then correct events should be mentioned and necessary restrain should be adopted.
Always send facsimile of the seal used for sealing exhibits while forwarding the exhibits to FSL/CFSL for examination/opinion.	Don't take the seal used for sealing the exhibits by the TLO.
It may be ensured that the complainant is not a habitual complainant who had earlier trapped other public servants. The intention of the complainant should be found out by the SP/TLO at the time of lodging of the complaint.	After FIR, the duty of police is not to prove the allegations but to find out the truth.
The correct events of the proceedings should be narrated as being an IO, his duty is to collect the evidence and not to create the evidence.	
After laying the trap and the accused has been sent to JC, the investigation of the case should be transferred to other IO in view of the guidelines of hon'ble constitutional courts.	
The chance witness available on the spot narrating the events should also be examined.	
If CCTV is in the office of the accused then its footage should also be secured on the spot.	

Note:

1. *Sometimes, the pink colour of the solution becomes light or the solution becomes colourless with passage of time as the stability of the pink colour decreases because of degradation of phenolphthalein due to chemical changes.*
2. *Intensity of pink colour depends on the amount of phenolphthalein transferred in the sodium carbonate solution.*
3. *While transporting the exhibits, the seal should remain intact otherwise it would lead to break in chain of custody and thus affects the case.*



Figure 13.4: Phenolphthalein in Sodium Bicarbonate solution gives no colour

12.11 Information Revealed After Forensic Examination

(i) Establish the presence or absence of phenolphthalein and sodium carbonate in the pink solution.

(ii) Presence of phenolphthalein on currency notes.

(iii) Presence/absence of phenolphthalein residue in the pockets of clothes, briefcase, etc.

12.12 Case Study

Case Study 1	
The CBI arrested a Group Captain, Air Force station, Devalali, Nasik (Maharashtra) for demanding and accepting a bribe of Rs. 50,000 from the complainant. The complainant (a civil contractor) alleged that the Group Captain had demanded a bribe from him for handing over a construction site. CBI registered a case and after verification of complaint,	laid a trap. The accused was caught red-handed while demanding and accepting a bribe of Rs. 50,000 from the complainant. Searches were conducted at the residential and office premises of accused and incriminating documents were recovered. The arrested accused was produced before the competent court at Nasik.

Source: *CBI Bulletin,* vol.-XXII, April-June 2014.

Case Study 2 :	
The CBI arrested an Assistant Commandant and a Sub-Inspector, both of Central Industrial Security Force (CISF), Dhanbad (Jharkhand) and three officials of Bharat Coking Coal Limited (BCCL), Lodna Area, Dhanbad in a bribery case of Rs. 31,000. A case was registered on the basis of a complaint from a representative of a private company engaged in purchase/sale of scrap material, wherein it was alleged that the accused persons, i.e. Assistant Commandant and a Sub-Inspector, both of CISF and 4 officials of BCCL,	Dhanbad had demanded different bribe amounts aggregating Rs. 31,000 per truck for allowing the said company in cutting scrap material from the site, optimum loading and movement of load/truck. The CBI laid a trap and an Assistant Commandant and a Sub-Inspector, both of CISF and 3 officials of BCCL were caught red-handed and arrested while demanding and accepting bribe of total amount of Rs. 31,000 (ranging from Rs.2,000 to Rs.10,000) from the complainant.

Source: CBI Bulletin, vol. XXII, April–June 2014

References

1. Prevention of Corruption Act 1988, Delhi, 2005.
2. Reading material on Trap, Central Bureau of Investigation Academy, U.P.
3. M.B. Rao, Handbook on Forensic Science for Police Officers, Sardar Vallabhbhai Patel National Police Academy, Hyderabad, 2008.
4. Handbook of Forensic Services, CFSL-CBI, 2009.

13 ACID ATTACK CASES

Sulphuric Acid, Hydrochloric Acid and Nitric Acid are the commonly used acids in acid attack cases. Acids are corrosive in nature. They erode and destroy the skin tissues and may expose or dissolve bones. The acids may damage eyes to the extent that the person becomes blind. Acid on inhalation enters the esophagus and may cause renal failure also. The victim may die due to excessive burns also. Treatment of burns is a long treatment involving plastic surgery in different stages and the victim suffers both from anxiety and depression.



Figure 13.1: Acid attack survivors

Source: *Hindustan Times*, 18 July 2013

Table 13.1: Types of acids and its properties

Acid	*Physical Appearance*	*Uses/Availability*	*Action*
Sulphuric Acid	Colorless, viscous, oily liquid, but commercial sulphuric acid is brownish because of impurities.	Used as an industrial cleaner and in industrial production of chemicals. Available at motor shops and in laboratories.	Color of skin changes from greyish-white to brownish-black.
Nitric Acid	Colorless liquid which tends to acquire yellow color with passage of time and has a peculiar choking odour.	Used in steel industry; by jewelers for cleaning jewelry; in the production of fertilizers and in laboratory as reagent.	Yellow discoloration of skin.
Hydrochloric Acid/ Maritus Acid	Clear, colorless, pungent liquid, but commercial hydrochloric acid is yellow in color due to impurities.	Used in cleaning bathrooms and toilets, cleaning metals, medicine preparation.	Yellow discoloration of skin.
Aqua Regia (Nitric Acid: Hydrochloric Acid=1:3)	Freshly prepared aqua regia is colorless, but it turns orange within seconds.	Aqua regia is used in etching, in dissolving metals including gold, as gold is not soluble in other acids and in some laboratories to clean glassware.	Causes more destruction of living tissues as compared to other Acids.
Phenol	Colorless to slightly pink in color.	As a disinfectant in household cleaners and in industries as a precursor in production of drugs, bakelite, etc.	Whitening of the skin usually occurs, with deeper burns developing later.

Sulphuric Acid causes most severe burns followed by Nitric Acid and then by Hydrochloric Acid.

How to Check an Acid or an Alkali?

Acids used can be detected by Litmus Paper Test:
Take a Litmus paper, moisten it with distilled water and bring it in contact with the suspected material.
Acid turns blue Litmus paper to red.
Alkali turns red Litmus paper to blue.



Modus Operandi:

(i) When acid filled in bulb is thrown at the victim, it spills on the face and other parts of body.

(ii) Acid can also be thrown directly from bottle/container/ syringe/jug.

(iii) Acid attacks are not only limited to women, but men are also attacked for vendetta.

(iv) Acid is mostly used to deface the girl when she refuses to continue with a love affair or marry.

(v) Mostly two-wheelers (motorcycle/scooter) are used in commitment of acid attacks to escape quickly from the crime scene.



Figure 13.2: Damage to eyes and face as caused by Sulphuric acid

Crime Data

According to the NCRB data, acid attack cases during 2011–13 are as follows:

Table 13.2: Acid attack cases

Acid attack cases	*2011*	*2012*	*2013*
Total no. of cases registered	83	85	66
Persons arrested	122	132	78
Persons charge sheeted	122	117	68

Source: NCRB

13.1 Indian Penal Code Sections

Section 326-Voluntarily causing grievous hurt by dangerous weapons or means

Whoever, except in the case provided for by section 335, voluntarily causes grievous hurt by means of any instrument for shooting, stabbing or cutting, or any instrument which, used as a weapon of offence, is likely to cause death, or by means of fire or any heated substance, or by means of any poison or any corrosive substance, or by means of any explosive substance,

or by means of any substance which it is deleterious to the human body to inhale, to swallow, or to receive into the blood, or by means of any animal, shall be punished with imprisonment for life, or with imprisonment of either description for a term which may extend to ten years, and shall also be liable to fine.

Section 326 IPC was amended in 2013 with the passing of **The Criminal Law (Amendment) Act, 2013**. The amendment resulted in insertion of **Sections 326A and 326B** for specifically dealing with acid violence.

Section 326 A Whoever causes permanent or partial damage or deformity to, or burns or disfigures or disables, any part or parts of the body of a person or causes grievous hurt by throwing acid on or by administering acid to that person, or by using any other means with the intention of causing or with the knowledge that he is likely to cause such injury or hurt, shall be punished with imprisonment of either description for a term which shall not be less than ten years but which may extend to imprisonment for life, and with fine; provided that such fine shall be just and reasonable to meet the medical expenses of the treatment of the victim and that any fine imposed under this section shall be paid to the victim.

Section 326 B

Whoever throws or attempts to throw acid on any person or attempts to administer acid to any person, or attempts to use any other means, with the intention of causing permanent or partial damage or deformity or burns or maiming or disfigurement or disability or grievous hurt to that person, shall be punished with imprisonment of either description for a term which shall not be less than five years but which may extend to seven years, and shall also be liable to fine.

With a view of preventing acid attacks, the Supreme Court has completely prohibited over-the-counter sale of acids unless the seller maintains a record register of the name and address of the buyer. The seller has to submit the detail of sale to the local police within 3 days. No acid should be sold to a person under the age of 18 years.

All the stock must be declared with the local Sub-Divisional Magistrate in 15 days. Undeclared stock could be confiscated and defaulter will be fined up to Rs. 50,000. The Supreme Court also directed in Writ Petition 129/2006 (Laxmi Vs Union of India) on 2 June 2013 that the centre and the state should make this offence cognizable and non-bailable under the Poison Act of 1919.

Section 307 IPC-Attempt to Murder

Whoever does any act with such intention or knowledge, and under such circumstances that, if he by that act caused death, he would be guilty of murder, shall be punished with imprisonment of either description for a term which may extend to 10 years, and shall also be liable to a fine; and if hurt is caused to any person by such act, the offender shall be liable either to imprisonment for life or to such punishment as is mentioned.

13.2 List of Reagents and Kits Required

I. Detection Kit

(i) Whatman filter paper (circular)

(ii) Test tubes

(iii) Glass droppers

(iv) Funnel

(v) Blue litmus paper

(vi) Red litmus paper

(vii) Tools for cutting out the portion of road/floor with acid stains (e.g. chisel, hammer, etc.)

(viii) Reagents for Detection of acids/other chemical

(a) For testing sulphuric acid:

Reagent A: 5–10 per cent solution of barium chloride in distilled water

(b) For testing nitric acid:

Reagent B (Acetic acid)

Reagent C (Brucine powder)

(c) For testing hydrochloric acid:

Reagent D—5 per cent solution of silver nitrate prepared in distilled water

Reagent E (Ammonia solution)

(d) For testing Aqua Regia:

Reagent B –Acetic acid glacial

Reagent C –Brucine powder

Reagent D–(Solution of silver nitrate)

Reagent E–(Ammonia solution)

(e) For testing Phenol:

Reagent F–(3 per cent solution of ferric chloride, i.e. 3g. of ferric chloride in 100 ml. of distilled water).

Kit Tests:

i. Test for Sulphate (Sulphuric Acid)

Addition of *Reagent A* to the sample (in container/swab from burnt area) gives white precipitate**.**

ii. Test for Nitrate (Nitric Acid)

Addition of *Reagent B* to the sample solution (from container/swab from the burnt area dissolved in distilled water) followed by *Reagent C* gives a blood red colouration**.**

iii. Test for Chloride (Hydrochloric Acid)

Addition of *Reagent D* to the sample (in container/swab from the burnt area) gives white precipitate which dissolves upon addition of **Reagent E.**

iv. Test for Aqua Regia: **It gives positive tests of both Nitric Acid and Hydrochloric Acid.**

Addition of *Reagent B* to the sample solution (from container/swab from the burnt area dissolved in distilled water) followed by *Reagent C* gives blood red colouration**.**

Addition of *Reagent D* to the sample (in container/swab from burnt area) gives white precipitate which dissolves upon addition of *Reagent E*.

v. Test for Phenol

Addition of *Reagent F* to the sample solution (from container/swab from the burnt area dissolved in distilled water) gives violet or bluish-violet colouration.

These are presumptive tests and the sample should be sent to the laboratory for confirmation.

II. Fingerprint kit

(i) Fingerprint powders (black, grey, anthracene, magnetic, fluorescent)
(ii) Brush (camel hair, ostrich hair, magnetic)
(iii) Light source
(iv) Adhesive tape
(v) Fingerprint lifting cards
(vi) Gloves

III. Footprint kit

(i) Footprint lifters
(ii) Electrostatic footprint lifting device
(iii) Plaster of Paris
(iv) Machine oil
(v) Talcum powder
(vi) Spirit
(vii) Shellac solution
(viii) Wire mesh
(ix) Frame for preparing plaster cast
(x) Magnetic compass
(xi) Glass sheet (35×20 cm)
(xii) Transparency sheet/tracing paper
(xiii) Fine tip permanent marker

IV. Digital Camera of minimum 16 MP

V. Evidence collection kit

(i) Cotton gauze cloth
(ii) Surgical cotton
(iii) Forceps
(iv) Gloves
(v) Hammer
(vi) Scissors

(vii) Evidence tag

(viii) Marking cloth bag

(ix) Sealing wax bar

(x) Candle

(xi) Matchbox

(xii) Metallic seal of IO

(xiii) Glass/plastic bottles (narrow and wide mouthed depending on the exhibit) with rubber corks/airtight plastic lid

(xiv) Polythene zip-top bags

(xv) Distilled water

13.3 Team required for Handling the Scene

Prepare a list of persons to be associated for:

(i) Protection of scene

(ii) Searching the scene

(iii) Identification and collection of evidence

(iv) Fingerprint/footprint and forensic expert

(v) Measuring and sketching of crime scene

(vi) Photography of crime scene

(vii) Information gathering

(viii) Evidence custodian

13.4 Crime Scene Investigation

A. Protection of the crime scene:

The crime scene must be protected from entry by any unauthorized persons so that physical evidence could not be altered, moved, destroyed, lost or contaminated and to avoid any injury to any person due to accidental contact with the acid spread over there. Following points should be kept in mind:

(i) Reach the location of crime as quickly as possible.

(ii) The victim should be provided with emergency medical help. Wash the affected part with plenty of water and soap followed by sodium/potassium carbonate or sodium/potassium bicarbonate.

(iii) All unauthorized persons (including relatives, friends, onlookers, photographers, etc.) should be excluded from the scene.

(iv) Officer-in-charge of the case should determine when, why and who should enter the scene.

(v) Police officer should not leave the scene unguarded.

(vi) The witnesses, suspects and informant should be detained for further details.

(vii) Crime scene should not get altered; it should be barricaded, enclosing a larger area then smaller one so that no clues are left out.

(viii) During examination the original condition of doors, windows, stair-case, lighting, routes of entry/exit should be preserved.

(ix) Do not move anything from its place. It has to be described and located by sketches and photographs.

(x) Scene should not be cleaned till thoroughly examined.

B. Photography of the crime scene

Photographs of following should be taken from different angles:

(i) Place where the acid attack took place.

(ii) Photograph of victim if present at crime scene covering the surrounding.

(iii) Clothes of the victim.

(iv) Acid stains at the scene of attack (on floor, soil, mud, wall etc.).

(v) Container from which acid was thrown, if found at the place of attack or in the surroundings.

(vi) Photograph of the acid trail.

C. Sketching of the crime scene

Sketches are to be drawn by an expert/IO and following are to be included in the sketch:

(i) The place where the acid attack took place and other places where the acid got spread.

(ii) Inter-distances between relevant objects and evidences.

(iii) Place, date and time when the sketch was made.

(iv) Name of persons assisting in taking measurements.

(v) Directions (east, west, north and south) should be indicated.

D. Crime scene search

The crime scene should be searched thoroughly and carefully. The following points should be kept in mind:

(i) The perimeters of the scene should be established and it should be properly documented with the help of photographs and sketches.

(ii) Ascertain legal basis for the search prior to any seizure of evidence.

(iii) Establish method of search based on investigative theory, size of area to be searched, and other factors. The following search methods are common:

(a) Zonal method*:* Area to be searched is divided into squares/sectors. An officer is assigned to each zone.

(b) Spiral method*:* Also called circle method and is effective in a small area. Searcher can begin in the center or the perimeter and moves in a circular path.

(c) Wheel method*:* The searcher gathers at the center of the scene and moves radially outwards. Drawback is the possibility of running evidence when gathering at the center and ever increasing distance between searchers as the investigation move outwards.

(iv) IO should collect information about the time of attack, mode of approach of the perpetrator(s), type of vehicle involved (if any)and physical identification of the acid attacker with the help of victim or witnesses.

13.5 Search for Evidences

(i) Stains of acid on floor, mud, soil etc. where attack has taken place.

(ii) Swabs of acid from the body of the victim to be collected at the time of medical examination/post-mortem.

(iii) Container from which acid was thrown at crime scene or around the crime scene.

(iv) Fingerprints on the container from which acid was thrown.

(v) Pieces of glass bottle, bulb, plastic bottle/jar, etc.

(vi) Stains of acid found on the clothes, body, vehicle of the accused.

(vii) Sign of burnt injury on the body of the victim.

(viii) Burnt or partially burnt clothes of the victim/accused.

13.6 Collection of Evidences

(i) Investigating Officer should collect information of incident in detail from the witnesses and the victim.

(ii) Apprehend the accused as soon as possible and collect the clothes he was wearing at the time of committing the act.

(iii) If the container still contains some acid or the traces of acid, collect that acid in a separate glass bottle.

(iv) Collect soil, mud where stains of acid are visible.

(v) If cases where the acid stains are on the floor made of bricks, concrete or coal tar, the floor surrounding it be removed with the help of hammer and chisel. The control sample is taken from some distance away.

(vi) Take photograph of crime scene along with the photograph of victim showing the burnt parts.

(vii) Victim should be taken to a nearby hospital for medical examination and treatment and for collection of clothes/hair having acid stain.

(viii) Doctor in the hospital should take swab from burnt part of body and collect washings in a bottle.

(ix) Check the hands of the accused/ suspect if they contain any acid burns.

(x) Look for any marks of tyre, foot, shoes, etc., at the scene of acid attack and lift / photograph.

(xi) Ascertain the exact place and direction from where acid was thrown.

(xii) Call an expert from Forensic Science Laboratory to assist in the collection of evidences

(xiii) Record the statement of victim.

(xiv) Collect CCTV footage, if available.

(xv) Mobile phone of victim to track the attacker and check e mail record for linking purpose.

(xvi) Find out the source from where acid was purchased. IO should then check whether the dealer had a valid license for selling acid and identification proof of the buyer submitted to shopkeeper.

(xvii) At the instance of attacker if acid container or syringes are recovered, the photograph of that place and signature of witness be obtained on recovery of items.

(xviii) Photograph of the vehicle seized and lifting of acid stain from the same.

(xix) If acid stains are found on road, take the swab of that acid stain using cotton in distilled water to test for acid/other chemical in the resultant solution.

(xx) If acid stains are found on mud/soil, then, take that portion of mud/soil in a test tube, add distilled water to it and filter. Collect the filtrate in another test tube. Test for acid/other chemical in the filtrate so obtained.

13.7 Packaging and Forwarding of Evidences

(i) *Exhibits should always be packed in glass container with plastic lid or in plastic container and never in metal container.*

(ii) Exhibits likely to have finger prints should be carefully packed and sealed.

(iii) Investigating Officer should direct the doctor to pack the clothes of the victim in polythene bag and, then, in a plastic container.The plastic container should then be covered/packed with cloth and sealed.

(iv) All the exhibits collected must be finally packed in a cloth bag and then sealed properly.

(v) The exhibit container should be labelled with date and time of sample collection, place of occurrence, police station, name and signature of witness and IO.

(vi) The exhibit should be sealed properly and sent to laboratory for analysis along with sample seal duly signed.

13.8 Seizure List

(i) Prepare list of evidence material collected from the scene.

(ii) List should be signed by two public witnesses giving their full details including permanent and temporary addresses.

(iii) The packets/parcels containing evidence material should be labelled giving description of its contents (exhibits), case reference and should be signed by the IO.

(iv) Forwarding memo should be filled up giving a brief history of the case, details of the parcels and their contents, nature of examination required and certificate authorizing the Director, Forensic Science Laboratory for examination of the exhibits.

13.9 End of Search

Before leaving the crime scene, the IO should ensure that:

(i) The crime scene search has been done thoroughly.

(ii) All evidences collected at crime scene are properly packed, labelled and sealed.

(iii) All memos are duly filled in and all other formalities in respect of procedures mandated by the law are completed.

(iv) Final photograph of the scene of crime and close photograph of evidences should be taken

13.10 Queries

A. From forensic medicine expert

(a) Extent of injury i.e. the degree of burn.

(b) Is injury/burn caused by an acid or any other corrosive?

(c) In order to ascertain the age of suspect (in case of juvenile), he should be produced before a designated medico-legal expert.

B. From Forensic Science Laboratory

(a) Whether any acid is present in the exhibits sent for analysis.

(b) Identification of the acid present.

(c) If not acid, then the identification of the corrosive chemical.

(d) Comparison of fingerprints on the container of the acid with the fingerprints of the suspect.

(e) Whether the shoe prints found at the place of attack match with the footwear of the suspect.

(f) Whether tyre prints/marks found at the place of attack match with the vehicle seized from suspect.

13.11 Case Study

Case Study 1	
A young girl hardly aged 20 years was working in a computer office of which the accused was the proprietor. After sometime, the office incurred a loss and she left the office and started working in some other company. The accused started pestering her to leave the new job and start working in the house for which he would provide a computer. This offer was rejected by her. She told him that she is already working comfortably and she does not want to leave the job. Enraged by it, the accused threatened her with dire consequences for not accepting his offer. One day when she was near the gate of the company in which she was working, the accused came on a motorcycle holding a plastic jug and on coming near her, he splashed the contents of the jug on her and fled.	When she cried out of pain, people nearby came and took her to Hospital. The trial Court further held that though the prosecution has proved that it is the accused/appellant who threw acid on the victim which caused severe acid burn injuries on her person, the offence does not fall under Section 307 IPC, as put forth by the prosecution but one punishable under Sections 326 and 201 IPC. Accordingly, the accused was sentenced to undergo R.I., for five years and 3 months (the period already undergone by the accused during trial) and also imposed a fine of Rs. 300000, carrying default sentence. He also sentenced the appellant to undergo R.I. for 2 years with fine for the offence punishable under Section 201 IPC (both the sentences to run concurrently).

Source: www.indiankanoon.org/doc/73735/

Case Study 2	
The Gwalior bench of Madhya Pradesh High Court has upheld the capital punishment awarded to a man by an Additional Sessions Court for causing a woman's death by throwing acid on her. The High Court dismissed the appeal filed by an accused against the verdict of Additional Session's Judge. Assistant public prosecutor said that the accused threw acid on the woman after forcing entry into her house.	Some acid also fell on her mother and brother, injuring them. In her dying declaration, the victim told the police that the accused wanted to have an intimate relationship with her and she had spurned him. The accused, a married man, was allegedly involved in a murder earlier too. Additional Sessions Judge awarded death sentence to the accused. The Division Bench upheld the lower court's verdict.

Source: www.indiankanoon.org/doc/90959285/

References

1. *Working Procedure Manual for Chemistry*, Directorate of Forensic Science, MHA, Delhi, 2005.
2. *Working Procedure Manual for Forensic Toxicology*, Directorate of Forensic Science, MHA, Delhi, 2005.
3. Anil Aggarwal, *Textbook of Forensic Medicine and Toxicology*, New Delhi, 2014.

14 FIREARMS

It is well known that firearms like shotguns, rifles, pistols, revolvers and country-made firearms, etc., are being frequently used in crime. In these crimes, several clues are present which are useful in finding the truth. These clues may be physical evidence, both visible and invisible, or some facts carrying evidential value. Proper evaluation of these clues helps in linking the criminal with crime and with the victim. It helps in finding out whether it is a case of homicide, suicide, accident, struggle, fabrication, etc. This chapter will provide guidelines for investigation in cases involving firearms.

According to the statistics published in *Crime in India, 2013* published by National Crime Records Bureau, MHA, the number of persons murdered by firearms in India during 2013 are as in Table 14.1:

Table 14.1: Number of persons murdered in India during 2013

S.No.		*Murdered by licensed firearms*	*Murdered by unlicensed firearms*	*Total*
1.	States	314	3244	3558
2.	Union territories	324	3297	3621

Source: Crime in India 2013, (NCRB)

14.1 Safe Handling of Firearms at Scene of Crime (SOC)

(i) Be alert while handling any firearm at the scene of crime, it may be loaded, cocked. Always point the muzzle upwards.

(ii) Firearms may be recovered at the scene of crime.

(a) It should always be treated as loaded.

(b) It may be in cocked position.

(c) Safety may not be in place.

(d) Its mechanism may be faulty.

(e) Its trigger pull may be light and liable for accidental discharge.

(iii) For handling the firearms, wear gloves.

(iv) Be alert while handling firearms. Muzzle must be pointed upwards. Barrel should never be pointed towards anybody.

(v) Unload the firearm. Remove the magazine, pull the bolt/breech block backwards so that any fired cartridge case or live cartridge in chamber will come out.

(vi) Look through the barrel. If the chamber is empty the firearm may be considered safe.

(vii) If the hammer is in cocked position, it may be slowly lowered safely.

(viii) Never meddle with the firearm mechanism.

(ix) Never insert any rod, etc., in the barrel.

(x) Hold the firearm from the chequered portion of stock like grip or from trigger guard or from sling.

(xi) Caution: It is likely that fingerprints of accused may be available at various parts of the firearm. Look for any blood stained fingerprints. It may be examined for presence and development of latent fingerprints prior to packaging it for forwarding to FSL.

14.2 Sections

The legal provisions covering these crimes are as follows:

1. Section 302 I.P.C:

Punishment for murder: Whoever commits murder shall be punished with death, or imprisonment for life, and shall also be liable to fine.

2. Section 304 I.P.C:

Punishment for culpable homicide not amounting to murder: Whoever commits culpable homicide not amounting to murder, shall be punished with imprisonment for life, or imprisonment of either description for a term which may extend to ten years, and shall also

be liable to fine, if the act by which the death is caused is done with the intention of causing death, or causing such bodily injury as is likely to cause death; or with imprisonment of either description for a term which may extend to ten years, or with fine, or with both, if the act is done with the knowledge that it is likely to cause death, but without any intention to cause death, or to cause such bodily injury as is likely to cause death.

3. Section 307 I.P.C:

Attempt to murder: Whoever does any act with such intention or knowledge, and under such circumstances that, if he by that act caused death, he would be guilty of murder, shall be punished with imprisonment of either description for a term which may extend to ten years, and shall also be liable to fine; and if hurt is caused to any person by such act, the offender shall be liable either to imprisonment for life, or to such punishment as is hereinbefore mentioned.

Attempts by life convicts: When any person offending under this section is under sentence of imprisonment for life, he may, if hurt is caused, be punished with death.

4. Section 308 I.P.C:

Attempt to commit culpable homicide: Whoever does any act with such intention or knowledge and under such circumstances that, if he by that act caused death, he would be guilty of culpable homicide not amounting to murder, shall be punished with imprisonment of either description for a term which may extend to three years, or with fine, or with both; and, if hurt is caused to any person by such act, shall be punished with imprisonment of either description for a term which may extend to seven years, or with fine, or with both.

5. Section 336 I.P.C:

Act endangering life or personal safety of others: Whoever does any act so rashly or negligently as to endanger human life or the personal safety of others, shall be punished with impris-onment of either description for a term which may extend to three months, or with fine which may extend to Rs. 250, or with both.

6. Section 337 I.P.C:

Causing hurt by act endangering life or personal safety of others: Whoever causes hurt to any person by doing any act so rashly or negligently as to endanger human life, or the personal safety of others, shall be punished with imprisonment of either description for a term which may extend to six months, or with fine which may extend to Rs. 500, or with both.

7. Section 25 Arms Act:

This section provides for punishment for contravention of sections 3, 4, 5, 6, 7, 8, 9, 10, 11, 17, 24A, 24B, for acquiring, possession, carrying, manufacture, sale, transfer, conversion, repair, testing, proving, import, export, shortening of barrel, etc.

8. Section 27 Arms Act:

Punishment for using arms, etc.:

(i) Whoever uses any arms or ammunition in contravention of section 5 shall be punishable with imprisonment for a term which shall not be less than three years but which may extend to seven years and shall also be liable to fine.

(ii) Whoever uses any prohibited arms or prohibited ammunition in contravention of section 7 shall be punishable with imprisonment for a term which shall not be less than seven years but which may extend to imprisonment for life and shall also be liable to fine.

(iii) Whoever uses any prohibited arms or prohibited ammunition or does any act in contravention of section 7 and such use or act results in the death of any other person, shall be punishable with death.

14.3 Police as First Responder at Scene of Crime-Duties and Responsibilities

(i) The success or failure of any crime investigation totally depends on the amount of efforts instilled by the investigating officers in the examination of crime scene for collection of physical evidence and for reconstruction of sequence of events. Thorough and careful examination is required.

(ii) The officers must arrive at the scene as quickly as possible. Section 157 of CrPC lays down that, having recorded the information and forwarded the report to the Magistrate, the officer in-charge of the police station shall proceed in person (or send a sub-ordinate) to the spot to investigate facts.

(iii) Delay in reaching the scene of crime results in tampering of physical evidence.

(iv) All the observations must be documented at the scene of crime very meticulously, paying attention to every detail. Reliance on memory should be strictly avoided.

(v) It must be kept in mind that whatever actions are taken by IO, he must not contaminate the scene and destroy the potential evidence.

14.3.1 Ensure Safety at the Scene of Crime

1. The safety of the responding officers as well as others present at the scene of crime is very important.
2. Any potentially dangerous situation should be immediately tackled.
3. The whole area should be scanned for any potential hazards.

14.3.2 Arrange for Medical Assistance

1. The primary responsibility of any responding officer reaching at the scene of crime is to preserve life.
2. Medical assistance should be immediately provided to the injured victim or suspect causing minimum disturbance to the scene. His position should be marked with chalk.
3. In case there is a possibility that the victim may die, dying declaration should be attempted to be recorded.

14.3.3 Apprehend any Suspects

1. Effort should be made to apprehend the suspect immediately in accordance with the law and recover the weapon of offence.
2. The statements of the suspects should also be recorded.

14.3.4 Secure the Scene of Crime

1. One of the most important responsibilities of the Investigating Officer (IO) is to secure the scene of crime from any interference.
2. Crime scenes are an important source of material for investigation as the clues present at the scene of crime (SOC) help in linking the criminal with crime/ victim and for finding out the truth.
3. The physical evidences present at the scene of crime are of fragile nature and, therefore, to protect and preserve them from any contamination, securing and protection of crime scene is must.
4. In order to maximize the chance of recovering the physical evidences from the scene of crime, the IO needs to identify, secure and protect the evidence.
5. The crime scene should be immediately cordoned off, using tapes or by ropes, etc.

6. Access of people and vehicles into the crime scene should be blocked.
7. Nothing at the scene of crime should be moved or touched until it is identified, measured and photographed.
8. Any person who is not part of the investigating team should not be allowed at the SOC.
9. After securing the crime scene, the witnesses must be identified and relevant information should be gathered from the persons who have witnessed the incident.
10. The motor vehicles present at the scene of crime and in vicinity should be noted and description of any suspected vehicle must be recorded.
11. CCTV camera should be seized that may have recorded any relevant incident.
12. After an investigator arrives at the scene, he should prevent approach to the scene by unauthorized persons including the inmates of the house.
13. The IO should protect traces of evidence present at crime scene from rain, wind, etc.

14.3.5 Identify Victim/Victims

1. The identification of victims enables investigator to instigate actions which may lead to early identification of suspects.
2. Persons reporting the incident and witnesses present at the scene of crime should be questioned regarding the identity of the persons.
3. A record should be made of the clothings worn by the victim together with their physical description.
4. In case the identity of the person is unknown, a search of missing persons record should be undertaken to establish any of the descriptions matching the deceased.
5. Visible tattoos, any piercing should be carefully noted and it may also be used to search the local records.

14.3.6 Call for Specialized Forensic Crime Team

14.4 Crime Scene Management

14.4.1 Crime Scene Assessment

(i) Crime scene assessment helps in determining the nature of the incident and the level of investigation necessary. Main sources of clue materials are:

(a) **Scene of crime**

(b) **Victim**

(c) **Suspect**

(ii) Thorough planning and examination of crime scene becomes essential because the physical evidence involved in firearms related crimes may be visible, trace and invisible.

(iii) Assess the additional manpower/expertise required to handle the scene effectively.

(iv) Assess the nature of evidence at scene of crime.

(v) Assess the area where the evidence can be available.

(vi) Assess focal point and area of strong disturbance.

(vii) The process of documentation should be done very carefully. The IO must observe each and every thing at the scene of crime and following are the points that must be attended to:

(a) Record the time of arrival at the scene and the name of the officer investigating the scene.

(b) Record exact location of the scene of crime. It should be mentioned whether it is a house, building or field or a highway, etc. Note down the address, neighbourhood and landmarks. One can also use GPS.

(c) The investigating team should be equipped with a sensitive GPS to note down the exact location in terms of longitudes, latitudes and co-ordinates.

(d) Record weather and light conditions.

(e) Arrange for witness interviews. It should be both written and audio-taped.

(f) The whole crime scene should be thoroughly assessed and entrance and exit points should be properly examined.

(g) The area of the crime scene varies with the nature of crime committed. For example, in a case of armed dacoity, the criminals come in a vehicle, leave it on the main road, travel some distance, raid a house and while escaping fire several rounds to prevent villagers from chasing them. This scene of crime may extend over a very wide area with physical evidence like fired cartridge cases, bullets, tire marks, etc. In burglary, the scene of crime may be limited.

(h) All other conditions present at the crime scene must be documented. The places where the witnesses have seen or could have seen anything should be noted, e.g. whether windows and doors are open or close, lights/fans are on or off, vehicles present at the scene of crime and their condition, etc.

(i) Examine the victim/victimes. Note down the conditions of the body/bodies.

(j) Safeguard all evidence and arrange for evidence collection. While collecting and packing the physical evidences, care has to be exercised to see that the evidence does not get contaminated. Always use clean containers, envelopes, boxes, etc.

(k) The presence of blood marks, signs of struggle, etc., should be recorded wherever necessary.

(l) Note down the exact state of things at the scene as at the time of occurrence, to draw a proper conclusion.

(m) Find out, if scene of crime had been disturbed by the inmates of the house or curious neighbours.

(n) Keep in mind that criminal might have left some hair, piece of clothing, tool, fingerprints, and footprints, scratches at scene of crime.

B. Documentation of Scene of Crime

1. Documentation plays a vital role as the initial observations about the scene establishes the scope of investigation.
2. It helps in identifying the location of evidentiary items that may later be lost, contaminated or destroyed.
3. Photographs, sketches, notes and thorough videotapes showing the position of victim (if dead) or position of victim marked by chalk (if alive) and other clues, close-up of victim and of all physical evidence, photographs of injuries, etc., provide a permanent record of the crime scene and these should be done in a professional manner. Profuse notes should be taken of the surroundings. A thorough video record preserves the scene in its original form.
4. All documents must be signed and witnessed.
5. The photographs may be marked by photo-data, date on which work was done, details of crime, etc.

14.4.2 Crime Scene Photography



An overall shot of the crime scene



A close-up shot of the victim



A close-up shot of different exhibits present at the scene of crime
2. Firearm 3. Cartridge case
4. Cartridge case 5. Cartridge case



A close-up shot of the gun-shot hole on the clothes of the victim. Here three gun-shot holes are seen, around which 'blackening effect' is clearly visible

Figure 14.1: Documentation of simulated crime scene

1. Take overall shots of the crime scene, and then it should be followed by close-ups. Photograph the location of the scene.
2. Close-ups of following should be done:
   (a) Victim
   (b) Wounds
   (c) All relevant items present at the scene of crime
   (d) Latent prints
3. Calibrated scale should be placed in the photograph to show the size of the item photographed.
4. Photograph from distance, close-up from tops, sides, bottom, etc., details about cocking, of the safety catch/serial number, or any evidence attached to firearm.

5. Clear photographs of the scene should be taken. These will help the IO and the court in visualizing the scene.

14.4.3 Crime Scene Sketching

1. A rough crime scene sketch should be prepared initially, indicating all the relevant items present at the scene of crime.
2. With the help of a measuring tape, exact measurements of the dimensions of items, their distances from one another as well as from the fixed points are taken. Positions of various items from two fixed points may be given if the crime is committed in a room and from a tree or trees or some other reference points if the crime is committed in an open space. This reference point is also shown in the sketch.
3. The locations of each items present at the scene of crime should be mentioned correctly.
4. Directions should be correctly mentioned and north direction should be properly indicated.
5. A finished sketch to scale should be made later.
6. The legend box should be included giving details of the case number, name of the IO, his signature, date, name and signature of other two witnesses.
7. Position of firearm with respect to victim's body should be carefully noted and marked on crime scene sketch.
8. The position of fired cartridge cases, bullets, pellets, wads, etc., should be correctly noted and marked on crime scene sketch.
9. The position of the fired cartridge cases may help in determination of position of firer.
10. *No attempts should be made to draw a sketch partly from measurements with the tape and partly from distances guessed at the scene of crime. Accuracy in the measurements should be the primary rule.*
11. Never forget to record the precise locations according to the points of the magnetic compass.
12. The IO should take all the measurements himself.

Notes:

(i) *Don't forget to determine the direction of north.*
(ii) *Draw it on sketch.*
(iii) *Do not rely on others to give you dimensions.*
(iv) *Do not rely on recollections to make correction at the police station.*
(v) *Note the scale on sketch.*

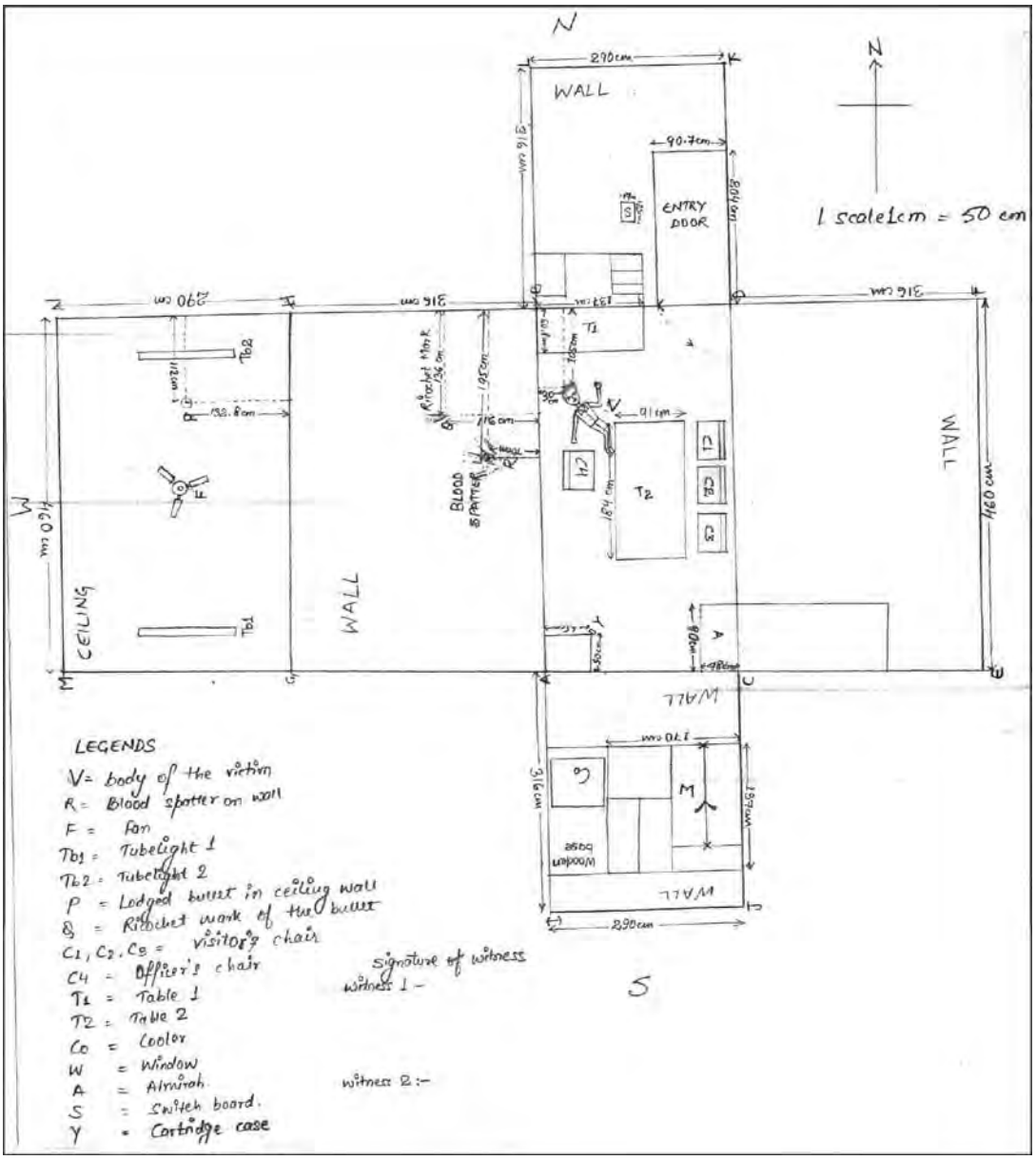
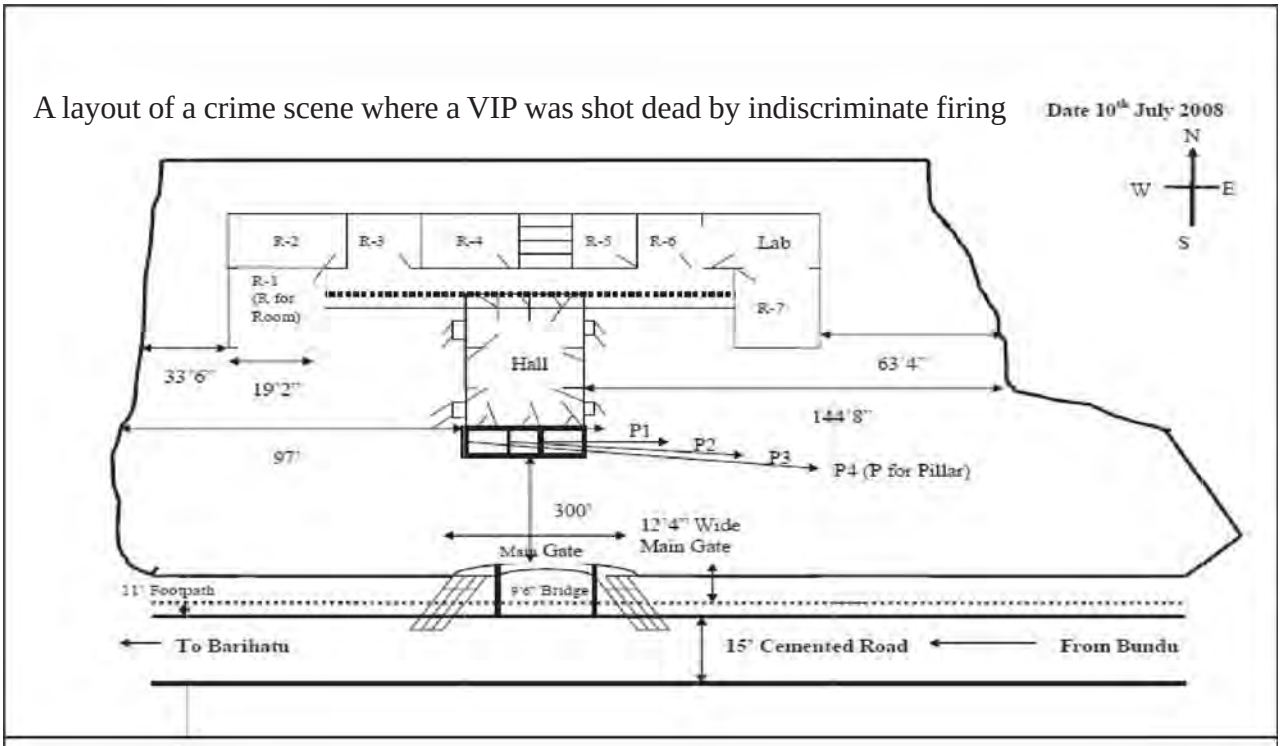


Figure 14.2: Sample of a Crime scene sketching

Case details: A man of about 40 years was found dead with gunshot injuries. There was a wound of entrance of about 8 mm., exit hole was also present. A 9 mm. bullet was found lodged in the ceiling of the room. A ricochet mark was found on the western wall. The gunshot injury was present on the forehead and the exit wound was found in the occipital region of the head. A cartridge case of 9 mm. caliber was found at south-west corner of the room, as shown in the sketch above.



A VIP was shot dead by armed gunmen in an ongoing function of a school. The VIP and his bodyguard were shot dead. The criminal used automatic firearms. From the scene of crime, a number of rifle cartridge cases were recovered. There were a number of bullet marks on the walls, windows and doors of the hall. These bullets were taken out, and the bodies were sent for post-mortem examination.

Figure 14.3: Illustration sketch of a layout of a crime scene where a VIP was shot dead by indiscriminate firing

Courtesy: A.K. Bapuly

14.4.4 Crime Scene Search

(i) **In case of indoor crime scene:**

(a) The investigator must be careful, thorough, and systematic in his search for traces.

(b) He must make keen observation and proceed methodically.

(c) The search should be conducted in a definite order—clock-wise or anti-clockwise movement, taking a door as starting point, moving around the center, the entire space should be searched by inspecting the floor, the roof and the walls.

(ii) **In case of outdoor crime scene:**

(a) It will be convenient to employ a team of officers and distribute the search work amongst them using any one of the following methods:

Strip method: The whole area is to be searched, and divided into a convenient number of strips. Each strip is examined carefully (as shown in Figure 14.4). Whenever any item of physical evidence is found, it is properly collected and preserved. The process is continued till the entire area has been searched.

Spiral method: Here the search is started from one end of the crime scene, carried out in spirals till the focal point of the crime scene.

Zone method: The scene is divided into small zones and each zone is examined in turn.

Grid Method: In the grid search method, the IO begins like a strip search. After completing the search by horizontal lanes, he searches back at right angles to the original strip (as shown in Figure 14.4). This search from two different angles helps in the recovery of evidence which may be missed in simple strip method.

Pie or Wheel method: It is a search pattern in which the area is divided into pie slices or sections of a wheel, usually six in number. Crime scene searchers start from a critical point, such as body, and travel outwards along straight lines or rays.

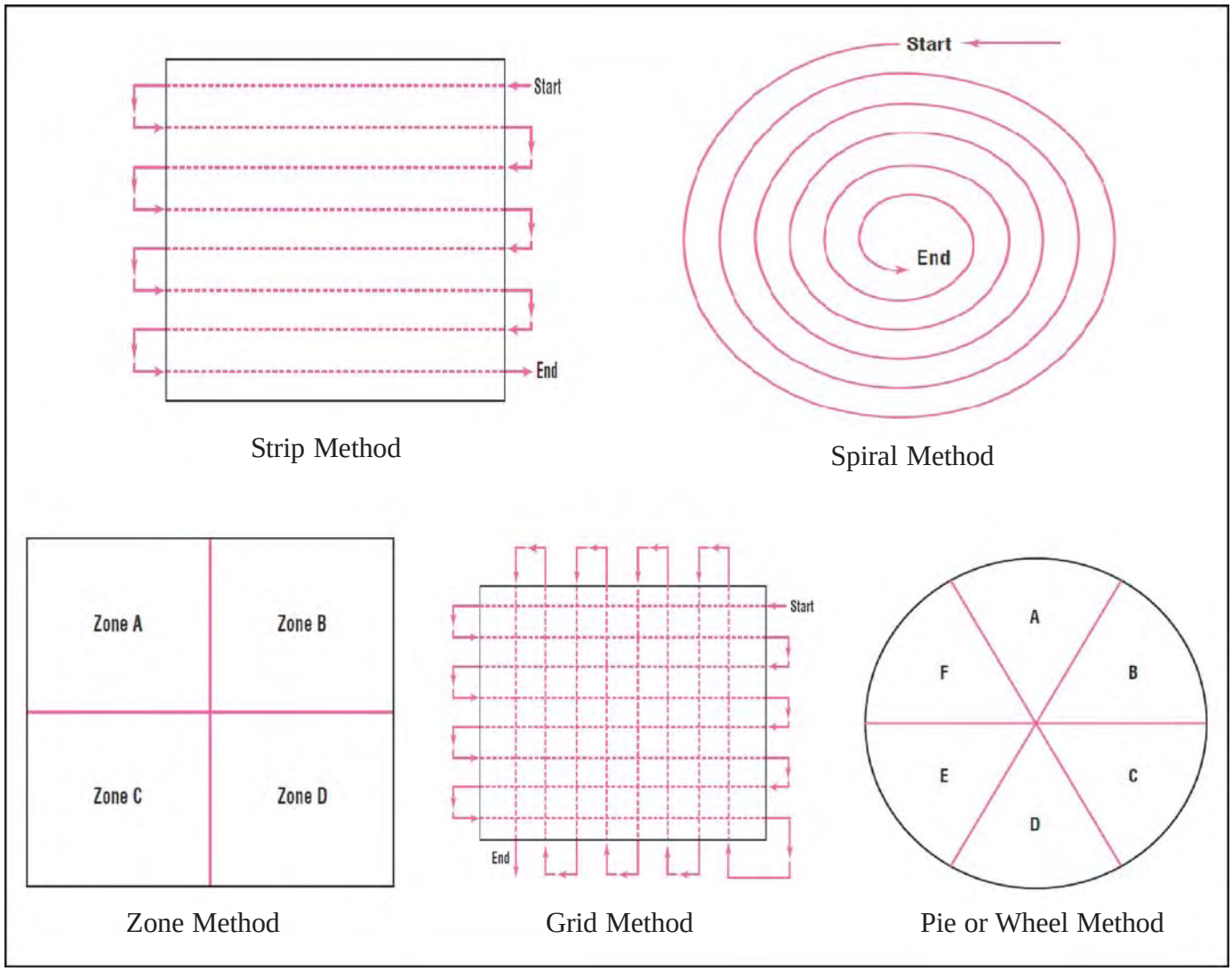


Figure 14.4: Crime scene search methods

(b) The investigator must never miss the spaces behind the open doors, portion of the floor covered by carpets, or mattresses or the space under the *almirah* furniture, etc.

(c) If the investigator does not find something which he logically feels should have been present, he must look for it specially, e.g., bullets.

(d) The scene must be observed by him for minute traces with rapt attention.

14.4.5 Kit

Initial responding officers must have the following items readily available. Officers may want to consider keeping them in police vehicles:

(i) Cordoning tape

(ii) Tweezers
(iii) Hand safety gloves
(iv) Camera, with telephoto, wide-angle and normal lens
(v) Cellophane tape
(vi) Containers for handguns
(vii) Rectangular boxes-plastic and cardboard boxes of various sizes
(viii) Filter papers
(ix) Forceps with rubber tipped endings
(x) Magnifying glass
(xi) Magnetic compass
(xii) Measuring tape (calibrated)
(xiii) Drawing sheets
(xiv) Pencil, eraser and other stationary items
(xv) Tags
(xvi) Marking pen
(xvii) Spatula
(xviii) Flash light
(xix) Good quality sealing wax
(xx) Good quality envelopes-cellophane pouches of various sizes
(xxi) Brown paper
(xxii) Geometry box
(xxiii) Cellophane sheet
(xxiv) Cloth
(xxv) Chalk
(xxvi) Sextant
(xxvii) Drawing board
(xxviii) Electric engraver
(xxix) Johnson's buds
(xxx) 5 per cent nitric acid
(xxxi) Cellotape used for lifting of fingerprints
(xxxii) Cotton

14.4.6 Lists of Exhibits Likely to be Found at Scene of Crime

(i) **Firearms:** It may be one or more of the following:

(a) **Standard:** These are factory-made firearms. It may be prohibited or non-prohibited.

(b) **Country-made:** Made by blacksmiths in their small workshops without following any factory specifications.

(c) **Freak:** Firearms which give the appearance of some innocent objects, but fire factory-made ammunition.

(d) **Air-guns, toy firearms.**

Types	Illustrations
Standard Firearms	 .410 Musket
	 .315 Sporting Rifle
	 Carbine
	 12 Bore DBBL Shotgun
	 AK 47 Assault Rifle

Standard Firearms		9 mm High Power Browning Pistol
		.32 Double Action Revolver
Country-made Firearms		A country-made firearm (hammerless) meant for firing 12 bore cartridge
		A country-made firearm (with hammer)
Freak Firearms		Stick-gun
		Pen Pistol

Figure 14.5: Types of firearms

(ii) **Live Ammunition and Their Components:** It is of following types:

A. Shotgun cartridge

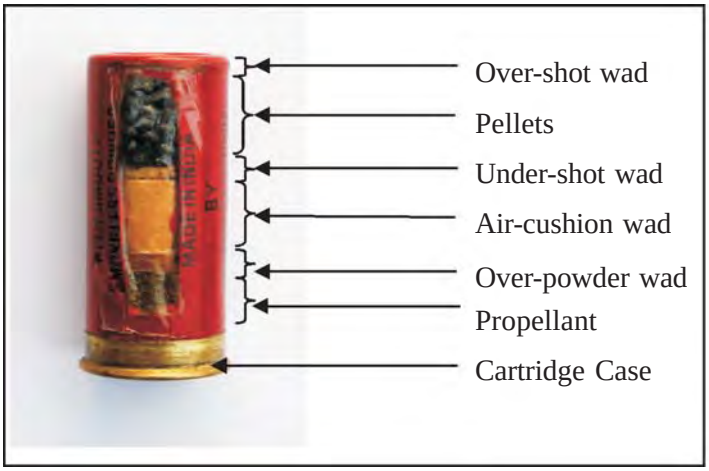


Figure 14.6: Cut section of a shotgun cartridge

The cut-section of a shotgun cartridge is shown in Figure 14.6. Cartridge case (made partly of metal and partly of cardboard/plastic) has percussion cap in the center of its head. There are over-powder, air-cushion, under-shot and over-shot cardboard wads. These wads are shown in Figure 14.7.

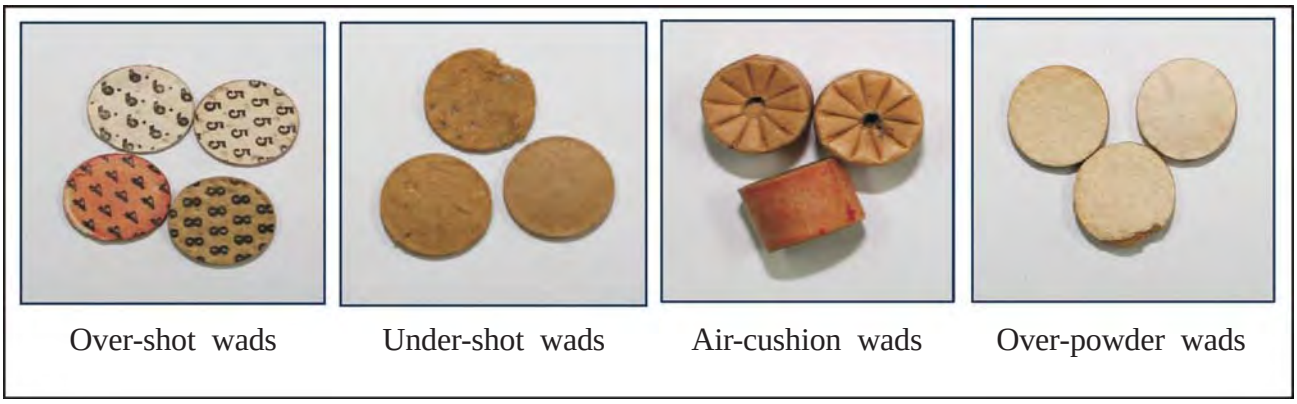
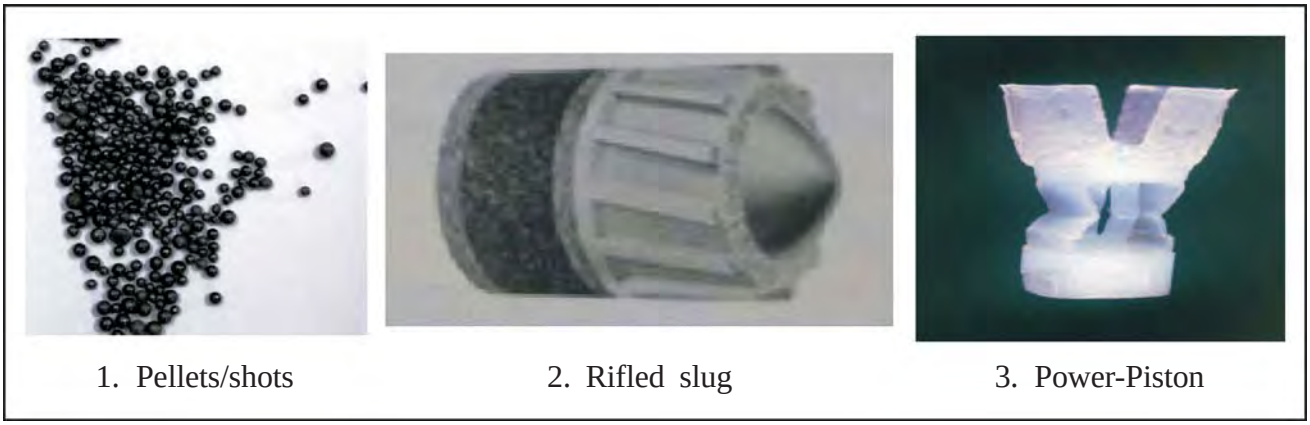


Figure 14.7: Different wads used in a shotgun cartridge

The shots/pellets used as projectiles are shown as 1 of Figure 14.8. Some cartridge may be loaded with single projectile like rifled slug as shown in 2 of Figure 14.8. In some cartridge, instead of these cardboard wads, a power-piston, as shown in 3 of Figure 14.8, having number of prongs is used, shots are loaded into this power-piston and the power-piston is then loaded into the cartridge case.



1. Pellets/shots 2. Rifled slug 3. Power-Piston

Figure 14.8: Projectiles used in a shotgun cartridge

B. Rifle Cartridge

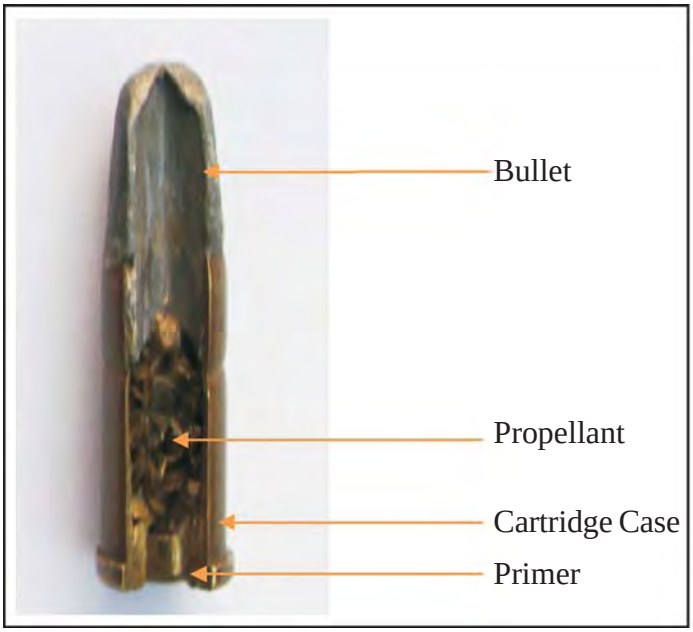


Figure 14.9: Cut section of a rifle cartridge

(iii) **Fired Cartridge Cases May Contain Impression Of:**

a. Firing pin
b. Breech face
c. Chamber
d. Extractor
e. Ejector



Figure 14.10: Fired cartridge cases

(iv) **Fired Bullet May Contain Rifling Marks.**



Figure 14.11: Fired bullets

(v) **Firearm Discharge Residue Inside The Barrel.**

This firing residue is contributed by priming composition, propellant and projectiles.

(vi) **Clothes of the victim having gun-shot/bullet holes or spread of pellets. It may contain firearm discharge residue around bullet hole.**

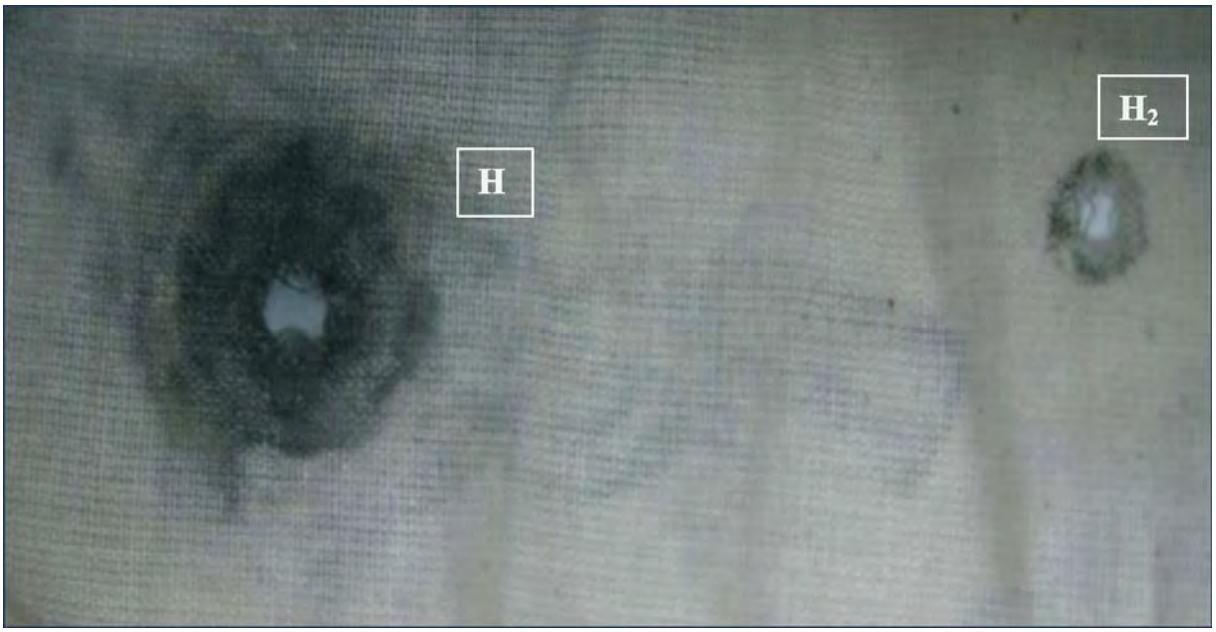


Figure 14.12: Clothes of the victim showing gun-shot holes

Around entry wound following may be present:

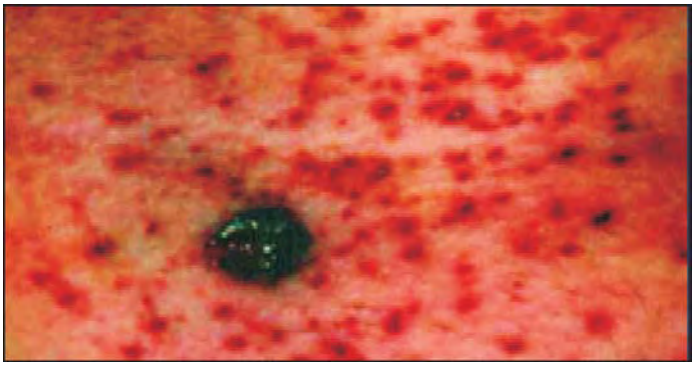
1. Burning (or scorching, charring, singeing of hair)



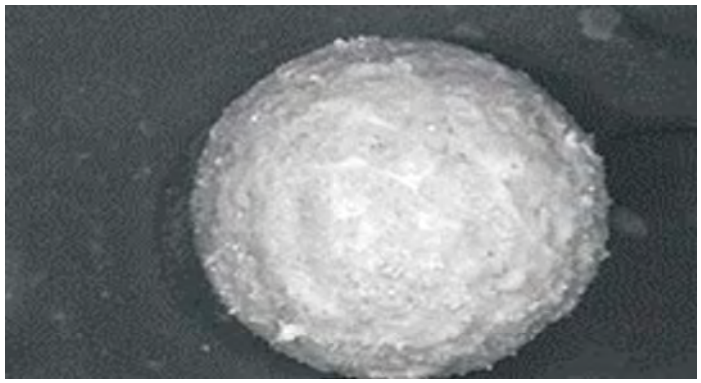
2. Blackening around gun-shot wound



3. Tattooing



4. Metallic particles/GSR



Invisible
Photograph taken by scanning electron microscope
(Magnified view of GSR particle)

5. Lead/Dirt ring/Bullet wipe/abrasion collar



Note: Around exit wound blackening, tattooing, GSR particle, lead/dirt ring, etc., are absent.

(vii) **Gun-shot residue on hands,face, clothes of shooter.**

(viii) **Propellant gases–inside the barrel, cartridge case, at the scene of crime.**

(ix) **Clothes of the accused.**

(x) **Gun-shot injuries:**

(a) Injuries Caused by High Velocity Bullets



Close Range Shot (massive destruction)



Distant Shot (small entrance wound at chin, just below lower lip and large exit wound below the ear)



Distant Shot-Entrance Wound (dimension much larger than caliber of bullet)



Distant Shot-Exit Wound (dimension much larger than caliber of bullet)

(b) Injuries Caused by Low Velocity Bullets (Handguns and Carbines)



Contact Shot at Right Temple
(star-shaped laceration)



Contact Shot at Right Temple
(blackening invariably found on bone around wound of entrance)



Loose Contact Shot at Left Temple
(star-shaped laceration, burning present)



Contact Shot at Chin
(tissues become pink due to the presence of carbon monoxide in propellant gases)



Contact Shot at Abdomen
(intestines coming out)



Contact Shot at Abdomen
(intestines pressed inside, burning and blackening present)



Contact Shot
(muzzle impression present)



Contact Shot at Abdomen
Very Close Range Wound On Neck
(blackening at abdomen; burning, star-shaped laceration caused by propellant gases at neck)



Close Range Shot
(blackening present)



Close-Range Concealed Wound of Eye
(blackening present)



Close-Range Entrance Wound
(blackening and tattooing)



Angled Shot
(left side: entrance wound showing angled shot (see wide abrasion on margin) exit wound: no abrasion)



Bullet Hole in Skull
(clear-cut hole on the spot of bullet entry)



Bullet Hole in Skull
(hole is bevelled on the side of bullet's exit (see eruption of bone chips))



Exit Wound at Head (star-shaped)



Exit Marks on Back (with bullets still lodged, with bullets palpable)

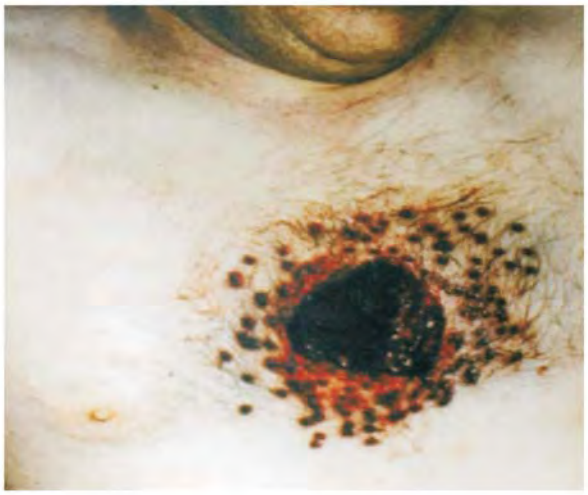


Exit hole on Back (with bullet still lodged within, bullet visible)



Entrance Wound (bullet penetration not deep because of low velocity, bullet visible at wound of entrance)

(c) Injuries Caused by Improvised Shotgun



Caused by a country-made shotgun at a range of about 2 yards.

(Note wide dispersion of pellets forming a rat hole surrounded by holes caused by individual pellets whereas a factory-made gun would cause only a single hole at this range)



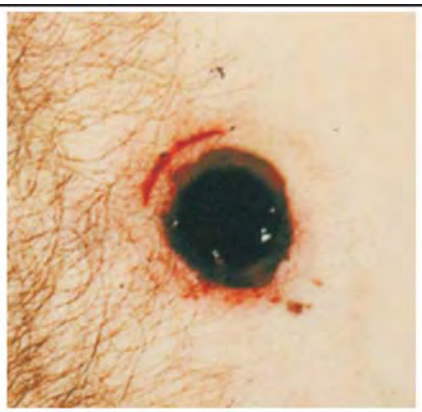
Caused by a country-made shotgun at a range of about 4 yards.

(Note the wide dispersion of pellets whereas a factory made gun would cause a rat hole at this distance)

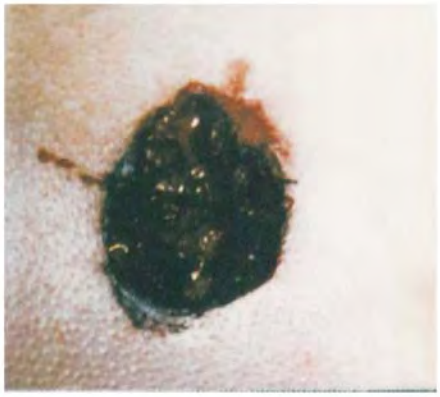
(d) Injuries Caused by Shotguns



Contact Shot (the blast and the heavy shot charge may cause massive destruction of tissues)



Tight Contact Shotgun Wound of Chest (abrasion present around the edges, muzzle impression also visible)



Contact Shotgun Wound of Chest (may not cause massive destruction but a circular hole)



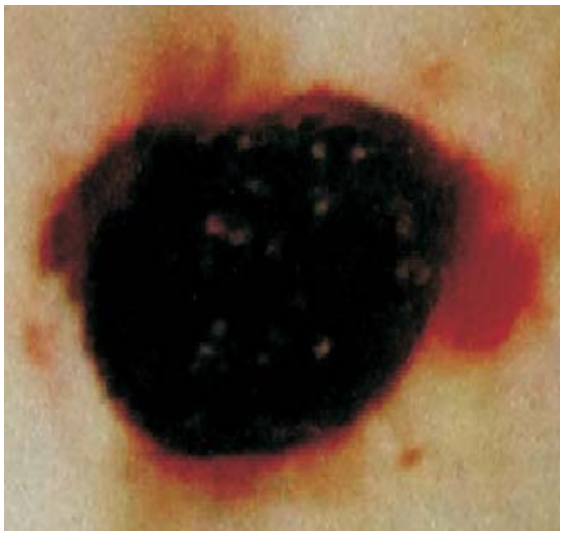
Close- Range Firing (if range within a few centimeters, large hole may be caused)



Close-Range Firing (blackening present if fired from a range of 12 inches)



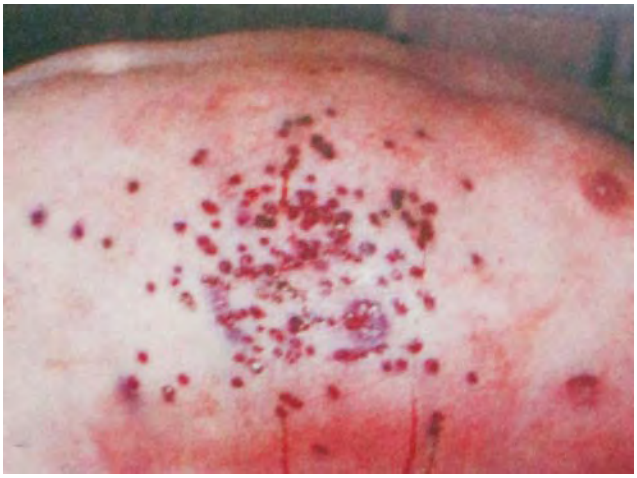
Close- Range Firing (blackening present and tattooing found if fired from up to 4 feet.)



Single Hole
(a single hole is caused in case of range of firing up to about 2 yards)



Rat Hole Wound
(caused by 12 bore shotgun from about 2 to 5 yards)



Distant Shot
(dispersion of pellets, making their own holes in case of range of firing of more than about 5 yards)

One or more of the following features may be present around the entrance hole:

(a) Burning, scorching, charring, singeing of hair around gun-shot holes.

(b) Abrasion/dirt-ring/elements left by the rubbing of the bullet around gun-shot holes.

(c) Bullet particles

(d) GSR particles (lead, barium, antimony)

(xi) **Bullet holes, marks, ricochet marks, pellet patterns, etc., on inanimate objects.**

(xii) **Blood, soil, glass particles, pieces of bone, wooden particles, etc. that may be sticking to the firearm and bullet.**

If the firearm is fired in contact with human body, the presence of blood/tissues may be found in the region of muzzle.

14.5 Various Clues Likely to be Found in Crime Involving Firearms, Their Recovery, Collection, Labelling, Packaging, Sealing and Transportation

The physical evidence available in crime involving firearms is of two types: visible and invisible. If the evidence is invisible, it is generally thought to be absent. One has to be very careful about this evidence. Below, we discuss about various physical evidence:

14.5.1 Firearms

Firearms like shotguns, rifles, revolvers, pistols, carbines, country-made firearms are being increasingly employed in the commission of heinous crime. The frequency of country-made firearms is quite high. Sometimes muzzle-loading firearms, toy firearms or air-guns may also be involved.



Country-made firearm (hammerless) meant for firing 12-bore cartridges is one of the most commonly used firearms.



A .32 revolver (non-prohibited) made by Indian Ordnance Factories

Figure 14.13: Firearms

(A) Recovery of Firearms at SOC

(i) The firearm may be recovered from scene of crime

(a) In cases of suicide, the firearm may be found lying close to body/thrown away from body/firmly grasped in hand by cadaveric spasm.

(b) In cases of suicide committed in open area, the firearm may or may not be found. It may be taken away by any passerby.

(c) In case of murder, the firearm may be planted into the hands of victim or placed close to victim. Fingers may not be circling around the grip of hand-gun.

Note: *The configuration of firearm when found and recovered should be photographed with respect to other articles at the scene. It may be helpful in finding out the nature of shooting, i.e homicidal, suicidal, accidental.*

(ii) Victim

(iii) Accused

(iv) House of accused

(v) Route taken by accused after crime–

(a) maybe found hidden in bushes

(b) corn-bins

(c) buried in ground

(d) thrown in well, pond, river, lake, over-head tank, etc. In this case the firearm can be recovered with the help of a strong magnet.

Cadaveric spasm



Holding of the firearm when the person is in tension. (Muscles that were in contraction at the moment of death remain in contraction after death without passing through the stage of primary relaxation).

(B) Collection of Firearm

(i) Always consider the firearm to be loaded.

(ii) *Note down whether the firearm was cocked. If cocked, hammer should be safely lowered.*

(iii) Note down whether the safety was on or off.

(iv) The IO may like to get the firearm examined for the presence of fingerprints of the suspect. For this, hold the weapon from grip or chequered portion of the firearm or from trigger-guard or from sling. Any fingerprint in blood should be photographed first.

(v) Note down the type of firearm correctly–shotgun, rifle, revolver, pistol, carbine or a country-made firearm. If there is a revolving cylinder behind the barrel, it should be written as REVOLVER. Record description with sketch.

(vi) While unlocking the cylinder and barrel in a revolver, care should be exercised to see that the cylinder does not rotate. Also note down the positions of live and fired cartridge cases in different chambers of cylinder.

(vii) Unload the firearm. Remove the magazine first, take out and note down the number of live cartridges in the magazine, reinsert the magazine.

(viii) Move the breech-block or bolt backwards.

(ix) If there is any live cartridge or a fired cartridge case in the chamber it will come out. Collect it.

(x) Look into the chamber, if there is any live cartridge/fired cartridge case, take it out.

(xi) Note down, if chamber was empty or there was live cartridge or fired cartridge case in chamber.

(xii) Note down the caliber, make, model, and serial number of the firearm correctly. In the case of factory-made firearms these details are mentioned on the barrel, breech-block or bolt, action, fore-end, magazine of the firearm.

(xiii) Note down the names of the parts on which these details of the firearm and serial numbers are mentioned.

(xiv) Any foreign material such as blood, hair, tissues, skin, flesh, fibers, paint, soil, bone particles etc. attached to any part of the firearm may be collected in cellophane pouches after drying, without scratching the inside of the barrel with knife. Nothing should be inserted into the barrel. Plug the breech and muzzle ends and also the chambers (in case of revolvers) with clean cotton or cloth.

(xv) Note down any operational characteristics of the firearm. Is there any deficiency or peculiarity like hard or weak trigger-pull?

(xvi) The clues should be collected in the presence of witnesses.

(C) Packaging and Labelling of the Firearms

(i) In the case of long-barrel firearms, following details should be written with permanent marker or on medicated tape affixed on stock or action-block and not on interchangeable parts of the firearm like fore-end/magazine.

(a) Put FIR number

(b) Police Station

(c) District

(d) Item number

(e) Name of IO with signature and date

(f) Signature of witnesses

(ii) Wrap the long-barrel firearm in a cellophane sheet and seal it in a clean cloth cover.

(iii) The above details are also put on the cloth cover. In fact, each packed box or container should be labelled as regards to contents also.

(iv) The firearm should be sealed at the scene of crime.

(v) The collection and sealing must be authenticated by at least two independent witnesses. Note down the addresses of witnesses.

(vi) In case of handguns, place it in a cellophane envelope and seal in a clean box. Give cotton padding so that the firearm does not rattle inside the box. The details may be put on parts like frame, receiver, back-strap, barrel, etc.

(vii) In the case of handguns the identifying details may be scratched on the firearm and also put on the box containing firearm.

(viii) Note down the number of seals on the parcel.

(ix) After packaging, labelling, and sealing the firearm, its photographs should be taken.

(x) In case of firearm recovered from any water source, it should not be dried. Attempts should be made to send this as such to the laboratory, otherwise it may rust.

(D) Important Points Regarding the Seals

(i) The seals used should be the authorized seals of the IO.

(ii) Original seal should be preserved. It should be in safe custody at all times.

(iii) *Seals should not be put with coins*.

(iv) An attested specimen impression of the seal used should be sent to the expert.

(v) Number of seals put on each parcel should be noted.

(vi) A superior quality of sealing wax should be used so that the seals do not peel off.

(vii) Be careful that the seals do not break, mutilate, or peel off while transporting the exhibits to FSL.

(E) Important Points Regarding Stitching

(i) Stitching of the parcels should be such that the messenger is not able to open the parcels without disturbing the seals and change the exhibits.

(F) Transportation of the Firearms

(i) The sealed firearm should promptly be transported to Forensic Science Laboratory from scene of crime.

(ii) Proper care of the parcel should be taken.

(iii) They should not be left unguarded.

(iv) They may be stolen by interested party.

(G) Queries to be raised to the Ballistic Expert

The firearm provides answers to the following questions:

(i) Whether the given device is a firearm as defined by the law.

(ii) Whether it is a standard or improvised or country-made firearm.

(iii) If it is standard firearm, what is its caliber, make and model?

(iv) Is the firearm in working order?

(v) Is it liable to fire accidentally?

(vi) Has it been fired? If so, when?

(vii) Whether any biological fluids, tissues, hair, etc., are present on the weapon. If yes,

(a) The location of such tissue.

(b) Origin of species of the biological material.

(viii) Has it been used in some other crime? (IO may need to give reference as the firearm could have been used in other offences also).

(ix) Whether the erased serial numbers, etc., on the firearm can be restored and its owner can be traced.

(x) Has the firearm been tampered with? If so, how?

(xi) How many firearms have been used in this case?

(xii) Linkage with fired ammunition.

Do's and Dont's

Caution: *Don't send loaded firearms*

DO's	DONT's
Make it a habit to point the barrel either upwards or downwards. Even if you know that the chamber is empty, the barrel should always be pointed upwards or downwards.	Never keep the barrel of the firearm horizontal.
Always use a magnifying glass to read the serial number, otherwise, '3' may sometimes be read as '8' or '5' may be read as '6'.	Never attempt to clean the firearm. Any foreign material, such as blood, hair, tissues, skin, flesh, fibers, paint, soil, bone particles, etc., is of forensic value.
Put the finger on trigger guard.	Never put the finger on trigger.
The firearm should be handled from the chequered portion of the stock or from sling, or from trigger-guard in case the investigating officer wants to get the firearm examined for latent fingerprints of the suspect.	Never scratch the inside of the barrel with knife as it may destroy individual characteristics of the barrel (the presence of rust, fouling inside the barrel may lead to useful conclusion whether it has been fired or not).
-	Nothing should be inserted into the barrel.
-	Do not blow the firearm.
-	*Don't seal the parcels with coins.*
-	Don't seal the exhibits at police station. There are chances of these getting mixed up with exhibits of other cases.
-	The identification details should not get rubbed off or mutilated.
-	Never use dirty clothes or boxes for packaging.
-	The firearm should never be planted.

(I) Muzzle-Loading Firearm

In the case of muzzle-loading firearms, the following problems arise:

(i) Were the recovered fired percussion caps fired from the suspected firearms?

(ii) Were the shots recovered from the body of the victim cast in the mould recovered from the suspect?

(iii) Were the shots recovered from the victim and accused prepared in the same mould?

(iv) Did the shots (or lead) recovered from the body of the deceased (or of the injured) and those recovered from the accused have the same elemental profile?

(v) Did the wad material, paper pieces or rags recovered from the accused and those recovered from the scene (or from the body of the victim) have a common source?

(vi) Was the gun-powder found at the scene or on the body of the victim similar to the powder recovered from the accused?

14.6 Fired Cartridge Cases, Percussion Caps

The fired cartridge cases if recovered are very helpful in linking them to the firearm recovered from the suspect thereby linking the suspect to crime scene.

(A) Recovery of Fired Cartridge Cases and Percussion Caps

(i) Cartridge cases are recovered from:

(a) Scene of crime.

(b) Accused.

(c) House of the accused/suspect.

(d) Chamber of the suspected firearm.

(e) Previous owner of the firearm.

(ii) Percussion caps

(a) Percussion caps may be found if the muzzle-loading firearms have been used to commit the crime.

(b) Percussion caps may be found at the scene of crime after thorough search.

(c) Inside the action of firearm. In country-made firearms, the percussion cap may not be properly supported by bolt and because of firing may get dislodged from cartridge case and may enter into the action of firearm through firing-pin hole.

(d) Care should be exercised to see that they are not lost.

(B) Collection, Labelling and Packaging of Fired Cartridge Cases and Percussion Caps

(i) Note down the position of the fired cartridge cases and percussion caps from where found.

(ii) Any legends on cartridge cases may be noted.

(iii) Labelling should not be done on the cartridge cases as these are very small exhibits and fine marks on them left by firearm may get damaged.

(iv) Note approximate caliber of the cartridge cases.

(v) Each cartridge case may be put in cellophane envelope separately and then packed collectively in a box. The fired cartridge cases recovered from different locations should be similarly packed in different boxes. Use cotton to avoid their rattling.

(vi) The following details should be mentioned on the box:

(a) Put FIR number

(b) Police station

(c) District

(d) Item number

(e) Name of IO with signature and date

(f) Signature of witnesses

(vii) The contents should also be mentioned on the box.

(viii) The box is now sealed with a cloth. The cloth should be labelled with the above information.

(ix) All the precautions about sealing mentioned in the case of firearms should be followed.

14.7 Projectiles-Bullets, Bullet Fragments, Pellets, Wads



Bullets | Bullet fragments | Wads | Pellets

Figure 14.14: Projectiles

(A) Recovery of Projectiles-Bullets, Bullet Fragments, Pellets, Slugs, Wads, etc.

(i) These projectiles may be recovered from:

(a) Scene of crime-it may be lying loose at the scene of crime or embedded in ground, walls, trees or some articles like furniture, etc.

(b) Body of the victim.

1. Bullets, bullet fragments, pellets, slugs, wads in the body of the deceased are recovered by medical officers.
2. *The body should be x-rayed in various positions to locate the bullet and the bullet should be recovered.*
3. There is a ruling of the Supreme Court of India that an IO can ask medical officer to take x-ray of the body and recover the projectiles (state of Orissa vs. Ramachandra AIR, 1965 Orissa 175).
4. *The medical officer should take out the bullets from body by hands or with plastic-tipped tweezers. The fine striations on the bullet should not be damaged at all.*
5. In case the bullet is found embedded in bone, the bone should be broken and bullet taken out. Avoid prying out the bullet from the bone.

(c) Testing place of the accused-lodged in trees, walls, etc.

Note down the positions from where it is found.

(ii) From scene of crime, the bullets are recovered by IO. The IO should recover bullet in such a way that the striation marks on its surface are not damaged.

(iii) If the bullet is found lodged in some object, the object containing the bullet may be sent as such to the laboratory after properly packing it. Or a small piece of the object may be cut and sent to FSL. Be careful that the cutter does not touch the bullet.

(iv) In case of pellets, the medical officer may not be able to take out all the pellets from the dead body.

(v) The x-ray of the body showing the spread of pellet should be taken.

(vi) The medical officer may be asked to take out some 15—20 pellets.

(vii) After exit from body, the bullet may not exit from clothes and may be found lodged in the clothes. The IO should be careful to see that the bullets are not lost while taking the body for PM examination or while collecting the clothes after PM examination.

(viii) Help of the ballistic expert may be taken to locate and recover the bullets at the scene of crime.

(ix) The recovery of bullet fragments, slugs, large sized buck-shots and wads may also be similarly made from victim's body/scene of crime.

(B) Collection, Labelling and Packaging of Projectiles-Bullets, Bullet Fragments, Pellets, Wads

(i) Note down the position of bullets, bullet fragments, wads, pellets from where found.

(ii) Note approximate caliber of the bullet.

(iii) The path traversed by the bullet inside any target may be noted.

(iv) Labelling should not be done on the bullets as these are very small exhibits and fine marks on them left by firearm may get damaged.

(v) Keep each bullet in a piece of paper, put in a cellophane pouch and pack them in a suitable box, sufficient padding of cotton may be given to avoid rattling. The box is sealed under cloth cover and labelled.

(vi) The bullet fragments, wads, pellets recovered should be separately put in plastic pouches and then packed in a box, sealed and labelled. Use cotton to avoid their rattling.

(vii) The bullets, bullet fragments, wads, pellets recovered from different bodies/locations may be separately packed in a similar manner.

(viii) The following details should be mentioned on the box:

(a) FIR number

(b) Police station

(c) District

(d) Item number

(e) Name of IO with signature and date

(f) Signature of witnesses

(ix) The box should be sealed with a cloth. The cloth should be labelled with the above information. Describe the exhibits in the box.

(x) All the precautions of sealing mentioned in the case of firearms should be followed.

(C) Transportation of the Cartridge Cases, Bullets, Pellets, Wads

(i) The boxes containing the exhibit should be carefully transported to the FSL.

(D) Queries Regarding Ammunition

The fired ammunition (cartridge cases, bullets, bullet fragments, wads, pellets) gives the following information:

(i) Whether the given cartridges, cartridge cases/bullets/pellets/wads are ammunition or components of ammunitions as defined in the Arms Act 1959.

(ii) Whether the given cartridge cases/bullets/pellets/wads are fired ones.

(iii) What is the shot size of the given shots/pellets?

(iv) Were the fired cartridge cases, fired percussion caps, bullets or mis-fired cartridges fired from the suspected firearm?

(v) Whether the percussion caps have been fired from the suspected muzzle-loading firearm?

(vi) In case the muzzle-loading firearms have been used in crime;

  (a) Whether the shots recovered from scene of crime or from body of victim have been cast in the mould recovered from suspect.

  (b) Whether the shots recovered from victim and suspects are cast in the same mould.

  (c) Whether the shots and wads recovered from victims or scene of crime have the same source as the shots recovered from suspect.

  (d) Whether the gun powder recovered from scene of crime/body of the victim and accused are similar.

(vii) Have the buckshots been fired from the given shotgun?

(viii) What is the caliber, make of fired ammunition, and of the firearm from which the cartridge cases/bullets were fired? How many firearms have been used?

(ix) Does the recovered fired/misfired ammunition bears multiple indentations?

(x) Is the source of fired ammunition recovered from scene of crime and the live ammunition recovered from suspect, the same?

(xi) Is the fired ammunition recovered from the scene and that recovered from the suspect fired from the same firearm?

(xii) Ejection pattern of fired cartridge cases may help in finding location of the shooter (if expert is called for SOC visit).

(xiii) Whether the given ammunition is factory made, improvised or reloaded.

(xiv) Whether the given exhibit is black powder or smokeless powder.

(xv) Whether the tools recovered from a suspect can be used to manufacture firearms/ cartridges.

(xvi) Are there any propellant particles sticking inside the fired cartridge case?

(xvii) What is the range of firing assessed by the presence of various shotgun wads at the scene of crime (if the expert has visited the SOC)?

(xviii) What is the bore size of the gun assessed by wads present at scene of crime?

(xix) Position of cartridge cases/bullets help in reconstruction of sequence of events.

Do's and Don'ts

Do's	Don'ts
The medical officer should take out the bullets from body by hands or with plastic –tipped tweezers.	Bullet should not be pryed out from the bone.
The IO should recover the bullet at SOC in such a manner that the fine striations are not destroyed.	Do *not* wash or clean the bullets, pellets, wads, etc. There may be blood, tissues, bone particles, fibers, wood, paint, soil, etc. adhering to the bullet. Help of these materials may be taken to link the bullet with the victim/scene of crime. For example, if the blood group of blood on bullet is the same as that of the victim, it provides a good corroborative evidence of passage of bullet through victim's body.
Care should be exercised to see that the percussion caps are not lost.	Don't plant any fired cartridge case at the scene of crime.

(F) Importance of X-Rays

Case Study 1	
A person A and his son B were sitting at the entrance of their house. A person C came and asked A to come along with him. A agreed. B followed A and C. When they had gone a few steps from their house, C fired at A and A died. The post-mortem examination of A was conducted and medical officer mentioned the wound as stab injury. Now B lodged a complaint with Chief Judicial Magistrate that it was not a stab injury and that his father had been shot dead before his eyes and so it was a gun-shot injury.	The CJM ordered that a second post-mortem be conducted by a Board of medical officers. The second post-mortem was conducted and bullet could not be found, but the Board recommended that the body be taken to some medical college having facility of x-ray examination. The body was taken to medical college, x-ray was taken and third post-mortem was conducted and a bullet could be recovered.

Likewise, x-ray of body becomes extremely important in the following cases: -

(i) A bullet may fragment inside the body. One fragment may come out, causing exit wound. Other fragments may be inside the body. Thinking about the presence of exit wound, the medical officer may not take out other fragments.

(ii) Lead core and jacket may separate. Lead core may come out, but the jacket which carries important individual characteristics of the firearm may remain inside the body.

(iii) Sometimes, the bullet does not cause exit hole but a piece of bone may cause exit wound.

14.8 Live Ammunition (Cartridges or Black Powder/Shots/ Wads in Case of Muzzle Loading Firearms

(A) Recovery of Live Ammunition

(i) From scene of crime.

(ii) From the firearm recovered from scene of crime.

(iii) From accused.

(B) Collection, Labelling and Packaging Of Live Ammunition

(i) Note down the location of the cartridges from where found.

(ii) Note down any distinctive features of the cartridges.

(iii) Note down bore/caliber and any other legend on the cartridge.

(iv) *Enclose the cartridges in a cellophane pouch and seal in a box giving sufficient padding of cotton between two cartridges to avoid the cartridges from colliding with each other during transit.*

(v) The box in which the cartridges are packed should be labelled. Do not put any details/signatures on the cartridges.

(vi) Describe the quantity and condition of live ammunition.

(C) Queries to be Raised to The Ballistic Expert

(i) Whether the given ammunition is ammunition as defined in the Arms Act 1959.

(ii) Whether the given ammunition is live or not.

(iii) Whether it is a reloaded one or a modified one.

(iv) What is type, caliber, make, etc., of the given ammunition?

(v) Whether the bullets/jackets recovered from scene of crime/body of the victim are of the same lot as ammunition recovered from the accused.

(vi) Whether it is prohibited or non-prohibited.

Note: *The live ammunition may be made available to the expert for test firing.*

14.9 Home-Made Ammunition

(i) The Investigating Officers should be aware that the criminals can also use home-made ammunition similar to the standard ammunition.

(ii) The fired cartridge cases may be reused or made of pipes, plastics, card-board, metals like copper, steel or aluminium may be used.

(iii) The percussion caps may be taken out of fired cartridge cases and may be replaced by live percussion caps available in the market with arms/ammunition dealers.

(iv) The propellants used are black powder, crushed match-heads, potassium chlorate plus sugar, potassium per-chlorate plus sugar, sodium chlorate plus sugar, powders used in various crackers etc.

(v) The bullets may be cast in moulds. Also shotgun pellets, nails, metallic balls, paper-pins, drawing board pins, metal pieces, blade fragments, ball bearings, nibs of ball-point pens, sulphur cast may be used as projectiles.

(vi) Wads made of paper, cork, cardboard may be used.

(A) Queries to be Raised to the Ballistic Expert

(i) Is the recovered ammunition standard ammunition or home-made ammunition?

(ii) What types of projectiles are used?

(iii) Whether the ingredients used in the preparation of home-made ammunition match with the ingredients recovered from the house of accused.

(iv) Whether the bullets recovered from the body of the victim were cast in moulds recovered from the house of the accused.

14.10 Clothes of Victims

These clothes carry gun-shot holes and firearm discharge residue, i.e. burning, blackening, tattooing, etc.

(A) Recovery of Clothes of Victim

(i) The clothes of the victim should be properly collected. Each cloth should be properly air-dried.

(ii) Each garment should be separately packed.

(iii) Locate the gun-shot holes in the clothes and paste a brown paper on the holes covering the blackening, and tattooing. Avoid folding of the clothes near the area of gun-shot holes.

(iv) Now it should be properly wrapped.

(B) Labelling and Packaging of Clothes of Victim

(i) The labelling should be done on the clothes, and they should be properly sealed in cardboard boxes.

(ii) Each garment should be separately packed in separate boxes and sealed.

(iii) The boxes containing clothes should also be labelled from outside.

(iv) Clothes should not be cut at the holes or near the holes.

(v) The clothes of victim/victims becomes a very important piece of evidence.

(C) General Observations

(a) The clothes should be carefully collected.

(b) The clothes should not be cut at the holes or near the holes.

(c) *Air dry the clothes, if wet. Properly wrap the clothes after placing brown paper over the suspected holes and seal these clothes in boxes.*

(d) The identifying details should be put on clothes as well as on sealed parcels.

(e) The blackening, tattooing (stippling), bullet wipe (lead ring/dirt ring) may be visible around the suspected holes. Sometimes the tattooing is not visible, then it should not be concluded that it is absent. It may be present, but may not be visible. Tests may be conducted by experts.

(f) In firings within a few inches, the margins of the fibers of the clothes, at entrance, may show bulbous appearance indicating their burning by flame. Presence of this bulbous appearance indicates contact or very close range firing.

Notes:

1. *The IO should be present at the time of post-mortem examination of deceased for proper collection of clothes/bullets.*
2. *In case the bullet is found at scene of crime with dried blood, the blood on bullet may be linked to victim through DNA.*

(D) Queries to be Raised to the Ballistic Expert/Medical Officer

(i) Were the holes caused by projectiles discharged through a firearm?

(ii) Is there any bulbous appearance on the margins of fibers of clothes of victim? Is there any blackening/tattooing present around the hole in clothes?

(iii) Whether the holes present on clothes are caused by a jacketed bullet or not.

(iv) Which is entry hole and which is exit hole on clothes?

(v) What was the range of firing?

(vi) What was the direction of firing?

14.11 Clothes of Suspects

(i) In case of firings through glass, glass particles also flow towards the shooter. Blood of victim may also flow towards the shooter, hence, clothes of suspect may also carry physical evidence like hair, fibers, blood of victim, glass fragments, etc.

(ii) These clothes should also be collected, labelled, packed and sealed properly.

(iii) Suspect can be connected to the victim through DNA analysis of blood.

(iv) The suspect can also be connected to crime scene by matching glass particles present on his clothes with glass available at scene of crime.

(v) The clothes of the suspect should be collected and packed in cardboard boxes, sealed, labelled and sent to FSL.

(vi) Some small glass pieces from windows, etc., through which the suspect had fired should be sent for comparison.

14.12 Gun-Shot Residue (GSR)

(i) GSR helps in identification of shooter.

(ii) Helps in deciding between homicide and self-infliction.

(iii) In India, the identification of shooter is carried out by some laboratories by a test called **'**dermal nitrate test'**.** Now this test has been discontinued.

(iv) In this test, a layer of molten paraffin is spread on the hands of the suspect or victim.

(v) When this layer dries, it is peeled off and tested for the presence of nitrates. If positive, it is concluded that the person had fired the firearm.

(vi) There are several situations when the dermal nitrate test gave positive results on the hands of persons who have not fired the firearm.

(vii) For example, if a person has worked in the fields handling ammonium nitrate or is a smoker or has passed urine, his hands give positive test for nitrates.

(viii) This test has been discontinued and should not be conducted.

(ix) The GSR consists of invisible spheroids of lead, barium, antimony. These may be found on the hands of persons firing revolver/pistol. These spheroids may be present on the firearm and from the firearm they may come on the palm of the shooter. These may also be found on the face or clothes of the shooter.

(x) These may be found on the persons standing near the firearm or on the objects lying near the muzzle.

(A) Recovery of GSR

Method I:

(i) The best method to recover GSR is by cello-tape used to lift fingerprints. Or it may be lifted by a specially designed metallic stub shown in Figure 14.15. This stub has adhesive coating. There is a plastic cover also to avoid contamination.

(ii) Wear the gloves.

(iii) A piece of this tape or a stub is pressed against trigger finger and web portion of the hand and thumb of right hand. The GSR sticks to the tape or stub as it is lying loose on the hand.

(iv) Separate pieces of cello-tape or separate stubs are pressed on back of right hand, palm of right hand, web portion of left hand, back of left hand and palm of left hand.

(v) These pieces of cello-tapes or stub are marked as web of right hand, back of right hand, palm of right hand, web of left hand, back of left hand, palm of left hand, etc.

(vi) Each piece of cello-tape is folded in such a manner that the adhesive sides join together.

(vii) Each of the stubs is covered with its cover.

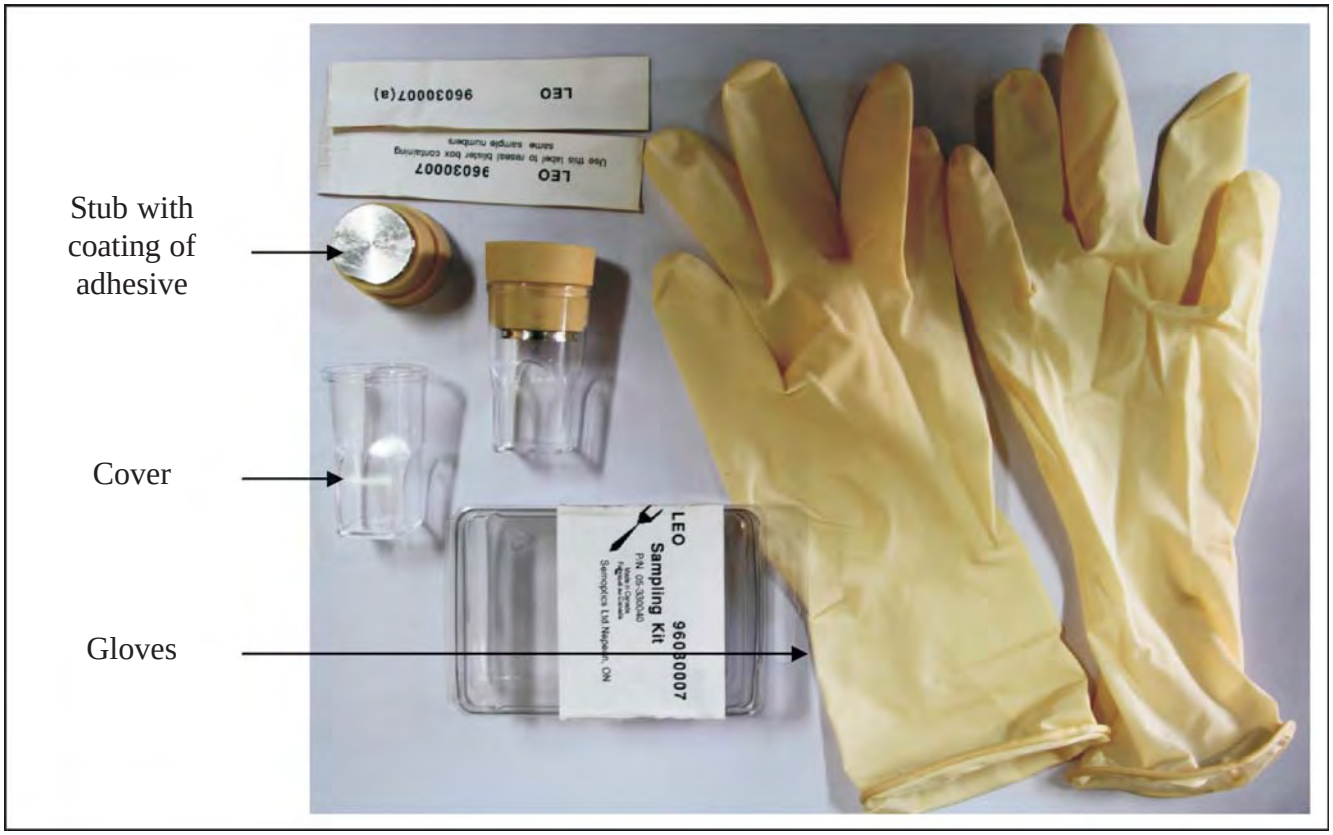


Figure 14.15: GSR recovery kit

Method II:

(i) These tapes or stubs are examined under SEM/EDX. If this instrument is not available, then the second method should be followed, as given below.

(ii) Ascertain the occupation of the suspect. If he is a mechanic, electrician, etc., or dealing with batteries, paints, glass, x-ray, photo goods, metals, insecticides, etc., then on his hands the residue should be lifted by cellotape or stub only, but if his occupation is different, then the following method should be used:

(iii) Prepare 5 per cent of nitric acid solution.

(iv) Wear surgical gloves.

(v) Take Johnson's buds.

(vi) Dip the cotton in 5 per cent nitric acid.

(vii) Take swabs from trigger finger, web-portion and thumb of right hand.

(viii) Similar swabs may be taken from back of right hand, palm of right hand, trigger finger, web and thumb of left hand, back of left hand and palm of left hand.

(ix) These swabs are air-dried and then put each in a separate polythene pouch.

(x) A *control* swab from part of the body away from the hands is also taken.

(xi) A *blank* swab, i.e. cotton with acid only is taken.

Method III:

(i) Sometimes, the investigator may be certain that it was a case of homicide. Here the accused may take the plea of struggle. In such cases, the hands of suspect and victim are washed in 50 cc of 5 per cent nitric acid taken in a polythene bag.

(ii) Washing of both the hands should be done separately.

(iii) This method is also followed if the occupation of the suspect or victim is not that of mechanic, etc.

NHRC Order: NHRC D.O. No. 4/7/2008 PRPNP dated 12th May 2010 on the subject 'Revised Guidelines/Procedures to be Followed in Cases of Death Caused by Police Action'. Para G (b) 3(iii) of guidelines states as follows:

"Results of forensic examination of 'hand wash' of the deceased to ascertain the presence of residue of gunpowder to justify exercise of right to self-defense".

Notes**:**

1. *The ejecta consisting of smoke, propellant particles, bullet elements, primer residues are called Firearm Discharge Residue (FDR) whereas the primer residue is called Gunshot Residues (GSR).*
2. *Help of the forensic expert may be taken for proper collection of GSR.*
3. *Analysis of swabs/washings in FSL by Atomic Absorption Spectrometer and Inductively Coupled Plasma techniques have proved very useful in identification of shooter.*

(B) Labelling and Packaging of GSR

1. Each lift is separately marked with portion of the hands from where taken. All these lifts by cello-tape are packed and sealed in one cardboard box. The box should be labelled with identifying details.

2. Each swab is put in a polythene pouch which should be appropriately marked about the place from where it is swabbed and these are then sealed in a box or bigger polythene bag. The box is labelled with identifying details.
3. The hand washings is taken in 50cc of 5 per cent hydrochloric acid or nitric acid and put in a plastic bottle and the plastic bottle is then labelled with identifying details. Some amount of blank acid is also similarly packed.

(C) Queries to be Raised to the Ballistic Expert

(i) Whether the gun-shot residue, lead, barium, antimony is present or not on the lifts or in wash.

(ii) What is the amount of these elements on lifts/swabs taken from different parts of the hands as well as in control and blank lifts /swabs?

(iii) What are the other elements present in the lifts/swabs?

(D) Notes:

(i) Here the pattern of gun-shot residue on the hands is determined.

(ii) More amount of residue on the trigger finger, web-portion and thumb than other places indicates firing.

(iii) If it is found on victim, correct interpretation is required.

(a) The victim might have fired. More amounts are found on trigger-finger, web, and thumb of firing hand.

(b) Or, he may be standing near the firer.

(c) Or, he had touched the fired firearm.

(d) Or, it may be the case of struggle when this residue may come on his hands.

(e) It may also happen that when the accused started firing, he might have raised his hands and some residue comes on his hand or any police officer might have touched his hands.

(iv) In the case of 12 bore guns and bolt action rifles, no residue may be found on the back of the hands of the shooter.

(v) If the firearm is planted into the hands of victim to simulate murder as suicide, more GSR will be found on the palm of the victim.

(vi) The GSR is lying loose on the hands, if the hands are washed or rubbed against the clothes, the GSR gets lost. So it should be collected as soon as possible.

(vii) The following information is required for proper interpretation:

(a) Date and time of shooting.

(b) Date and time of taking swabs/washings.

(c) Last time the suspect washed his hands.

(viii) In case there is going to be delay in the collection of GSR, protect his hands by paper envelopes.

(ix) Do not allow the suspect to wash his hands or urinate or drink water prior to collection of residue. Do not drag the suspect. Avoid touching suspects hands with your own.

14.13 Gun-Shot Injuries

(i) Gun-shot wounds are the wounds produced by impact, entry and travel of projectiles discharged from firearms into human body.

(ii) The gun-shot injuries are lacerated wounds, caused by passage of blunt projectiles.

(A) Shapes of Entrance Wounds:

(i) The discharge of 12 bore guns and high velocity rifles from close distance causes massive destruction of tissues.

(ii) **Star-Shaped**: In the case of contact shots at sites where there is bone under the skin, it may be star-shaped.



Figure 14.16: Star shaped entrance wound

(iii) In the case of close-range firings say within a few cm.,clothes may tear in a star-shaped manner.

(iv) It may be an elongated hole. It is called key-hole wound.

(v) The wound of entrance is smaller and exit is larger than the caliber of the bullet.

(vi) Sometimes, the bullet may pass through some intermediate target or may ricochet from a surface. In this situation, the wound of entrance may be larger than the caliber of the bullet and irregular.

(vii) Sometimes, the wound of entrance may be larger than the caliber of the bullet.

(viii) The bullet may strike the skin at an angle and may cause grazing injuries.

(ix) Gutter-wound.

(x) Contusions on skin.

(B) Exit Holes

(i) Generally, the exit hole is larger than the caliber of the bullet. The dimensions of wounds of entrance and exit may also be equal.

(ii) It may be star-shaped, elliptical, circular or crescent.

(iii) Sometimes the bullet may be found lodged in the exit wounds.

(iv) Sometimes the bullet may be palped inside the skin at the point of exit.

(C) Track

(i) The track may be irregular, sometimes at certain places its diameter may be *larger than the caliber of the bullet***.**

(ii) The damage to body around the track and away from the track should be assessed.

(D) Presence of Firearm Discharge Residue at Wound of Entrance

(i) Burning effect

(a) Burning

(b) Scorching

(c) Charring

(d) Singeing of hair

(ii) Blackening

(iii) Tattooing

(iv) Shotgun pattern

(v) Bullet wipe/lead-ring/abrasion collar

(vi) Dirt-ring: This ring contains bullet elements. If it is lead bullet, then lead may be present. If it is jacketed bullet then copper, nickel, etc., are present. In the case of soft point bullet lead and copper both are present.

(vii) Margins of the wounds of entrance are going inside the body, these are called 'inverted margins'. Margins of the wounds of exit are going outside, these are called 'everted margins'.

(viii) In the case of perpendicular hit, the abrasion collar may be uniform around the gun-shot hole. In the case of angled shot, the abrasion is wider on the entry site.

(E) Characteristics of Contact Entrance Wounds:

(i) At temple, forehead, etc., where there is bone under the skin

(a) Star-shaped tearing.

(b) Margins everted.

(c) Diameter larger than caliber of bullet.

(d) Pink nature of tissues.

(e) Presence of muzzle-impression.

(f) Blackening on bone, etc.

(ii) At abdomen, i.e. at sites where there is no bone under the skin

(a) Abrasion-collar present.

(b) Inside tissue damage is greater.

(c) Tissues may come out through the entrance hole. Intestines may protrude.

(d) Muzzle impression of non-firing muzzle may be found in case of DBBL guns.

(F) Shotgun pattern by firing a two and a half inch 12 bore cartridge from cylindrical barrel:

(i) Regular 12-bore gun

(a) Single hole upto about 2 yards.

(b) Diameter of this hole is about 2 cm. at a distance of 30 cm. from muzzle, 3 cm. at a distance of 1 yard or 4 cm. at a distance of 2 yards. From 2-5 yards there is formation of rat-hole, i.e. there is a central hole. It is surrounded by holes caused by individual pellets.

(c) Beyond about 5 yards all the pellets make their own individual holes.

(ii) Spread from country-made shotguns

(a) Tattooing may be found up to 15-20 feet.

(b) Pellets start spreading very soon.

Notes:

1. *At wounds of exit, the above mentioned characteristics of close-range firings around entrance wound are absent.*
2. *The bullet may hit some objects at the scene. This object may become projectile and may cause injuries. Or the projectile may fragment and the various fragments may cause separate injuries.*
3. *Gun-shot injuries may be caused to by-standers also.*

(G) Queries to be Raised to Medical Officer

(i) What was the path of the projectile in the body from wound of entrance to the end?

(ii) Which one of the wounds was fatal? Are the injuries fatal individually or collectively? Or death was due to some other cause?

(iii) How long the victim could have survived after being shot?

(iv) What was the age of injuries?

(v) X-ray of the body may be done to locate the bullet(s)/projectiles(s).

(vi) Which is the wound of entrance and which is the wound of exit?

(vii) What was the range of firing?

(viii) Whether the multiple wounds could have been produced by one bullet?

(H) Do's and Don't's

Do's	Don't's
Always distinguish blackening from abrasion collar/lead ring/dirt ring.	Often the medical officers have misinterpreted the dirt-ring/lead-ring found on skin as blackening. The dirt-ring/lead-ring is visible in distant shots and is found as a ring of width of about 1-2 mm around the gun-shot hole whereas blackening is found in close range shots covering a wide-area around the gun-shot hole. This misinterpretation leads to contradictions on range of firing and may result in acquittal.
Lead splash-blackening due to lead splash is to be distinguished from blackening due to smoke. Figures 14.17 and 14.18	Lead splash: When a lead bullet passes through a hard object like glass, lead evaporates and deposits on the nearby objects. Do not confuse lead splash with blackening.

Tattooing may be available on skin or clothes. It may be visible or not. If we perform Walker's test around the gun-shot wounds there is presence of orange-red spots as shown in Figure 14.19. Solutions used for performing Walker's test: (a) 1 g. of Sulphanilic Acid is dissolved in 100cc of solution consisting of 70 cc. distilled water and 30 cc. glacial acetic acid by warming. (b) 30 mg. of Alpha-naphthylamine is boiled in 70 cc of distilled water, solution is decanted and 30 cc. of acetic acid is added. (c) About 15 per cent of acetic acid solution.	There are many cases when tattooing around gunshot holes in clothes is not visible, but it is actually present. It may be mis-interpreted as absence of tattooing leading to distant shot. Now, there is contradiction between eye-witness account and the conclusions of distant shot drawn because of invisible tattooing. The cases end in acquittal. In order to avoid these contradictions Walker's test is performed with the help of photographic paper. Tattooing becomes visible in the form of orange-red spots.
If the wound is on the parts of body covered by clothes then clothes may be examined for the presence of tattooing. Blood around the gunshot holes and clothes should be dried.	
If the wound is on skin the tattooing must be tested at the time of PM examination.	The contradictions as mentioned above arising because of invisible tattooing may also be caused when the wound is on skin. Now, the pattern of tattooing is revealed with the help of a filter paper soaked with a reagent containing equal amounts of sulphanilic acid and alphanaphthylamine solutions is pressed against the suspected hole, when the tattooing pattern becomes visible in the form of orange-red spots. Photographs of this filter-paper showing orange-red spots can be maintained for presentation in the court.

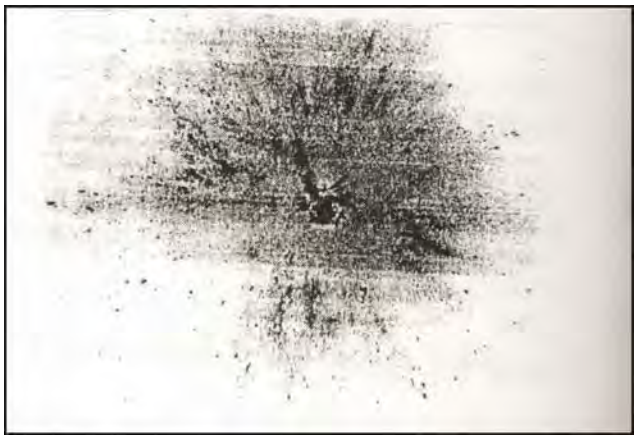


Figure 14.17: Lead splash



Figure 14.18: Blackening

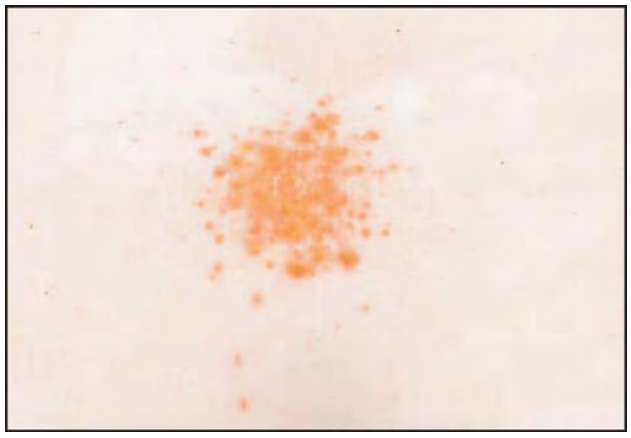


Figure 14.19: Tattooing as seen after the Walker's Test

Case Study 2	
In one case, two glass doors fixed in wooden frames and joined together by hinges were in over-lapped condition. The inmates of the house reported that something had passed through this door, causing holes in both the portions of the glass. When these were opened by police, there was blackening around the exit hole in first glass door. The police confused it with blackening and told the inmates that somebody from their	house had fired from close range, but the inmates resisted and the experiments conducted later on proved that this blackening was due to lead splash. So, the lead splash should be distinguished from blackening. In actual blackening, the whole area around the hole is black but in blackening due to lead splash, the streaks of lead deposit can be seen around the hole.

(I) Collection, Packing, Sealing-Few Points for Medical Officers

(i) The medical officers should get the gun-shot injuries photographed. The photographs must show the presence or absence of burning, blackening, tattooing, etc., around the gun-shot holes and directions of margin. These photographs should be taken before and after cleaning the injuries. Describe the injuries fully.

(ii) The dimensions of the holes should be appropriately taken by measurements and not guessed.

(iii) Get the body x-rayed to locate and recover the bullets without damaging any marks on them. The doctor should seal the projectiles himself with his own seals and label the container prior to handing them over to IO. The medical officers must also sign.

(iv) The injuries and path of bullet should be plotted on body diagram.

(v) The clothes of the victim should be collected and marked with identification marks, signature with dates at places away from the holes.

(vi) The number of bullets recovered should be noted.

(vii) Arrangement for recording of dying declaration should be made.

14.14 Firing Through Glasses



An 8 mm plate glass hit by a .22 bullet (non-jacketed); the side shows the Entry hole



An 8 mm plate glass hit by a.22 bullet (non-jacketed); the side shows the exit hole



A 5 mm plate glass hit by a .32 bullet (non-jacketed); the side shows the entry hole



A 5 mm plate glass hit by a .32 bullet (non-jacketed); the side shows the exit hole



A 5 mm plate glass hit by a 9 mm bullet (jacketed); the side shows the entry hole



A 5 mm plate glass hit by a 9 mm bullet (jacketed); the side shows the exit hole

Figure 14.20: Samples of firing through glasses

(i) Firing through glass fitted in households, vehicles.

(ii) There are 3 types of glasses:

(a) **Plate glass** fitted in house-hold windows

(b) **Tempered glass** fitted on the side and rear windows of vehicles

(c) **Laminated or safety glass** on the windscreen

(iii) Passage of bullet causes radial and concentric cracks.

(iv) Mark inside/outside of glass on house-hold and vehicles.

(v) In plate glass the rib marks on the edge of glass are perpendicular to one edge and parallel to the other.

(vi) The direction of force, in radial cracks, is on the edge opposite to the edge at which the rib marks are perpendicular.

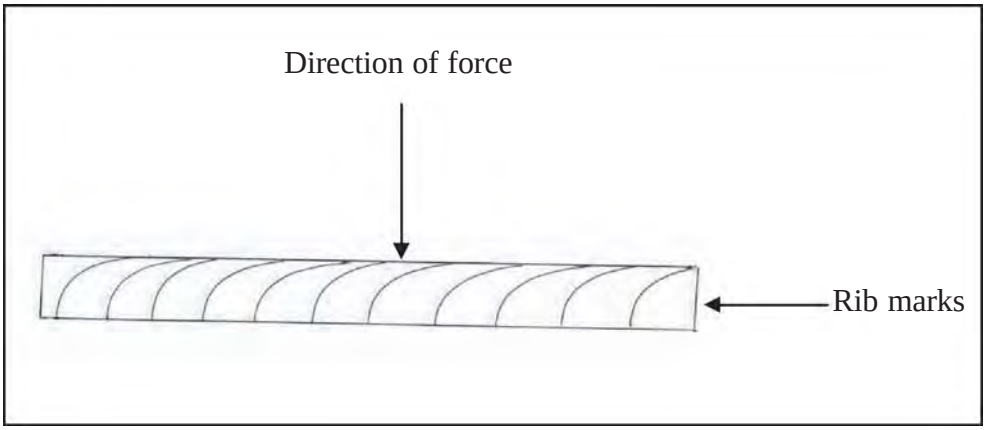


Figure 14.21: Radial cracks

(vii) The direction of force, in circumferential cracks, is on the edge at which the rib marks are perpendicular to the edge.

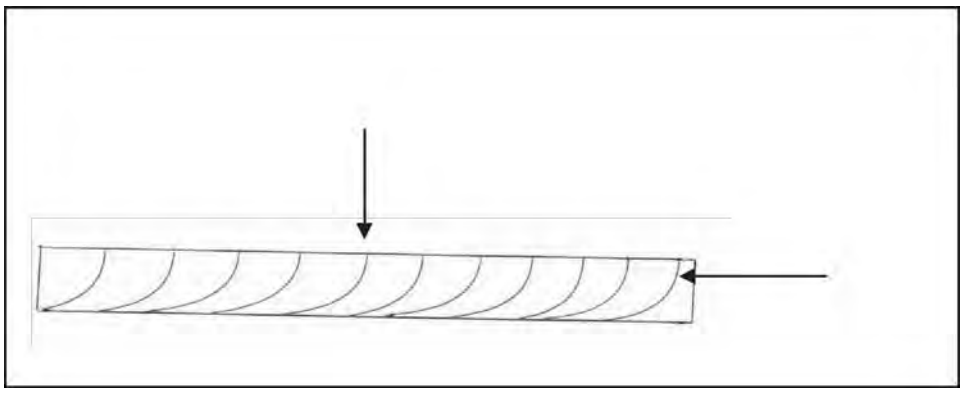


Figure 14.22: Circumferential cracks

(viii) Sequence of shots–The radial cracks originating from the hole caused by subsequent shot stop at the radial cracks caused by first shot.

(ix) Tempered glass–When the bullet strikes it, it cracks in small square or rectangular pieces, difficult to determine direction of firing. First shot may provide some radial cracks. It may or may not be possible to find direction of firing.

(x) Laminated glass–Direction may be determined from rib marks as mentioned above. Also from cone-fractures. Here, the entry side of the hole has smaller diameter whereas exit sides has wider diameter.

(xi) Lead splash–When a lead bullet passes through glass, more lead is found on entry side and less lead on exit sides. This lead is invisible.

(xii) In plate glass and tempered glass, the determination of direction of firing may be possible from cone fractures.

(xiii) In close range firings through glass, the glass particle also flies towards the shooter and may be found on his clothes.

(xiv) Bullets passing through laminated glass may deflect. Line joining entry and exit may not be true direction of firing.

(A) Collection, Labelling and Packaging of Glasses

(i) If the window glass, although broken is not shattered and the pieces are found adhering to the frame, the whole window should be transported to the lab properly packed in wooden crate, pieces joined together by brown tapes and with ample cotton to prevent damage. Labelling may be done on the wooden crates.

(ii) IO may collect some small glass pieces lying at the scene of crime, label and seal in a cardboard box.

(iii) Large pieces may be protected by packing between layers of cotton, sealed in a box. The box is labelled.

(iv) The inside and outside surface of the glass, i.e. inside, outside of vehicles, buildings, etc., should be marked.

(v) The clothes of the culprit may be collected, properly wrapped, labelled and sealed in cardboard boxes.

(vi) The glass particles can also be found on shoes of suspects. This possibility should also be considered by IO.

(B) Questionnaire

(i) Whether the holes in glass have been caused by the passage of bullets/shots.

(ii) If so, type of bullets/shots causing the hole.

(iii) What was direction of firing?

(iv) What is the sequence of shots?

(v) Whether the glass particles collected from the scene of crime and the glass particles found on the clothes of the culprit match with glass bearing holes.

(vi) If glass particles are found on the clothes of the suspect, then what was the range of firing?

(vii) What was angle of firing?

14.15 Bullet Holes/Marks/Ricochet Marks on Inanimate Targets

(i) Found in trees, furniture, doors, windows, walls, roads, tiles, concrete floors, soil, ground, granites, metal sheets, steel wheels, rubber tire, leather, plastics, etc.

(ii) Caused by both lead and jacketed bullets. Lead/copper is found in marks.

(iii) In ricochet, a bullet strikes at a low angle and gets deflected. Entry point is very sharp than exit point.

(iv) The materials like soil, paints, wood, fibers, etc., from where the bullet ricochets may be found sticking to the bullet. Link the bullet with place of impact through this material. It may indicate accidental nature of injury.

(v) After ricochet, a bullet produces elongated hole in body of victim.

(vi) After ricochet from walls, etc., the bullet travels very near to the surface. It is helpful in recovery of fired bullet. The point of maximum depth is near the entrance.

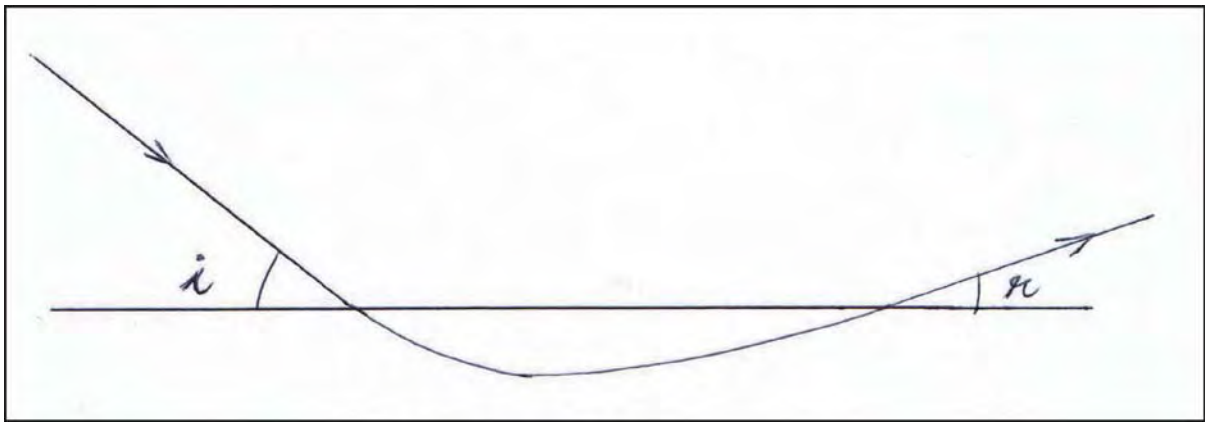


Figure 14.23: Ricochet from walls – the point of maximum depth is near the entrance. The angle of ricochet (r) is smaller than the angle of incidence (i).

(vii) In ricochet marks on metal, the point of maximum depth is near the exit side.

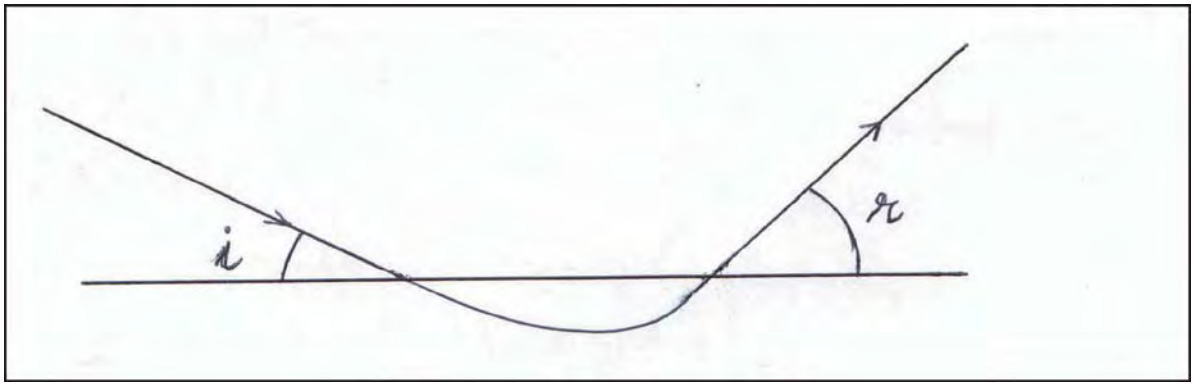


Figure 14.24: Ricochet from metals – the point of maximum depth is near the exit. The angle of ricochet (r) is greater than the angle of incidence (i).

(viii) Entrance holes in tires are smaller than the caliber of the bullet. In firings through tires, the positions of four wheels of tires should be noted.

(ix) Bullet may punch out a plug of metal or tire. Without penetration of bullets, a scab from rear side of metal may come out.

(x) Holes in some materials like trees, furniture, doors, metal sheets (vehicles) may show margins coming out. In the case of wooden materials, these margins are on the exit

sides. Their directions may be noted. In metal sheets, these margins may be found on entry as well as exit sides. The volume of metal of these margins is more on exit side than on entry side.

(xi) In thin metal sheets, the diameter of the hole may be larger than the caliber of the bullet.

(xii) Around the entry hole, blackening/tattooing may be present.

(xiii) In plastics, the cone-fractures may be present.

(A) Collection, Labelling, Packaging and Transportation of Bullet Holes/Marks/ Ricochet Marks

(i) Fully record the shapes, sizes, nature of margins, beveling, etc., of various holes/ marks.

(ii) In ricochet marks, the sharpness of edges and the distance of point of maximum depth from the edges may be recorded.

(iii) Prepare sketches of all the marks showing all details and their position on the objects. The object bearing the hole should be cut and sent to the laboratory.

(iv) All the marks/ricochet marks should be photographed. Close-up shots should be taken with scale and identification chit.

(v) If the object/vehicle can be brought to the FSL, it may be done so.

(vi) The object bearing the hole should be cut, labelled, appropriately sealed and sent to the laboratory.

(vii) Objects should be labelled with details of the case.

(viii) Sometimes, say on granite floor, these marks are not visible. An examination under near darkness may reveal the marks, photograph it.

(ix) If the object cannot be taken to the lab, swabs with 5 per cent nitric acid may be collected for testing of lead/copper, dried, sealed in cellophane envelopes and labelled. It should be done after wearing gloves. Control swabs from areas away from the mark should be collected. Also collect blank swabs. Dry these swabs and put in separate polythene envelopes.

(x) Labelling should be done on the object as well as on the parcel.

(xi) Photograph of position of the vehicle and also four wheels should be taken.

(B) Questionnaire

(i) Whether the hole/mark/ricochet mark has been caused by the passage of bullet/pellets fired from firearms.

(ii) If so, the type of projectile. What is it's caliber?

(iii) What was the direction of firing, i.e. angle of firing? In the case of gunshot holes in vehicles, the direction of firing should be determined with the help of spokes passing through entry/exit holes.

(iv) What was range of firing?

(v) What is the path of bullet?

(vi) Whether the bullet had ricocheted from smooth or rough surface.

(vii) These are helpful in overall reconstruction of sequence of events. Visit of experts would prove helpful.

(viii) Any trace material carried by bullet like glass, bone, paint, soil, concrete, etc., helps in proving that the bullet made the impact at this point.

14.16 Whether a Hole in Human Body is A Gun-Shot Hole or Not.

(i) May be ascertained by the presence of burning, blackening, tattooing, abrasion collar, lead-ring, and dirt-ring around the suspected holes.

(ii) May be ascertained through bullets present in the body.

(iii) May be ascertained through diverging nature of injuries.

(iv) Can be ascertained by detection of lead or copper from around the suspected holes.

Collection, Labelling and Packaging

(i) Take swabs by 5 per cent nitric acid from around each suspected hole separately by Johnson's bud. Dry and seal these swabs in separate cellophane envelopes.

(ii) Label the envelopes properly.

(iii) Also take control swab from parts of the body away from the suspected holes and pack separately. Label it.

(iv) Also pack a blank swab and label it.

(v) Pack these swabs in bigger cellophane envelope and label it.

Note**:** *Any cutting of skin bearing gun-shot hole may not be sent in any saline solution, etc., to lab. Instead of skin, the swab as mentioned from around the suspected hole may be sent to the lab.*

14.17 Shot-Gun Patterns

(i) Shot-gun patterns caused by firings of regular 12 bore guns and country-made firearms are found on victims, walls, doors, etc.

(ii) These patterns are helpful in range estimation and reconstruction of sequence of events.

(iii) Scaled photographs of these patterns should be taken.

(iv) If possible, the object bearing the shot-gun pattern should be sent to FSL after properly labelling it.

14.18 Chain of Possession

(i) For successful prosecution of the accused, it is very essential that the above instructions about recovery, collection, preservation, packing, sealing and transportation of evidence to FSL be strictly followed.

(ii) These instructions prove that the exhibits being presented in the court are the actual exhibits which were collected from scene of crime and which were examined in FSL.

(iii) Place of recovery should be photographed along with evidence and sketched.

(iv) Evidence should not be loosely packed. Rattling, rubbing may damage the evidence.

(v) The recovery should be witnessed by independent witnesses.

(vi) The labelling is done on the exhibits, if feasible, otherwise on the parcels.

(vii) The medical officer should hand over the bullets to IO in sealed condition only.

(viii) The identification marks should not be rubbed off.

(ix) For purity of the evidence, it is essential to use clean containers.

(x) The exhibit should be sealed at the scene of crime itself and taken to FSL.

(xi) The seals should not get peeled off.

(xii) The exhibits should never be left unguarded. They may be stolen away.

(xiii) The chain of custody of the evidentiary clues should be established from the time it is recovered or from the time it is taken into custody till produced in court.

(xiv) There should be no time gap for which the possession of clue material could not be accounted for.

(xv) So a date wise chart of the possession of each clue material should be kept in records.

(xvi) In case there is any time gap which cannot be accounted for, the cases have resulted in acquittal.

(xvii) While handing over the exhibits, the IO must obtain signatures of the person to whom the exhibits are handed over. They must also give signature while receiving the exhibits.

(xviii) There is urgent need for the IOs to carefully collect various invisible evidence and be aware of various facts carrying evidential values..

(xix) As soon as the clue materials like cartridge cases, bullets, pellets, wads, etc., are recovered these should be sent to the lab immediately without waiting for firearm to be recovered. As and when the firearms are recovered, these may be sent to the laboratory.

(xx) If it is not done, then at the time of trial, the defense counsel may take the plea that the exhibits were changed. No such chance should be given to the defense counsel.

(xxi) All the precautions followed by IO in the handling of clue materials should be recorded, which may prove helpful at the time of trial.

14.19 Differentiation between Homicide, Suicide and Accidental Firing

Table 14.2: Differences between homicide, suicide and accidental firing

S.No.	*Point*	*Homicide*	*Suicide*
1.	Victim	Any	Generally adult males
2.	Site of injury	Any body part	Temple, center of forehead, roof of mouth, under the chin, front of chest
3.	Range of firing	Usually distant, may be close also	Generally close/contact
4.	Direction of firing	Any	Consistent with self-firing
5.	Number of shots	Any	Generally one
6.	Cadaveric spasm	Not present	Present (The presence of cadaveric spasm is not a sure indication of suicide)
7.	Gun-shot residue on hands of victim	Absent	More amount of GSR present
8.	Scene of crime	Evidence of disorder may be present. May be made to look as suicidal	Generally, no evidence of disorder. Suicide note may be found
9.	Circumstances of shooting	Eye-witnesses account may be obtained	Victim may be having some social, marital or economic problem
10.	Firearms	Number of firearms-one or more than one, may or may not be found at SOC	Number of firearm - one

Note**:** *Visit to scene of crime by expert proves useful for reconstruction of sequence of events, for determination whether the scene is fake or real or to verify versions like suicide, homicide, accident, self-defense, etc.*

Accidental Shot:

1. Measure the trigger pull. An easy trigger pull indicates that the firearm is liable for accidental discharge.
2. In case it is very hard to pull the trigger, then also the firearm may fire accidently.

14.20 Case Studies

Case Study 3: Plea of Struggle Proved Wrong with the Estimation of Range of Firing	
There were two brothers living separately. Their mother was living with the younger brother. One day, the elder brother went to the house of younger brother to see his mother. When he went there, he was shot dead. In this case, the mother took the plea that there was a struggle between the two brothers. During the struggle, the firearm had	fired and the elder brother had died. But here the expert evidence proved that the range of firing was more than 2 m. and there was gun-shot residue on the hands of the younger brother whereas it was totally absent on the hands of the elder brother. It ruled out the plea of struggle and it was proved to be a case of murder.

Case Study 4 : Plea of Quarrel Proved Wrong with the Estimation of Range Of Firing	
Some police personnel were travelling in a train with their firearms and ammunition. When the train stopped at a station, crowd entered their compartment. The police officers were able to push the crowd out of their compartment. But in this process, quarrel ensued between the police personnel and the	crowd. The police fired to frighten the crowd but a bullet struck a person standing on the platform and he died. Here, police took the plea that the crowd was trying to snatch the firearm and in this process the firearm had fired, and the person died. Here the range of firing was proved to be distant, thus, ruling out the theory of struggle.

Case Study 5:Theory of Police Proved Wrong with the Determination of True Direction of Firing	
A driver in police jeep was found dead with gun-shot injuries, one at back and the other at chest. There was a hole in the windscreen as well. According to police, some person fired from the front, the bullet entered through the windscreen and then entered the chest of the driver, and came out from back of victim. But when injuries were examined, it was found that the margins of the wound at the back were inverted, (going inside the body) indicating as if it was wound of entrance and the margins of the wound at chest were	everted, i.e. going outside indicating as if it was wound of exit. The hole in the windscreen was examined and it was found to have been caused by a projectile coming from inside to outside. Now the rear of the driver's seat was examined and a lot of blackening, tattooing, etc., was found surrounding the hole showing that it was the entrance hole. Thus, the presence of physical evidence in this case indicates the true direction of fire. Actually victim's own colleague had shot him dead with a high velocity service rifle from behind his seat.

Case Study 6 : Theory of Encounter Proved Wrong with the Estimation of Range of Firing	
Some police personnel were going on a road. A child of about 12 year old passed by them and passed some remarks on them. They got angry, caught hold of this boy and shot him dead with a carbine.	They took the plea that there was encounter from a distance of 100 yards. But the presence of blackening around the gun-shot hole proved that the range of firing was about 6 inches, thereby ruling out plea of encounter.

Case Study 7	
A VIP was shot dead by some gang members, while he was on visit to some school for an inaugural function. He died on spot with several gunshot wounds on his body. The culprits fled after the massacre. When the investigation team reached the spot, they found bodies of VIP along with bodies of his bodyguards. Several rounds were fired by the	culprits. Bullet holes and marks were found on the walls, windows, and doors. Bullet was also found lodged in the metallic body of the car. The scene was immediately cordoned and after proper and careful documentation of the crime scene (photography, videography, sketching, notes, etc.) the bodies were sent for post-mortem examination.



Figure 14.25: Blood and bullet marks present at the scene of crime

Bullet marks were marked using chalk and numbered accordingly. Their close-up shots were taken. Dimensions of the bullet holes, marks were recorded. Exit and entry holes were carefully noted in car, for determining the true direction of firing. Several bloodstained shoeprint marks were also located at the scene of crime.



Figure 14.26: Blood stained footprint marks at the scene of crime, photographs taken

Courtesy: Dr. A.K. Bapuly

14.21 Unusual Practices Followed by Criminals in Committing Crimes by Firearms-Inviting Attention of IOs

I. Firing of Pistol Cartridge from Revolver

(i) The revolver cartridges are rimmed and pistol cartridges are rimless.

(ii) Sometimes, in order to mislead the investigation, the criminals insert a thin clip in the extractor groove of rimless pistol cartridge, chamber the cartridge in cylinder of revolver with clip at the rear of the cylinder and fire it.

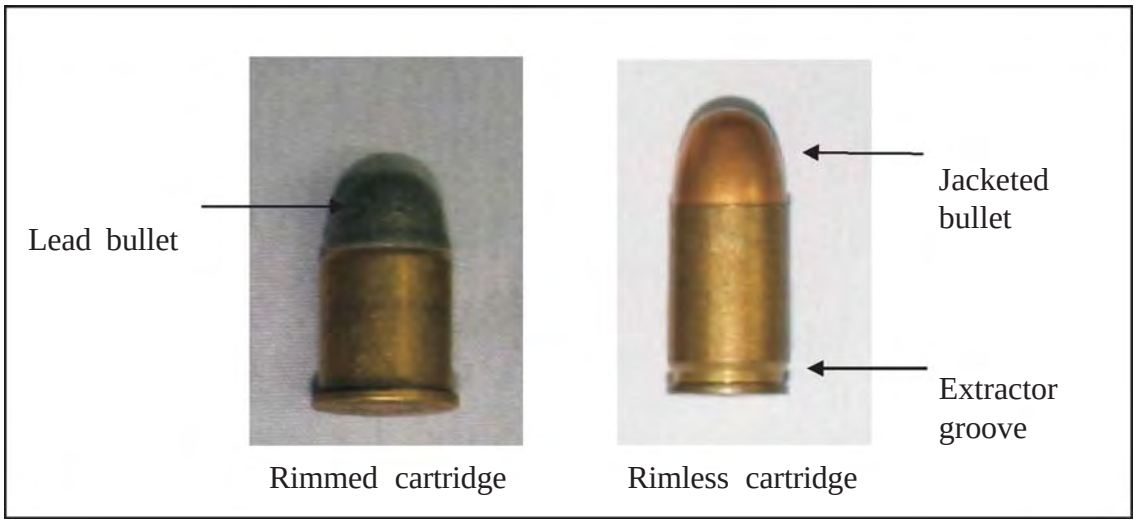


Figure 14.27: Different types of cartridges

(iii) Now, a rimless cartridge case may be found at the scene of crime.

(iv) The IO may look for a pistol involved in the crime. However, during investigation, if a revolver is recovered, it may be got examined from the expert to find out if the pistol cartridge case has been fired by the suspected revolver.

II. Firing of Lead Bullet from Pistols and Jacketed Bullets from Revolver

(i) Lead bullets are fired from revolvers. However, from .38 revolvers, either lead or jacketed bullet is fired. Sometimes the criminals may load lead bullet in pistol cartridges and jacketed bullets in revolver cartridges.

(ii) Recovery of a lead bullet from a body normally indicates the use of revolver, but actually pistol was used.

(iii) So again, if a pistol is found during investigation, it may be examined from expert for possible linkage of recovered lead bullet with pistol.

III. Revolver/Pistol Cartridges Fired from Rifles

(i) Sometimes, the criminals fire revolver/pistol cartridges from rifles with the help of *adaptor or supplemental chambers.* Now, IO may recover a revolver/pistol bullet from the body/scene of crime which has actually been fired from the rifle.

(ii) So, during investigation, if IO recovers a rifle, its linkage with bullet may be requested to the expert.

IV. .22 Long Rifle Cartridge/Revolver or Pistol Bullet Loaded in 12 Bore Cartridge

(i) Criminal cases have occurred when criminals have loaded .22 long rifle cartridges or a handgun bullet in a shotgun cartridge.

(ii) From the body, the recovery of .22 cartridge may mislead the investigation. Similarly, the recovery of a handgun bullet from body may show that a handgun has also been used in crime along with 12 bore cartridge.

V. Pistol or Revolver Bullets, or Lead Balls or Steel Balls may be Loaded in Rifle Cartridges and Fired from a Rifle

(i) Though pistol/revolver bullets may indicate the use of handguns, and balls, etc., may indicate the use of shotgun, but if, a rifle is found during investigation, then pistol or revolver bullet may be linked with this rifle.

(ii) It is not possible to link the pellets with rifles.

VI. Interchange of Barrel after Committing the Crime

(i) This is possible in the case of 9 mm pistols and earlier models of carbines.

(ii) The criminals used to change the barrels but the police investigation found out the true facts by finding the true barrel.

VII. A Pistol Cartridge of One Caliber May be Fired from Pistol of other Caliber

VIII. A Firing Pin may be Easily Replaced

IX. Filing of Firing Pins and Breech Faces of Firearms

(i) The filing of firing pins and breech faces may change individual characteristics on them.

(ii) Making the linkage of fired cartridge case with suspect firearm difficult.

(iii) The filing may be obvious from bright appearance but these parts can be easily oxidized or reblued.

X. Replacement of Revolver Barrel after Committing Crime

XI. Check Lists

Checklist on Homicide Investigation

(i) Whether dead or still alive

(ii) If alive, mark the position of victim with chalk, etc., and send to hospital

(iii) Dying declaration

(iv) If dead, whether sudden or unnatural death

(v) Who was the first to see the dead body?

(vi) Who and when saw living last?

(vii) Position of the dead body

(viii) Locality and location

(ix) Sign of struggle

(x) Blood splatter pattern

(xi) Details of the dress including colour, cotton/terry-cotton, and make/tailor/dhobi mark

(xii) Ornaments

(xiii) Cash

(xiv) Visiting card

(xv) Letter

(xvi) Receipt

(xvii) Occupational dust

(xviii) Dust adhering to the clothes and shoes

(xix) Type of shoes

(xx) Handkerchief

(xxi) Height

(xxii) Build

(xxiii) Age

(xxiv) Male/female

(xxv) If female, whether married

(xxvi) Whether pregnant

(xxvii) Complexion

(xxviii) Colour of hair

(xxix) Colour of eye

(xxx) Identification mark

(xxxi) Brand cigarette/*bidi*

(xxxii) Tattoo mark on the body

(xxxiii) Nail and nail bed

(xxxiv) Any peculiar smell

(xxxv) Discolouration of the face and other body parts

(xxxvi) Colour and condition of the teeth

(xxxvii) Any discharge from nostrils/mouth

(xxxviii) Condition of the eyes

(xxxix) Condition of the mouth-whether open/closed

(xl) Post-mortem staining

(xli) Rectal temperature

(xlii) Rigor mortis present

(xliii) State of decomposition

(xliv) Whether homicide/accidental

(xlv) If homicide, whether death is caused by poisoning or otherwise

If Death is due to Gunshot Injury

Examination of Victim:

(i) How many persons sustained firearm injury in the incident?

(ii) How many dead?

(iii) How many injured?

(iv) Examination of wounds

(a) Which part(s) of the body injured (location)?

(b) Whether there is any wound with massive destruction or any part of the body blown off.

(c) Whether there is any star-shaped wound on temple, head, forehead with everted margins, burning present.

(d) Whether there is any key-hole with inverted margins.

(e) Any irregular hole with inverted margins.

(f) Any clean hole with inverted margins.

(g) Any grazing injury.

(h) Any gutter wounds.

(i) How many exit wounds are present?

(j) Locations of wounds of exit.

(k) Are these injuries firearm injuries?

(v) Whether there is any hole in clothes with number of tears starting from hole. Are there any tissues protruding from the wound of entrance?

(vi) Are there any injuries superfluous – not deep?

(vii) Whether there is any bullet protruding from skin/clothes.

(viii) Dimensions of the injuries.

(ix) In case of multiple wounds of entrance whether all the wounds look alike or different.

(x) Whether all the wounds are caused by shots fired from one or different firearms.

(xi) What is the size of the area in which injuries/wounds of entrance are spread?

(xii) Whether there is blackening around the injuries.

(xiii) Whether there is tattooing around the injuries. Whether any tattooing is present on others part of the body or not.

(xiv) Whether there is burning, scorching, charring, etc present on the injuries.

(xv) Whether strands of hair are singed.

(xvi) Whether there is abrasion collar/dirt ring/lead ring, etc., present around the holes.

(xvii) Whether there is wad impression in the body/clothes. Is there any muzzle-impression around the wound of entrance? Is there any impression of non-firing muzzle in case of DBBL guns?

(xviii) What type of firearm/firearms was used?

(xix) From what distance of firing?

(xx) Approximately how many shots fired?

(xxi) Which injury/injuries appear to be fatal? Did the victim die due to gun-shot injuries or was there any other reason?

(xxii) Extent of damage caused to the organs.

(xxiii) Extent of bleeding.

(xxiv) Which other organs of body show the presence of blood.

(xxv) Corresponding to exit holes in skin, are there exit holes in clothes?

(xxvi) Is there any other portion of the body showing burning effect?

Examination of the Scene

(i) Is it an indoor or outdoor crime?

(ii) Is it inside a house, building, vehicle such as bus, car, railway compartment, airplane, ship, etc?

(iii) Type, colour, make and condition of the vehicle.

(iv) Whether shots were fired from outside or from inside the vehicle.

(v) If fired from outside, approximate distance of firing.

(vi) What other evidences were found outside or inside the vehicle?

(vii) If shots were fired from inside what was the position of the suspect and the victim?

(viii) What other evidence was found inside the car?

(ix) Extent and location of damage caused to the vehicle.

(x) Fracture pattern on the tempered glass – i.e. on the side windows or rear of the vehicles.

(xi) Fracture pattern of the windshield.

(xii) Position and location of dead body inside the vehicle.

(xiii) Margins of holes in metal sheets-direction of firing.

(xiv) Diameters of holes in metal sheets.

(xv) Swabs from around the holes in metal sheets.

(xvi) Are there any holes in the tires?

(xvii) Any plug of tire may be present inside the tire.

(xviii) Position of the four wheels.

(xix) Recovery of bullets from tires-whether the bullet is intact/damaged/fragmented.

(xx) Is there any bullet hole in steel wheel?

(xxi) Are there any ricochet marks on the vehicles?

(xxii) If so, the direction of firing.

(xxiii) Fracture pattern of plate glass fitted to households-directon of firing from rib marks.

(xxiv) Bullet holes inside the house-walls, door, furniture, and other objects.

(xxv) Are there any bullet ricochet marks on the walls?

(xxvi) Pellet pattern on walls, etc., size of these pellet patterns.

(xxvii) Is it an open area such as road, field, park, sea beach etc?

(xxviii) What was the position of dead body?

(xxix) How far is it from the main road?

(xxx) Is there any firearm lying near the body or held in hands?

(xxxi) Distance of firearm from body.

(xxxii) Any other article(s) seen lying near the dead body such as cycle, motor bike, firearm, fired bullet, empty, any other weapon.

(xxxiii) Fired bullet found at the scene-if yes, how many and their locations?

(xxxiv) Number, type and make of the bullet.

(xxxv) Number, location and type of the empties found.

(xxxvi) Number, make and type of firearm found.

(xxxvii) Condition of the firearm.

(xxxviii) Whether firearm belongs to the class of prohibited bore.

(xxxix) Whether the firearm found is a country made.

(xl) Whether the firearm found at the scene can produce the type of injuries present on the dead body.

(xli) Whether the bullet and empty recovered from the scene match with the firearm found.

(xlii) Extent of bleeding from the dead body.

(xliii) How blood is distributed at the scene?

(xliv) Is there any sign of struggle before shots were fired?

(xlv) Position of the suspect.

(xlvi) Positions and dimensions of holes, ricochet marks in various targets at scene of crime.

(xlvii) Whether the bullet had struck some object at the scene of crime. Is there any injury caused by this object.

(xlviii) Are there any glass particles found near the glass windows?

(xlix) Are there particles inside or outside the house?

(l) Presence of blackening/tattooing/lead ring/dirt ring around the holes.

(li) Are there any blood, tissue, soil, glass, hair, etc., sticking to the bullet?

(lii) Type of wads recovered from scene of crime.

(liii) Whether improvised firearm was used.

Actions to be taken

A. At the scene of crime

(i) Secure the scene

(ii) Close observation of the scene

(iii) Detailed description of the scene

(iv) Photography of the scene in undisturbed condition showing the location, every possible details of the scene such as position of the body as marked with chalk, firearm, empty cartridge cases and their number, holes where the bullets are lodged, ricochet marks, wads, pellet patterns, blood stains, signs of struggle, position of the furniture, etc.

(v) Search of the scene, marking and numbering of the physical evidence including the dead body.

(vi) Photography, videography of the processed scene.

(vii) Measurements-preparation of sketch.

(viii) Inquest of the dead,identification, location, nature and dimension of each wound, time since death, matching the corresponding injuries on the cloth with the injuries on the body, search of the dead body for other evidences such as hair, fibres, etc.

(ix) Sealing and sending dead body for post-mortem examination.

(x) Collection and packaging of physical evidence.

(xi) Observation note.

(xii) Reconstruction of the sequence of events.

(xiii) Documentation.

(xiv) Interview of the witnesses.

(xv) Decide follow-up actions.

(xvi) Interpretation of PM report/injury report.

(xvii) Forensic reports.

(xviii) Decide line of further investigation.

B. Physical evidence to be collected: From the scene of crime

(i) Firearms-with or without live or spent ammunitions.

(ii) Fired bullets dislodged from the bullet holes of the scene.

(iii) Empty cartridge cases.

(iv) Live ammunitions.

(v) Wads.

(vi) Pellets.

(vii) Holes and ricochet marks on various targets/or swabs from holes/ricochet marks.

(viii) Determination of direction of firing from holes in glass doors/windows.

(ix) Glass particles.

(x) Gun-shot residue from hands of victim.

(xi) Blood-stained clothing with gunshot holes.

(xii) Blood stains.

(xiii) Swabs from the nails.

(xiv) Hair and fibres.

(xv) Tire tread impressions.

(xvi) Foot impressions and suspected shoes.

(xvii) Fingerprints on the firearm surface or other places of the scene.

(xviii) Documents such as suicide note, threatening letters, etc.

(xix) Firearm in the possession of the victim or in his house and ammunitions, both live and used ones.

From the dead/injured person

(i) Extracted bullets.

(ii) X-ray of the body showing lodged bullets/pellets.

(iii) Sample blood.

(iv) Hair sample.

(v) Swab from the private part if the victim is a women.

(vi) Swab from the gunshot holes for firearm discharge analysis.

(vii) Fingerprints of all the ten fingers recorded on standard fingerprint recording form.

(viii) Foot impressions.

From the suspect

(i) Firearm and document related to the purchase, if any.

(ii) Live and spent ammunitions and document related to the purchase, if any.

(iii) Swab of the hands for gunshot residue analysis.

(iv) Sample hair.

(v) Sample blood.

(vi) Any bloodstained clothes.

(vii) Clothes for possible comparison of blood and glass particles on clothes with blood of victim and glass particles later from window.

(viii) Fingerprints of all the ten fingers recorded on standard fingerprint recording form.

(ix) Foot impressions.

(x) Suspected shoes.

(xi) Clothing suspected to have seminal stains.

(xii) Standard writings to match with any document found at the scene or in the possession of the victim to establish the origin of writing and link the suspect.

(xiii) All the above from his accomplices.

Packaging instructions

1. Firearms

(i) Photograph the firearm with ammunition.

(ii) Inspect for live ammunition; if any, remove them.

(iii) In the case of revolvers, while unlocking the cylinder, care should be exercised to see that the cylinder does not rotate. Note down the positions of live and fired cartridge cases.

(iv) Take out the empty cartridge casings, count and keep them on soft surface.

(v) Inspect the firearm for latent fingerprints or blood stains.

(vi) Develop the fingerprints, photographs and lift them if the technique and expertise are available.

(vii) Otherwise take care that the fingerprints are not destroyed during handling or packaging.

(viii) Dry the bloodstain.

(ix) Write some identification mark in an inconspicuous place so that you may identify in the court during the trial.

(x) If there are fingerprints, pack in such a manner that the fingerprint surface does not come in contact with the packaging material.

(xi) Wrap the long-barrel in a cellophane sheet and seal in a clean cloth.If the firearm is a hand gun, place in a cellophane envelope and seal in a clean box.

(xii) Label the evidence properly entering exhibit number, FIR number, police station, name and signature of the IO, name and signature of the witnesses, date, place, details of the exhibit such as make, type, trade mark, etc.

(xiii) Ensure that seals were applied at appropriate places to prevent tampering at any stage till it is handed over to Forensic Science Laboratory.

2. Empty Cartridge Cases

(i) Each cartridge case may be put in a cellophane pouch and then packed collectively in a box.

(ii) Protect the base of the case with cotton wool to prevent any scratch, which might develop on the percussion cap during the transportation. This is essential to protect the firing pin mark, chamber mark, and the ejector mark present on the empty shell.

(iii) Write some identification mark in an inconspicuous place of the case so that you may identify it in the court during the trial.

(iv) The fired cartridge case recovered from different locations should be similarly packed in different boxes.

(v) Label the evidence properly entering exhibit number, FIR number, police station, name and signature of the IO, name and signature of the witnesses, date, place, details of the exhibit such as make, type, trade mark, manufacturing batch/lot number, etc.

3. Live Cartridges

(i) Enclose each live cartridges in a cellophane pouch separately and seal collectively in a box giving sufficient padding of cotton between two cartridges to avoid cartridges from colliding with each other during transit. The box should be labelled.

(ii) Clearly indicate the condition of the ammunition on the main container so that adequate care is taken while unpacking the exhibit.

4. Extracted Bullets, Pellets, Bullet Fragments, Wads from the Dead Body or from Other Areas of the Scene of Crime

(i) X-ray examination of the injured person or a dead body should be done before extracting the bullet. After examining the actual position of the bullet in the human body, it should be extracted taking utmost care that no additional scratches are developed during the process of extraction. Rubber/latex tipped forceps are ideal to handle such evidence.

(ii) Write some identification mark in an inconspicuous place so that you may identify the particular bullet/pellet when shown in the court.

(iii) Keep each bullet in a piece of paper, put in a plastic envelope and pack them in a suitable box. Sufficient padding of cotton may be given to avoid rattling. The box is sealed under cloth cover and labelled.

(iv) Label the evidence properly entering exhibit number, FIR number, police station, name and signature of the IO, name and signature of the witnesses, date, place, details of the exhibit type, condition whether damaged or intact, etc.

5. Clothes of victims

(i) The clothes of victims bearing gun-shot holes should not be cut at holes or near the holes.

(ii) Air dry the clothes, if wet.

(iii) Properly wrap the clothes after placing brown paper over the suspected holes, and seal these clothes collectively in a box.

6. Gun-shot Residue

Method I: Different stubs or cello-tapes (each with GSR lifted from different areas of hands and appropriately labelled) may be tightly packed collectively in a box. The box is sealed with cloth and labelled.

Method II: Different swabs taken with Johnson's buds, dried and each put in a cellophane pouch and appropriately labelled, may be tightly packed collectively in a box. The box is sealed with cloth and labelled.

Method III: The washings of each hand taken separately in cellophane pouch may be separately packed in plastic bottles and appropriately labelled.

References

1. B.R. Sharma, 'Firearms in Criminal Investigation and Trials', New Delhi, 2011.

2. A.K.Bapuly, *Forensic Science-Its Application in Crime Investigation*, Hyderabad, 2006.

3. *Crime in India, 2013*, National Crime Records Bureau, MHA, New Delhi.

4. *A Handbook on Police Investigation*, Government of Tamil Nadu, 1990.

5. Chester Mueller and John Olson, *Shooter's Bible-Small Arms Lexicon and Concise Encyclopedia*, South Hackensack, N.J. 1st edn, 1968.

15 FORGED DOCUMENTS

Forged documents are used for financial or extraneous gains causing wrongful loss to others. A number of corporate frauds and scams have been perpetrated in the past causing huge loss to government exchequer. Forged documents are produced to substantiate false claims. These documents generally relate to the cases pertaining to cheating, embezzlement, misappropriation, disproportionate assets, anonymous complaints, extortion or criminal misconduct and corporate frauds. Collection of proper standards for comparison with disputed documents, markings, packing and forwarding of these forensic documents to CFSLs/FSLs becomes important.

As many as 649 vigilance cases were registered by CBI and 4246 by state/UTs during 2013 under the Prevention of Corruption Act. About 5.45 crore Indian bank notes and 2.10 crore foreign currency were seized in cases falling under FERA (Foreign Exchange Regulation Act) and FEMA (Foreign Exchange Management Act) related to money laundering. There has been enormous about 350% increase in the number of searches and raids during 2013 than in 2012 as per the NCRB (National Crime Records Bureau) Annual Report 2013, which was published in 2014.

15.1 Relevant Sections under the IPC

1. Section 29 of the Indian Penal Code 'Document'—The word 'document' denotes any matter expressed or described upon any substance by means of letters, figures, or marks, or by more than one of those means, intended to be used, or which may be used, as evidence of that matter.

Explanation 1.—It is immaterial by what means or upon what substance the letters, figures or marks are formed, or whether the evidence is intended for, or may be used in, a court of justice, or not.

Illustrations

(i) A writing expressing the terms of a contract, which may be used as evidence of the contract, is a document.

(ii) A cheque upon a banker is a document.

(iii) A power-of-attorney is a document.

(iv) A map or plan which is intended to be used or which may be used as evidence is a document.

(v) A writing containing directions or instructions is a document.

Explanation 2—Whatever is expressed by means of letters, figures or marks as explained by mercantile or other usage, shall be deemed to be expressed by such letters, figures or marks within the meaning of this section, although the same may not be actually expressed.

Illustration

A writes his name on the back of a bill of exchange payable to his order. The meaning of the endorsement, as explained by mercantile usage, is that the bill is to be paid to the holder. The endorsement is a document, and must be construed in the same manner as if the words 'pay to the holder' or words to that effect had been written over the signature.

2. Section 120B in the Indian Penal Code: Punishment of criminal conspiracy—

(i) Whoever is a party to a criminal conspiracy to commit an offence punishable with death, 2 [imprisonment for life] or rigorous imprisonment for a term of two years or upwards, shall, where no express provision is made in this Code for the punishment of such a conspiracy, be punished in the same manner as if he had abetted such offence.

(ii) Whoever is a party to a criminal conspiracy other than a criminal conspiracy to commit an offence punishable as aforesaid shall be punished with imprisonment of either description for a term not exceeding six months, or with fine or with both.

3. Section 407 in the Indian Penal Code: Criminal breach of trust by carrier, etc.—

Whoever, being entrusted with property as a carrier, wharfinger or warehouse-keeper, commits criminal breach of trust in respect of such property, shall be punished with imprisonment of either description for a term which may extend to seven years, and shall also be liable to fine.

4. Section 408 in the Indian Penal Code: Criminal breach of trust by clerk or servant—Whoever, being a clerk or servant or employed as a clerk or servant, and being in any manner entrusted in such capacity with property, or with any dominion over property, commits criminal breach of trust in respect of that property, shall be punished with imprisonment of either description for a term which may extend to seven years, and shall also be liable to fine.

5. Section 417 in the Indian Penal Code: Punishment for cheating—Whoever cheats shall be punished with imprisonment of either description for a term which may extend to one year, or with fine, or with both.

6. Section 418 in the Indian Penal Code: Cheating with knowledge that wrongful loss may ensue to person whose interest offender is bound to protect—Whoever cheats with the knowledge that he is likely thereby to cause wrongful loss to a person whose interest in the transaction to which the cheating relates, he was bound, either by law, or by a legal contract, to protect, shall be punished with imprisonment of either description for a term which may extend to three years, or with fine, or with both.

7. Section 420 in the Indian Penal Code: Cheating and dishonestly inducing delivery of property—Whoever cheats and thereby dishonestly induces the person deceived to deliver any property to any person, or to make, alter or destroy the whole or any part of a valuable security, or anything which is signed or sealed, and which is capable of being converted into a valuable security, shall be punished with imprisonment of either description for a term which may extend to seven years, and shall also be liable to fine.

8. Section 463 in the Indian Penal Code: Forgery—Whoever makes any false documents or false electronic record or part of a document or electronic record, with intent to cause damage or injury, to the public or to any person, or to support any claim or title, or to cause any person to part with property, or to enter into any express or implied contract, or with intent to commit fraud or that fraud may be committed, commits forgery.

9. Section 465 in the Indian Penal Code: Punishment for forgery—Who ever commits forgery shall be punished with imprisonment of either description for a term which may extend to two years, or with fine, or with both.

10. Section 467 in the Indian Penal Code: Forgery of valuable security, will, etc.—Whoever forges a document which purports to be a valuable security or a will, or an authority to adopt a son, or which purports to give authority to any person to make or transfer any

valuable security, or to receive the principal, interest or dividends thereon, or to receive or deliver any money, movable property, or valuable security, or any document purporting to be an acquaintance or receipt acknowledging the payment of money, or an a quittance or receipt for the delivery of any movable property or valuable security, shall be punished with imprisonment for life, or with imprisonment of either description for a term which may extend to ten years, and shall also be liable to fine.

11. Section 468 in the Indian Penal Code: Forgery for purpose of cheating—Whoever commits forgery, intending that the document or electronic record forged shall be used for the purpose of cheating, shall be punished with imprisonment of either description for a term which may extend to seven years, and shall also be liable to fine.

12. Section 469 in the Indian Penal Code: Forgery for purpose of harming reputation—Whoever commits forgery, intending that the document or electronic record forged shall harm the repu-tation of any party, or knowing that it is likely to be used for that purpose, shall be punished with imprisonment of either description for a term which may extend to three years, and shall also be liable to fine.

13. Section 470 in the Indian Penal Code: Forged document or electronic record—A false document or electronic record made wholly or in part by forgery is designated 'a forged document or electronic record'.

14. Section 471 in the Indian Penal Code: Using as genuine a forged document or electronic record—Whoever fraudulently or dishonestly uses as genuine any document or electronic record which he knows or has reason to believe to be a forged document or electronic record shall be punished in the same manner as if he had forged such document or electronic record.

15. Section 472 in the Indian Penal Code: Making or possessing counterfeit seal, etc., with intent to commit forgery punishable under section 467—Whoever makes or counterfeits any seal, plate or other instrument for making an impression, intending that the same shall be used for the purpose of committing any forgery which would be punishable under section 467 of this Code, or, with such intent, has in his possession any such seal, plate or other instrument, knowing the same to be counterfeit, shall be punished with imprisonment for life, or with imprisonment of either description for a term which may extend to seven years, and shall also be liable to fine.

16. Section 473 in the Indian Penal Code: Making or possessing counterfeit seal, etc., with intent to commit forgery punishable otherwise—Whoever makes or counterfeit any seal, plate or other instrument for making an impression, intending that the same shall be used for the purpose of committing any forgery which would be punishable under any section of this chapter other than section 467, or, with such intent, has in his possession any such seal, plate or other instrument, knowing the same to be counterfeit, shall be punished with imprisonment of either description for a term which may extend to seven years, and shall also be liable to fine.

17. Section 489 in the Indian Penal Code 489(A-E). **Tampering with property mark with intent to cause injury**—Whoever removes, destroys, defaces or adds to any property mark, intending or knowing it to be likely that he may thereby cause injury to any person, shall be punished with imprisonment of either description for a term which may extend to one year, or with fine, or with both.

18. Section 489A. Counterfeiting currency-notes or bank notes—Whoever counterfeits, or knowingly performs any part of the process of counterfeiting, any currency note or bank note, shall be punished with imprisonment for life, or with imprisonment of either description for a term which may extend to ten years, and shall also be liable to fine.

19. Section 489B. Using a genuine, forged or counterfeit currency notes or bank notes.

20. Section 489C. Possession of forged or counterfeit currency notes or bank notes.

21. Section 489D. Making or possessing instruments or materials for forging or counterfeiting currency notes or bank notes.

22. Section 489E. Making or using documents resembling currency notes or bank notes.

15.1.1 Pre-Search Planning and Preparation to Examine Scene of Offence:

Make a clear assessment about the place where search is to be conducted for collection of physical evidence including documents.

15.1.2 General Guidelines for Carrying out Search at Scene of Crime:

(i) Collection of all possible, relevant and authentic information required for making assessment about the planning and preparation for search.

(ii) Assessment of all available information for planning and preparing for the correct timing of search.

15.1.3 Constituting Teams Required for Handling the Crime Scene

(i) Outer Cordon

(ii) Inner cordon

(iii) Search and seizure

(iv) Handling of witness

(v) Handling of suspects/accused

(vi) Law and order

15.1.4 Additional Guidelines

(i) Search should be led by a senior police officer.

(ii) Role of an informant/source/identifier must be clearly identified for an operation.

(iii) The roles and responsibilities of police and non-police personnel must be clearly defined.

15.1.5 Briefing Team Members

Members of a search team, including police and non-police personnel, should be briefed on following key points:

(i) The purpose of search.

(ii) The outlines of the plan of action.

(iii) The role and responsibilities of teams and individuals attending CS.

15.2 Basic Integrated Kit for Document Related Cases:

(i) Digital camera (min. 16 mega pixel)

(ii) High intensity light source

(iii) UV lamp-long, medium and short wavelength

(iv) IR light source

(v) Safety gloves

(vi) Safety masks

(vii) Marking crayon pencils (red and blue)

(viii) Lenses/magnifiers

(ix) Metallic scale

(x) Transparent/celluloid envelopes (various sizes)

(xi) Thin glass sheets

(xii) Gum sticks

(xiii) Marking black, blue and red pens

(xiv) A4 plane white sheets

(xv) Card board box

(xvi) Celluloid sheets

(xvii) Forceps and spatula

(xviii) Plastic tapes

(xix) Staplers

(xx) Cloth lined envelopes of all sizes

(xxi) Clean white clothes

(xxii) Wax sealing material (sealing wax, special seal, lighter, scissors, etc.).

(xxiii) Laptop

15.3 Crime Scene Investigation

Following three basic steps should be taken for effective crime scene investigation:

15.3.1 Protection and Security of a SOC:

The scene of crime should be protected with utmost care and precautions such as cordoning of the area, restrict entry/exit and access to unauthorized persons, disallowing tampering of evidence, photography and videography of the crime scene.

All telephones and mobiles must be taken charge of by team members.

15.3.2 Search for Evidence:

The search team should divide itself into sub-teams and systematically start searching the place from one end to another in each room/open space, etc. Depending upon the nature of a case, three types of evidences may be found at a SOC, namely, documentary evidence, forensic evidence and material evidence.

15.3.3 Documentary Evidence:

(i) Registers carrying details such as money transaction, visitors, personal details of victims, tasks assigned to people connected with the case

(ii) Letter head pads/practiced signatures on newspapers, children's exercise books, etc.

(iii) Phone bills/electric bills/water bills/establishment bills etc.

(iv) Contact diaries/business cards

(v) Business related registers

(vi) Account related registers

(vii) Property documents

(viii) Employment papers

(ix) Identification documents (passport, ration card, voter's card, PAN card, Aadhaar card, I-card etc.)

(x) Educational documents

(xi) Bank documents

(xii) Bank draft booklets, removed pages from booklets

(xiii) Tender documents/supply orders

(xiv) Printed formats of the government stationary, banks, company, etc.

15.3.4 Material Evidence

(i) Instruments used for writing: Pen, ball pen, pencils etc.

(ii) Raw material used for writing: Tracing papers, plain papers etc.

(iii) Computers: Desktop, laptop, palm top, floppies/CDs/pen drives etc.

(iv) Mobiles

(v) Video or still cameras

(vi) CCTV footage

(vii) Photocopiers, printers, scanners, typewriters

(viii) Rubber stamps, seals, inkpads used by accused

15.3.5 Crime Scene Photography (Document Photography)

Aim of document photography:

The main objective of crime scene photography consisting of document photography includes for records, analysis and demonstration purposes. The document photography includes photography under ultraviolet light, infrared light, oblique light, transmitted light and filters to enhance contrast. Trick photography is also used in some cases. The specialized photography is required in case of forgery, writings, signatures, alterations, obliterations, indentations and secret writings, etc. In a similar way, the photographs of disputed writings on wall, mirror, etc., is also required. The writings in which either media (writing ink) is unconventional or substrate (writing surface) is unusual are called unusual writings and should be photographed in the presence of a document expert which are further used by the expert for examination in the laboratory. Some examples of unusual writings are:

(i) Suicide note on palm
(ii) Suicide note on forearm
(iii) Writing on shoe
(iv) Writing on shirt
(v) Writing with blood on wall or floor
(vi) Writing with coal on wall
(vii) Writing on big stone boulders
(viii) Writing with lipstick on mirror/car front/rear glass panels
(ix) Writing on car chassis
(x) Writing on seat cover of vehicle, etc.
(xi) Writing with blood on palm, hand or clothes, etc.

15.4 Procedure for Preservation of Questioned and Standard Documents and Collection of Standard Document for Comparison:

(i) Examine paper quality and printing (if any) of the suspected document. If the same does not appear original, seize it. Examine the text of the document and see that the writings and signatures in it are original or photocopied or scanned or have been obtained through tricks.

(ii) It is possible that some lines or words or even letters are subsequently added, deleted, erased or obliterated from original text changing the meaning/value of the original document considerably. IO must look for such evidence.

(iii) Abnormal size and colour of paper, location of text and signatures, anachronistic features in the document should be carefully examined by IO.

(iv) Any feature suggestive of care and attention, slow and drawn signatures, re -touching, overwriting, presence of hesitations and tremors in signatures should be examined for forged signatures by IO.

(v) Features suggesting transplantation of signatures or signatures obtained by trickery are to be examined in a suspected document.

(vi) Any feature suggestive of carelessness in its production, however, show sign of genuineness.

(vii) If a relevant document show alterations in letters, words, lines, figures changing the value or importance, it should be seized.

(viii) All suspected documents should be photographed /photocopied on, as is where is basis. The questioned documents containing writing/signature/typewriting/stamp impressions etc. should be enclosed with red pencil and marked with blue pencil in 'Q' series (Q1, Q2, Q3 . . .) and sealed in one separate envelope duly labelled with full case details and signed by the investigator.

(ix) Specimen or sample writing should be obtained from the suspect considering the principle of 'Comparison of Like with Like'.

(a) Similar text, writings/figures, signatures should be obtained by dictating on similar type of paper with similar writing instrument, i.e. under similar parameters.

(b) Original disputed document should never be shown to the accused. The specimen writings should be sufficient and suitable for comparison with disputed writing/ signatures.

(c) The specimen documents containing writing/signature/ typewriting/stamp impressions etc. should be encircled and marked with blue pencil in 'S' series (S1, S2, S3 . . .) and sealed in separate envelope duly labelled with full case details. If, IO feels that the accused is disguising the writings/signatures, suspect should be called after 3–4 days to give further samples. He is likely to forget about the nature of disguise that was performed earlier. The specimen writings should be obtained in slow, medium and fast speeds. After the specimen have been obtained, the suspect may be directed to write an endorsement 'Given by me voluntarily' followed by his own signature with date on each of the specimen sheet. All the specimen writings, thus taken, should be referred for examination. In case of old persons their age/health conditions may also be specified.

(d) The rubber stamp/metallic seal impressions should be obtained with uniform pressure under proper attestation. If sample rubber stamp is damaged/ defective, contemporaneous impressions should be procured.

(e) The suspect should be made comfortable as far as possible for normal writings.

(x) Specimens of typewriting, computer printouts and printed matter should be obtained carefully. Any correction/rectification or repair work in the printers, etc., should be noted. Sufficient number of specimens should be obtained in such cases.

(xi) The admittedly genuine writings/signatures should be obtained from official records of contemporaneous documents duly proved under section 47 IEA, These documents should contain as far as possible similar pattern of signatures, text, letters, words, figures and combinations as appearing in disputed documents. Such writings are available in banks, government records, police records, business establishments and from friends and relatives, etc. The admittedly genuine or contemporaneous documents may be encircled and marked with blue pencil in 'A' series (A1, A2, A3 . . .) and sealed separately in an envelope duly labelled with full case details.

(xii) Personal diary, children's exercise books should be collected for practiced forgery. Newspapers and their cuttings may also be collected from crime scene and sealed in separate envelope as admittedly genuine writings/signatures for proving simulated forgery in some cases. Forgers generally use these materials for practice.

(xiii) In case of mechanically printed or duplicate documents, the suspect device itself should be submitted. If it is not possible to submit the device, at least 20–30 standard samples according to the questioned document along with entire range of alphabets, numerals and special characters should be obtained and sent for examination. If the suspected device has a number of settings, standards of comparable text of each setting be obtained and sent to laboratory.

(xiv) Rubber stamps, writing instruments, inkpots, carbon paper, etc., if found at crime scene should be sealed separately in envelope with full case details.

(xv) Each type of exhibit should be separately packed, sealed and labelled indicating the serial number of the items. The sealed envelopes may bear signatures and specific seal of the forwarding officer so that any tampering is immediately detected as it will also mutilate or destroy the seal. The metallic seal so used should be kept in the safe custody of the officer concerned. Sample seal impressions in a clean lined cloth or coarse paper should be obtained and sent separately along with forwarding letter for verification/tallying at CFSLs/FSLs. The requisition letter may contain Annexures–I,

II, III and IV as list of questioned writings/signatures, specimen writings/signatures, admittedly genuine writings and questionnaire.

(xvi) Original documents should be submitted to the FSLs/CFSLs. Photocopies or scanned copies are not suitable for scientific examination as they do not show all details of the original documents.

(xvii) The wax sealed parcel containing exhibits should be sent to the Forensic Science Laboratory preferably through special messenger or alternatively by insured parcel.

(xviii) The forwarding letter should be signed by the Presiding Officer of a court or by a Gazetted Officer duly appointed Inquiry Officer.

(xix) Lamination of document should not be done. Alternatively the documents may be kept in plastic covers.

15.4.1 Marking of Documents

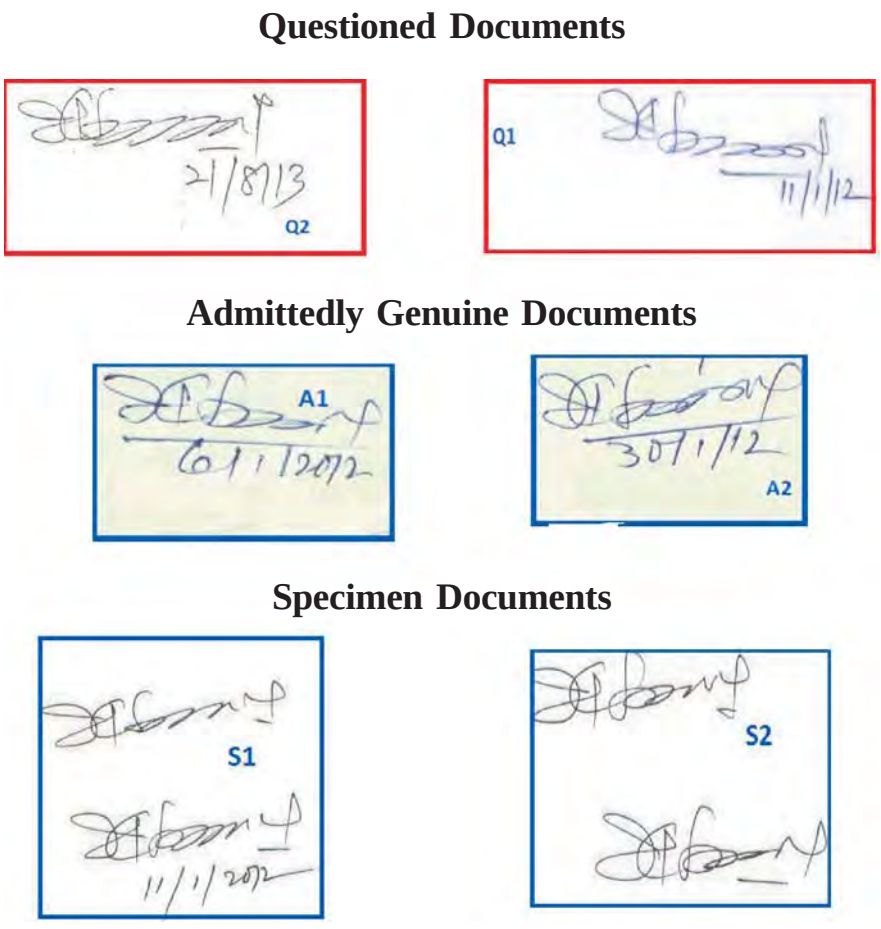


Figure 15.1: Marking of documents

15.4.2 Questionnaire for Genuine Signatures: Some of the Sample Queries

(i) Whether or not the disputed signatures marked Q1 and Q2 are written by the person who wrote the specimen signatures marked S1 and S2 and admittedly genuine signatures marked A1 and A2.

(ii) Whether Q1 and/or Q2 are transplanted signatures.

(iii) Any other observation relevant to the case may also be pointed.

Note: *Specific queries would depend upon the nature of crime and exhibit seized.*

15.4.3 Forgery

Forgeries in signatures can be classified into the following four general categories:

(i) Simple Forgery: Where signatures of fictitious person/non existing person are written by the forger in his own style of writing. There is no physical or mental model of the signature before the forger. These are freely written signatures with no signs of imitation. The forger can always be identified in such cases.

(ii) Forgery by Tracing: Where genuine signature is used as model for tracing purpose. There are evidence of outlines, indentations, hesitations and retouching in signatures. In such cases, the forger cannot be identified as tracing is drawing and does not reflect writing habits of the forger.

(iii) Simulated or Copied Forgery: In this type of forgery, accused person practice a number of times by looking at the model signature and copying the model. The authorship of such signatures can be fixed in some cases depending upon extent of imitation and disguise by the forger and presence of individual writing features of the forger in the forgery.

(iv) Forgery by Trickery or by Using Built-up Documents: Where the genuine signature is normally used and is either transplanted using photocopier, scanner and colour laser printer or lifting the genuine signature written over revenue stamp or addition of a text over genuine signature altering the meaning, value or importance of the document considerably, the signatures are normally genuine. Intersection of signature and writing/typewriting also reveal the sequence of strokes indicating which one (out of the two) was written first and thereby determining genuineness or otherwise nature of the document.

The transplanted signatures obtained by using photocopier, scanner and colour laser printer can be identified by conducting spot tests i.e. there will be no indentation marks on the

reverse of the document, no penetration of ink or pressure marks can be expected in the paper, when viewed in strong light at different angles show presence of toner and normally the ink (toner) is not soluble in water. The ink signatures can always be differentiated from computer generated and printed signatures by microscopic examination.

Samples of Forged Signatures

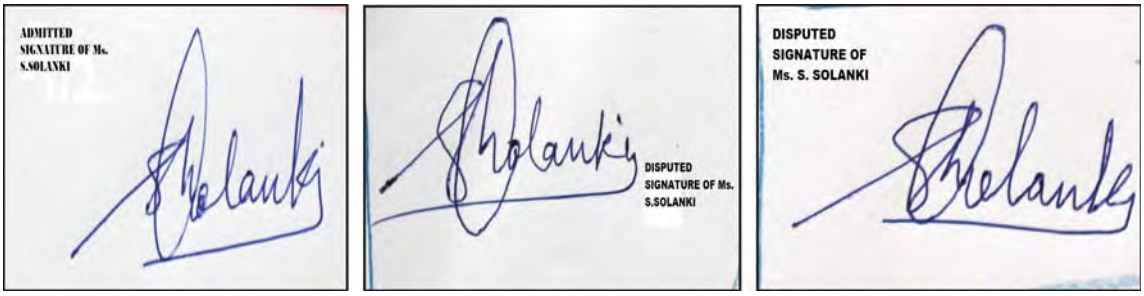


Figure 15.2: A case of simulated forgery-obtained by copying admitted signature of Ms. S. Solanki

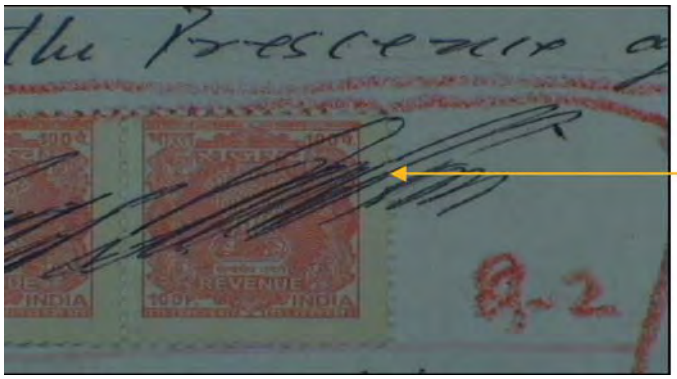


Figure 15.3: Forgery by lifting two revenue stamps from some genuine document and re-fixing them on the fraudulent document

Source: FSL, NCT, Delhi

15.4.4 Questionnaire: Some of the Sample Queries:

(i) Whether or not the disputed signatures marked Q1 is written by the person who wrote the specimen signatures marked S1 to S10 and admittedly genuine signatures marked A1 to A8.

(ii) If not, whether the writer of signatures marked S11 to S20 or S21 to S32 also wrote the disputed signature marked Q1.

(iii) Whether Q1 is a transplanted signature.

(iv) Whether the signature marked Q1 is written with the same ink as that of the body writings.

(v) Whether the signatures were done prior to writing (or printing) of the document or after the document was written (or printed).

(vi) Any other observation relevant to the case may also be pointed out.

Note: *Specific queries would depend upon the nature of crime and exhibit seized.*

Do's and Don'ts

Do's	Don'ts
Check the quality of paper and printing in a disputed document.	Do not ignore the inferior quality of paper of important documents.
Look for abnormalities in text of the documents.	Do not ignore alterations in documents.
Make the suspect comfortable while obtaining sample writings.	Do not threaten the accused at the time of furnishing specimens.
Follow the principle of comparison of 'Like with Like', for obtaining specimen writings/typewriting/stamp impressions.	Do not procure specimen writings casually and don't show the disputed documents to the accused.
The specimen writings should be written in normal conditions.	Do not send disguised writings as standards for comparison with normal writings.
The writings/signatures should be properly encircled by coloured pencils and marked at appropriate places.	Do not mark the relevant portions of disputed document abruptly. Do not mark with pen/ballpoint pen.
Every document at crime scene may be useful in investigation which should be collected.	Even the blank document should not be discarded. It may contain secret writings or indentation marks useful for investigation.

15.4.5 Basic Equipment for Examination of Genuine or Forged Writing/ Signatures:



Figure 15.4: Stereo zoom microscope

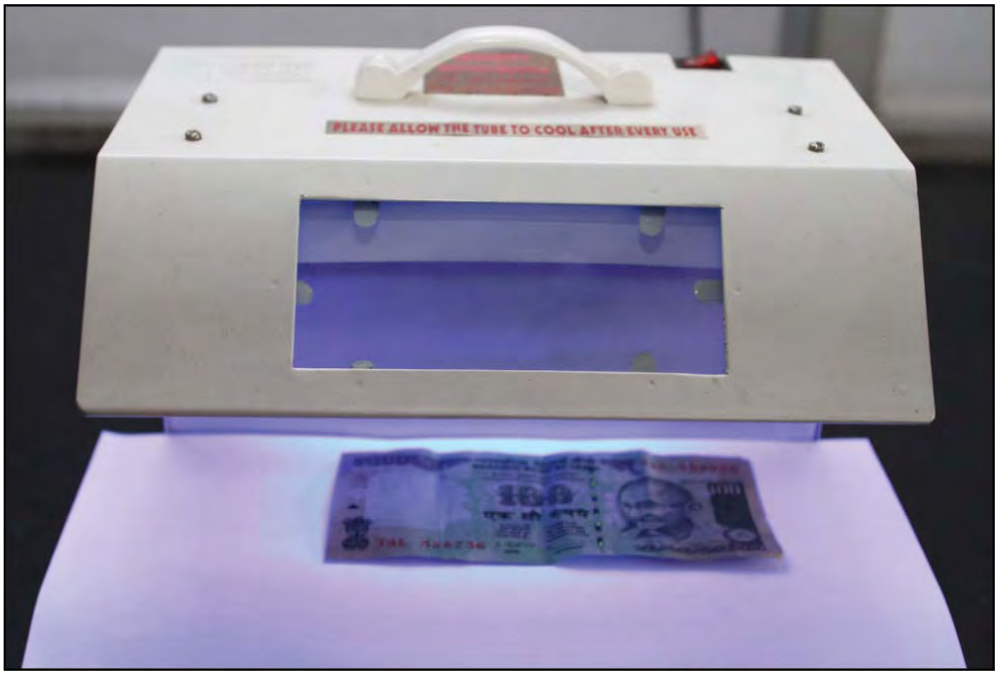


Figure 15.5: UV lamp



Figure 15.6: Leica stereo zoom microscope

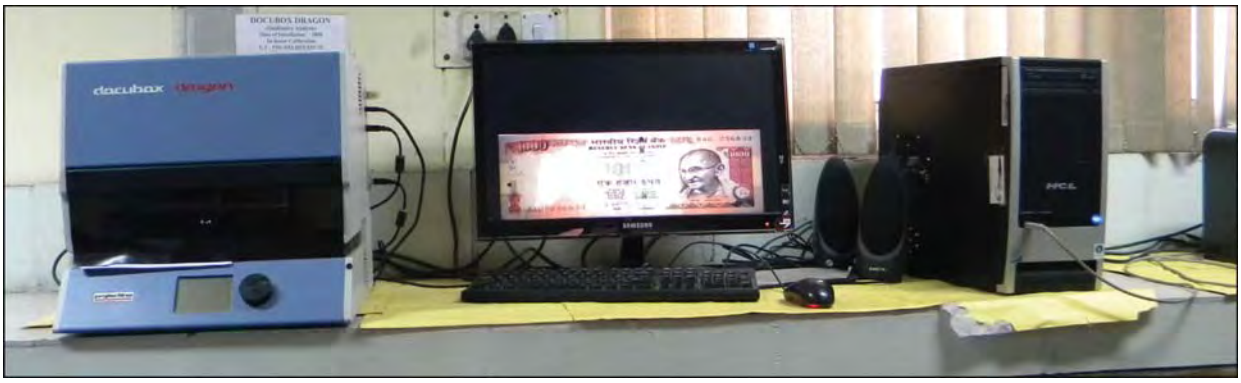


Figure 15.7: Docubox

Source: FSL, Delhi

15.4.6 Wax Sealing of Documents:

A metallic seal of the department, a gas stove or burner, lac sticks (wax), are essentially required for sealing of cloth-lined or inside laminated envelopes containing exhibits. The sealing should be neat, clean and tamper-proof. A sample seal should be sent separately, preferably on a white cloth.

15.5 Seizure List:

The seizure list and memo must be prepared on the spot itself in the presence of two independent witnesses. The witnesses should sign the lists and memos giving their full details including temporary and permanent addresses in their own handwriting, signature and date.

15.6 End of Search

Before announcing the formal termination of a search operation the officer-in-charge must ensure that;

(i) Every potential witness is safely escorted to a police station with an officer deputed for the task.

(ii) All evidence collected at a SOC are properly packed, sealed and marked.

(iii) All memos are duly filled in and all other formalities in respect of procedures mandated by the law are completed.

15.7 Scrutiny of Evidence Collected from the SOC:

A thorough evaluation of the evidence collected from a SOC provides highly relevant and useful information for the purpose of investigation including crucial information about:

15.7.1 Accused

(i) Identity of accused (photo, genuine documentary record, testimony)

(ii) Information and/or details about other members (photo, genuine documentary record, testimony).

15.7.2 Crime

(i) Items and/or description of items used for commission of crime (documents, instruments, etc.).

(ii) Nature of exploitation (record, testimony).

(iii) Modus operandi.

15.8 Confiscation of Proceeds of Crime:

(i) Any financial crime is committed for generating illegal and illegitimate money. A part of it is utilized to create other legal and/or illegal businesses/commercial establishment.

(ii) It is therefore, necessary to confiscate the proceeds of crime.

(iii) The IO should track the proceeds of crimes with required documentary evidence establishing clear links with the assets owned by a member.

15.9 Submission of Charge Sheet/Complaint

Depending on the nature of a case, a charge sheet/complaint should be filed at the end of investigation. A legal review of the charge sheet or complaint should be obtained from the concerned public prosecutor before filing.

A complaint should include details about all the offences made out in a case including the ones under IPC, and must only be filed after securing authority from a competent authority as identified or appointed under the relevant Act.

15.10 Case Studies:

Case Study 1	
Mr X was unhappy because his elder sister and his mother had obtained grant of probate in respect of a will in which Mr X's father had apparently left his entire estate to his sister and Mr X's wife. Mr X alleged that the will had been forged and/or it had not been properly executed and so his father had died intestate, i.e. without making a will. Mr X succeeded in respect of both allegations because evidences were available that the will was signed after his father's death. We sent the will	and other documents bearing deceased's signatures to a forensic handwriting expert. The expert produced a report confirming that, in her view, the will had indeed been forged. Eventually, because of this evidence, Mr X's mother and his sister accepted that the will was invalid and a court order was obtained that Mr X's father had died without any will and so Mr X was entitled to share in his father's estate.

Source: https.//www.kingslaynaply.co.uk

2. Poyais, the Bogus Nation

Case Study 2	
A Scottish adventurer, Gregor McGregor, perpetrated an almost unbelievable swindle in the early 1800s. The British Naval Officer, who could boast participation in some legitimate battle, turned up in London in 1817 claiming that he had been appointed the leader of a new Central American Nation, 'Poyais'.	He even published an entire book detailing Poyais. The people were eager to invest and some even exchanged their money for Poyais dollars and planned to settle in the new nation. There was just one problem: the country of Poyais did not exist. Two ships of settlers left Britain for Poyais in the early 1820s, and found nothing but jungle.

Source: http.//Theoddmentemporium tumbir.com

References

1. Albert S. Osborn, *Questioned Documents*, 2nd edn., Delhi,1998.

2. Ordway Hilton, *Scientific Examination of Questioned Document*, New York, 1982.

3. Wilson R. Harrison, *Suspect Documents: Their Scientific Examination*, Delhi, rpt, 2001.

4. Ellen David: *Questioned Documents*: *Scientific Examination, Taylor & Francis*, Washington, 1991.

5. Jan Seaman Kelly & Brian S. Lindblom, *Scientific Examination of Questioned Document*, 2nd edn., Taylor & Francis Group, London, 2006.

6. R.E. Jacobson, S.F. Rar, G.G. Attridge, N.R. Oxford, *The Manual of Photography*: *Photography and Digital Imaging*, 9th edn., 2000.

7. Roy A. Huber & A.M. Headrick, *Handwriting Identification: Facts and Fundamentals*, Washington D.C., 2000.

8. Ron N. Morris, *Forensic Handwriting Identification: Fundamental Concepts and Principles*, Academic Press, London, 2000.

9. Katherine M. Koppenhaver, CDE, *Forensic Document Examination: Principles and Practise*, New Jersey, 2007.

10. B.R. Sharma, Forensic Science in Criminal Investigation and Trials, 4th edn., New Delhi, 2005.

16 SECURITY DOCUMENTS

Currency and passport/visa are the most important security documents that a country issues to its citizens. Other important and valuable security documents include educational documents, property documents, postal documents, employment related documents, bank documents, etc. Counterfeiting of bank notes and use of forged travel documents are most common crimes related to illegal immigration, work permits, fire arms, terrorism, drug trafficking, prostitution, etc. Similarly, other security documents like identity cards, judicial/ non-judicial stamp papers, postal and bank documents are also very frequently forged.

Security documents, including Indian passport and visa, are printed in India Security Press (ISP), Nasik and other security documents in Security Printing Press, Hyderabad. Indian bank notes are printed at Currency Note Press (CNP), Nasik; Bank Note Press (BNP), Dewas; New Note Presses under Bharatiya Reserve Bank Note Mudran Private Limited (BRBNMPL) at Salboni and Mysore. The security paper is manufactured at Security Paper Mill (SPM), Hoshangabad.

16.1 Applicable IPC Sections:

In case of counterfeiting of currency, sections 489 (A–E) I.P.C are applicable. Currency also includes foreign currency.

1. Section 489 B in Indian Penal Code:

Whoever sells to, or buys or receives from, any other person, or otherwise traffics in or uses as genuine, any forged or counterfeit currency-note or bank-note, knowing or having reason to believe the same to be forged or counterfeit, shall be punished with imprisonment for life, or with imprisonment of either description for a term which may extend to ten years, and shall also be liable to fine.

For fake passports and other security documents, usual sections of IPC are applicable.

2. As many as 2349 cases were reported, with 37.8 per cent conviction in cases relating to counterfeiting during 2013. There have been 1203 cases of counterfeiting in 2013 as per National Crime Records Bureau (NCRB) report booked under Sections 489 A-E IPC.

3. Relevant para from 'THE GAZETTE OF INDIA REGD.NO. D.L.- 33004/99 dated 27TH SEPT. 2013**'** (Part–II-Section 3-Sub Section(i)).

Investigation of High Quality Counterfeit Indian Currency Offences Rule

I. Short title and commencement:

(a) These rules may be called the Investigation of High Quality Counterfeit Indian Currency Offences Rules 2013**.**

(b) They shall come into force on the date of their publication in the official Gazette.

II. Notification of forensic authority: For the purpose of section 15, the following shall be authorized or notified forensic authorities, namely:

III.

(a) Laboratories under the Bhartiya Reserve Bank Note Mudran Private Limited or Security Printing and Minting Corporation of India Limited.

(b) Forensic Laboratories under the Government of India and the State Governments.

(c) Any other establishments having necessary facilities and trained personnel so notified by the Central Government from time to time.

IV. Procedure for applying the provisions of sub-clause (iiia) of clause (a) of sub-section (1) of section 15 read with section 16: -

(a) When a case has been registered upon seizure of currency suspected to be high quality counterfeit Indian currency, the Investigating Officer shall forthwith send the seized currency or sample thereof to the authorized or notified forensic authority and the said authority shall forward a preliminary report, as to whether the seized currency is 'high quality counterfeit Indian currency' or not within 15 days of receipt of such samples.

(b) The IO shall forward the seized currency by the quickest means to the notified forensic authority, *not* later than 48 hrs. of the seizure, and the notified forensic authority shall communicate the results of the examination to the requisitioning officer by the quickest possible means including an e-mail or facsimilie:

Provided that the preliminary report may not contain a detailed forensic report but may restrict itself to the question of whether the key security features as specified in the III Schedule to the Act have been imitated or compromised in the seized counterfeit currency and the complete report for the purposes of prosecution shall be provided before completion of the investigation:

Provided that the procedure referred to in sub-rule 1 shall not preclude the continuation of investigation under any other law for the time being in force.

V. As per clause 6.4(h) whether the high quality counterfeit Indian currency is mixed with genuine currency in currency chests, Automated Teller Machines.

16.2 Crime Scene Investigation (CSI)

Relevant legal provisions for search should be followed for CSI. The IO should conduct CSI at each such location to collect complete evidence.

A SOC can be investigated in more than one ways—depending on the circumstances of a case. However, the following basic guidelines for CSI should always be followed.

16.2.1 Basic Guidelines for CSI

(i) Defining control boundaries of a SOC for protecting and securing it.

(ii) Preserving a SOC with minimum possible contamination and disturbance of any physical evidence.

(iii) Safety and security of all persons in and around a SOC.

(iv) Limiting the number of persons accessing a SOC and recording their movement.

(v) Controlling, identifying, verifying and removing persons from a SOC after proper recording of their details (name, address, etc., preferably in their own handwriting, signature and date).

16.2.2 Pre-Search Planning and Preparation to Examine Scene of Offence:

Make a clear assessment about the place where search is to be conducted for collection of physical evidence. It may be closed or open places.

16.3 Basic Integrated Kit Meant for Forged Document May be Used (refer to Chapter 15; para 15.2 for details)

16.4 General Guidelines for Carrying out Search at Scene of Crime

(i) Collection of all possible, relevant and authentic information required for making assessment about the planning and preparation for search.

(ii) Assessment of all available information for planning and preparing for the correct timing of search.

16.4.1 Constituting Following Teams Required for Handling the Crime Scene:

(i) Outer cordon

(ii) Inner cordon

(iii) Search and seizure

(iv) Handling of witness

(v) Handling of suspects/accused

16.4.2 Role of Team Members:

(i) Search should be led by a senior police officer.

(ii) Role of an informant/source/identifier/decoy must be clearly identified for an operation.

(iii) The roles and responsibilities of police and non-police personnel must be clearly defined.

16.4.3 Briefing Team Members

Members of a search team, including police and non-police personnel, should be briefed on the following points:

(i) The purpose of search.

(ii) The contours of the plan of action.

(iii) The role and responsibilities of teams and individuals.

16.4.4 Protection and Security of a SOC

The scene of crime should be protected with utmost care and precautions such as cordoning of the area, restrict entry/exit and access to unauthorized persons, disallowing tempering of evidence, photography and videography of the crime scene.

All telephones and mobiles must be taken in charge by team members.

16.4.5 Search for Evidence

The search team should divide itself into sub-teams and systematically start searching the place from one end to another in each room/open space. Depending upon the nature of a case, three types of evidence may be found at a SOC, namely–documentary evidence, forensic evidence and material evidence.

1. Documentary Evidence

(i) Registers carrying details such as money transaction, visitors, personal details of victims and suspect, tasks assigned to people connected with the case.

(ii) Phone bills/electric bills /water bills/establishment bills.

(iii) Contact diaries/business cards

(iv) Business related registers

(v) Account related registers

(vi) Employment papers

(vii) Identification documents

(viii) Educational documents

(ix) Bank documents

(x) List of past records/registers of bank/financial documents

(xi) Bank notes

(xii) Passports

(xiii) Visa stickers

(xiv) Airline tickets, identity cards, boarding cards

(xv) Judicial and non-judicial stamp papers of different denominations

(xvi) Aadhaar card/voter identification card

(xvii) Vehicle registration certificate and driving license

(xviii) Plastic cards: credit cards, debit cards, smart cards, etc.

2. Material Evidence

(i) Instruments used for work

(ii) Raw material used for work

(iii) Computers: desktop, laptop, palm top, floppies/CDs/pen drives

(iv) RAM for volatile memory

(v) Mobile phones

(vi) Video or still cameras

(vii) CCTV footage

(viii) Colour photocopiers

(ix) Scanners

(x) Colour printers (inkjet/laser jet)

(xi) Memory stored in photocopiers, colour printers, scanners and fax machines

(xii) Rubber stamps, seals and inkpads

(xiii) Printing inks

(xiv) Bundles of paper

(xv) Cutting and packaging material

(xvi) Adhesives

16.5 Procedure for Collection/Preservation of Security Documents

All security documents should be collected and preserved carefully using water-proof celluloid or cloth-lined envelopes. Packaging and forwarding of all Questioned Security Documents is similar to other routine documents referred for examination to Forensic Science Laboratory.

Note: *All questioned Security Documents may be marked with 'X' or 'Y' series with blue pencil and should not be encircled.*

16.6 Suspected Counterfeit Currency/ Bank Notes (FICN):

For Field Officers: Checking Genuine/Counterfeit Indian Bank Notes

I. Genuine Security Document: All the security features are present in a Genuine Security Document.

II. Counterfeit/Fake Security Document: Even if a single security feature is absent or improper in a security document, then it is a counterfeit/fake security document.

Security Features of Genuine Bank Notes

i. The paper quality should be checked for its GSM and thickness. The ordinary paper gives fluorescence in UV light whereas genuine bank notes have UV dead paper.

ii. Feel of the paper-crackling sound.

iii. Presence/absence of all water marks: Three, 3-dimensional water marks upto Rs. 500 and four, 3-dimensional water marks in Rs.1,000 bank notes. Presence/absence of dual coloured security fibers giving fluorescence may be checked.

iv. Security thread and printing on it-6 segments (Rs. 50 and onwards and 5 segments in below Rs.50 denominations) seen in front with RBI in English.

v. See-through effect. By holding the bank note against light, the denomination can be seen in the left side above brail mark which otherwise looks as normal pattern of design and Bharat in Hindi printed on it. When held against light, a continuous thread is seen.

vi. Presence of brail mark for different denominations above Ashoka Emblem.

vii. Optical Variable Feature in the middle of front side of bank note of Rs.500 and 1000 denominations. The green colour changes on tilting of note.

viii. Latent image of the denomination can be seen by holding the banknote at eye level in the front right side of coloured panel. This is due to Intaglio printing.

ix. Microprinting of denomination and RBI printed on front right side near printed portrait of Mahatma Gandhi..

x. UV printing of series and serial number, middle portion in the front side of bank note, Omron features and year of printing on back side etc. are required to be examined. RBI features may also be referred.

xi. Presence/absence of Optical Variable Ink (OVI)-Figures of denomination in the central area change its colour from green to grey when tilted in Rs. 500 and Rs.1000 denomination.

xii. Latent image of denominations-can be seen when front green panel at right hand side is held parallel to your eye or grazing angle.

xiii. Presence/absence of UV features-security thread, security fibres, number panel, middle portions of bank notes are UV fluorescent whereas paper itself is UV dead.

xiv. Intaglio printing in the middle of the obverse side.

xv. See-through effect is seen in the denomination in the left portion of bank notes.

xvi. Alphabets I, J, O, X, Y and Z are never allotted as series number.

Genuine Bank Note



High Quality Counterfeit Bank Note



Printing on security thread absent

Figure 16.1: Sample of Genuine and Counterfeit Indian Bank Notes (Rs.1000)

Examples of Genuine and Counterfeit Indian Bank Notes (Rs.500)

Genuine Bank Note



High Quality Counterfeit Bank Note



Printing on security thread absent

Figure 16.2: Sample of genuine and counterfeit Indian bank notes (Rs.500)

Genuine Bank Note



Counterfeit Bank Note



Figure 16.3: Sample of genuine and counterfeit Indian bank notes (Rs.100)



Figure 16.4: Genuine Indian Bank Notes Courtesy: RBI



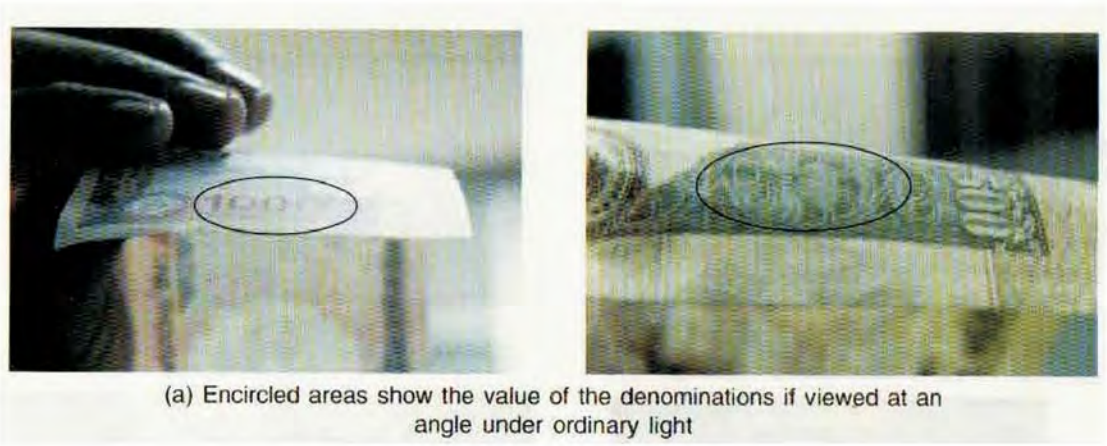
UV Dull paper | Fluorescent security thread | Optical fibres

Counterfeit Bank Note



UV Fluorescent paper | UV dull security thread | Fake marks, looking like fibres introduced by fluorescent ink pen

Figure 16.5: UV features in bank notes



(a) Encircled areas show the value of the denominations if viewed at an angle under ordinary light

Deciphering Hidden Watermarks



Deciphered watermarks such as portrait of Mahatma Gandhi, hidden water marks 'RBI', Denomination '1000' and '1K'

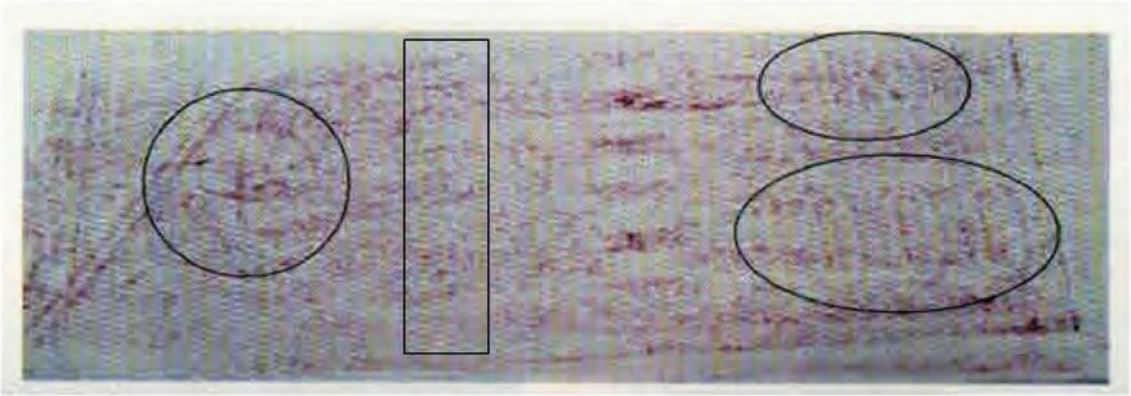


Figure 16.6: Latent image of denomination

Courtesy: A K Bapuly

Security Features of New 500 Rupee MG Series Bank Note

Note:

(i) For detailed examination of counterfeit currency, CNP Nashik or BNP Dewas/RBI/ forensic laboratories under the Government of India and the state governments may be referred.

(ii) These security features are not permanent but are changed from time to time as per RBI/Ministry of Finance Directions.

(iii) All foreign currencies suspected to have been counterfeited should be sent to the respective embassies/high commissions/consulates for verification.

Some of the equipments used for examination of security documents



Figure 16.7: UV Lamp for Observing Fluorescence in Security Documents



Figure 16.8: Stereo Zoom Microscope

Questionnaire: Some of the sample queries:

1. Whether the questioned bank note is genuine or counterfeit.
2. If the questioned bank note is counterfeit, what is the methodology of producing it?
3. Whether there are any alterations in the series and serial number of bank notes.
4. Whether the given bank notes are assembled and consist of portions of different genuine bank notes.

Note:

(i) Specific queries would depend upon nature of the crime and exhibit seized.

(ii) IO should monitor that the preliminary report for all high denomination counterfeit bank notes (Rs.100, 500 and 1000) are verified for their fake nature by CNP Nashik, BNP, Dewas or state/central FSLs within 15 days.

16.7 Forged Passport

Indian passports can be classified into three main categories:

A. Diplomatic
B. Official
C. General Citizen Passports.

In addition, Jumbo and Hajj passports are also issued.



Figure 16.9: Indian Passports

The following are different types of Travel Documents:

(i) Machine Readable Passport (MRP): Ordinary Passport of 36 pages (dark blue cover).

(ii) Machine Readable Passport (MRP): Jumbo Ordinary Passport of 64 pages (dark blue cover).

(iii) Machine Readable Passport (MRP): Official Passport (off white cover).

Machine Readable Passport (MRP): Diplomatic Passport (maroon cover).

(iv) Machine Readable Passport (MRP): Indo-Bangladesh Passport (light blue cover).

(v) Person of Indian Origin (PIO): Booklets (grey cover).

(vi) Overseas Citizenship of India (OCI): Booklets (sky blue cover).

(vii) Emergency Passport (white cover).

(viii) Indo-China Trade Travel Passport (saffron cover).

(ix) Certificate of Competency for shipping department (14 varieties).

(x) Continuous Discharge Certificates for shipping Department.

(xi) E-Passports.

Security features of Indian Passports:

(i) Substrate: Ashok Pillar cylinder water marks.

(ii) Cover page: Ashok Chakra printing (visible in 365 nm).

(iii) First page-body printing: Black in visible light and green in Luminescence.

(iv) Heat Activated Ultra Violet (HAUV) film: Printing visible in red and yellow in UV.

(v) Data page: Micro line, text, tint, design (Emblem, Govt. of India), Passport printing, rainbow printing: Blue and orange printing, gothic numbering, bifluorescencent invisible design, invisible fibers (green and blue).

(vi) Page numbering: Micro lines on all pages visa visible and invisible.

(vii) Passport number: 8 digit alphanumeric laser perforated conicals of passport booklet.

16.7.1 Forgery in Passport

I. Data-Pages: **In case there is change in the data/cover pages.**

***Actionable steps to be taken by police*:**

1. Thorough interrogation of ticket issuing agent (travel agent) including sub-agent should be done by the police.
2. Thorough interrogation of the air staff who issued boarding card, duty manager of airline staff should be interrogated.
3. Real passport holder be interrogated, otherwise his/her LOC be opened.
4. Family members of the person holding the passport should also be interrogated.
5. Police Custody Remand of the person holding the passport must be obtained.
6. A passport having genuine data-page with genuine stamps and visa but not in use by the genuine holder of the passport.

II. Photo Substitute: In this case the original photo of the passport holder is replaced

***Action to be taken by police*:**

1. Same process is to be followed as in the case of bio-data.
2. Actual identity of the passport holder who is using the fake passport is to be established.

III. Impersonation: **In this case no forgery exists in travel document. Some passport holder uses passport, identity card, green card, resident permit of other person.**

***Action to be taken by police*:**

1. Police need to interrogate the real holder of the passport, in establishing facts, whether he lost his passport or sold his travel documents to the present bearer.

IV. Forged Immigration Stamp: **This is done in order to get entry in countries abroad.**

***Action to be taken by police*:**

1. The forged stamp can be verified through specimen of stamp in records of immigration at the airport.
2. To establish the fact to whom the passport holder handed over his/her passport.Arrival/ departure to be confirmed through immigration records.

V. Managed Stamp: **- It is different from forged stamp. In this case the genuine stamp is affixed on passport, but there is no record of Arrival/Departure of the passport holder in immigration.**

***Action to be taken by police*:**

1. Verifications need to be done from flight records from the airlines.
2. It is generally seen when there is only one arrival stamp in passport (in this case passport is issued from abroad).
3. Here travel agent plays an important role, whether the ticket is issued in India or return ticket (issued from abroad).
4. Managed stamp is generally seen when fax arrived after overstaying abroad. Fax arrived without knowledge of immigration. After that he could manage arrival stamp so that he can obtain another fresh visa from the embassy.

VI. Re-stitching of Passport or Changes of Pages in Passport: **This case is generally seen when the passport holder tries to conceal material facts, e.g. some remarks passed in the passport.**

***Action to be taken by police*:**

1. Generally such cases are detected on arrival and pax must be thoroughly interrogated.

VII. No Departure Stamp: **In these cases, only arrival is registered; there is no departure stamp in passport of the holder. This indicates, that the passport holder left India in the name of some other person on forged document and later on obtained his/her own passport either by poster carrying at the time of departure. Passports are generally blank, i.e. no visa and departure stamp in this case.**

***Actionable steps to be taken by police*: -**

1. Whether passport is issued before departure or later on.
2. Efforts to be made to confirm departure.
3. Identification of the agent who arranged journey.
4. Section 419 & 420 IPC must be added as burden of proof on passport holder to prove his/her departure as genuine.

VIII. Obtaining Passport by Fradulent Means: **Sometimes the passport holder obtains a passport from some other place where he is not residing. In this case more than one passport is in possession with the person. This is generally done by carrier. In this case there is no forgery in passport.**

***Action to be taken by police*:**

1. Local enquiry of the passport holder.
2. Photocopy of all the papers including passport to be obtained from the concerned R.P.O.
3. In case the passport holder has more than one passport, it should be seized.
4. LOC may be opened.
5. Verification is required in case the person holding the passport issued it from abroad while living in India. The arrival stamp as well as the ticket is to be deeply verified.

(Carrier–a person whose own document is genuine but facilitates other person's forged document).

IX. Obtaining Passport of Other Nationality: **In this case person of other nationality obtained Indian passport,e.g. Sri Lankan, Nepali, Tibetan, Afghan national.**

Action to be taken by police:

1. Joint interrogation.
2. Letter to their concerned embassy about the arrest.
3. Arrest report of foreigner to Ministry of Home Affairs (MHA).
4. After disposal of the case, the person holding the passport must be deported back to their respective country.
5. Role of C.I.D officer.

E-Passport



Figure 16.10: Diplomatic e-Passport

E- Passports have symbols as shown in Figure 16.10 with 32 kb chip.

16.8 Indian Visa

Security features of visa stickers:

(i) Use of Optical Brightening Agent (OBA) free paper.

(ii) Rainbow and Guilloche pattern printing.

(iii) Presence of hexagonal shaped planchettes and invisible fibres (blue and red).

(iv) Chemical sensitive paper.

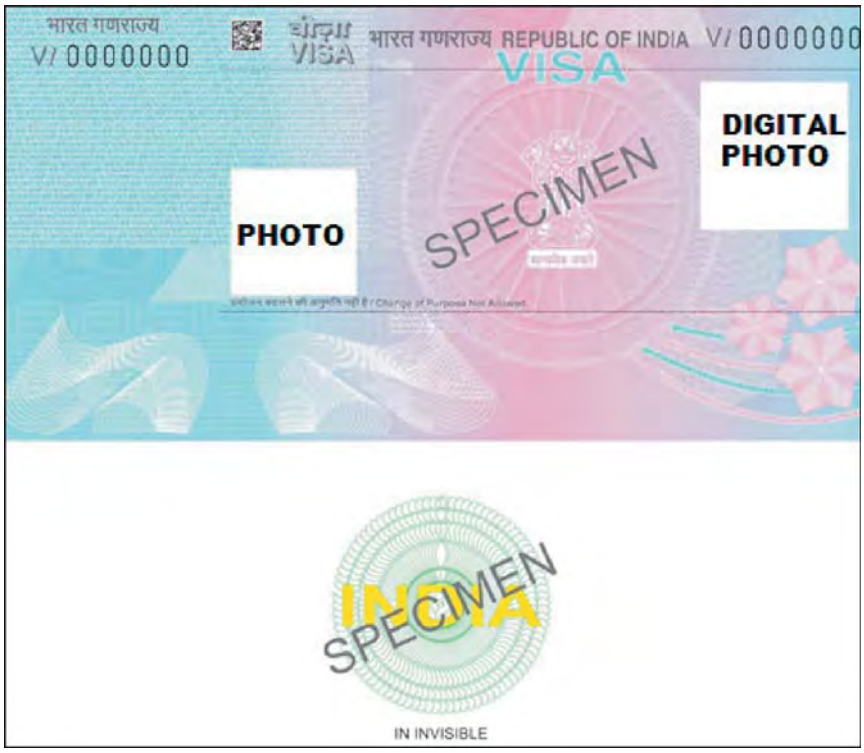
(v) Ashok Chakra in the background and Ashoka Pillar in the centre.

(vi) Micro lettering of visa in bilingual.

(vii) 2-D barcoding of ISP and date of printing.

(viii) Printing with UV fluorescent ink.

Indian Visa



I. Forged Visa: **Passport holder is having genuine passport but forged visa in passport.**

***Action to be taken by police*:**

1. Thorough interrogation with the ticket issuing agency to know the name of the agent.
2. Role of airline's staff who issued boarding card along with the Duty Manager on that day of airline.
3. Visa is to be identified by the embassy.
4. Thorough interrogation with the family members of the passport holder.

II. Chemical Wash Visa: **In this case, visa is issued from the embassy to some other person. With the use of chemical, visa is washed and name, date of birth, passport number is changed.**

***Action to be taken by police*:**

1. Verification from the embassy by getting all the papers of visa application form.
2. Visa can be checked by smelling it.
3. Visa can be checked under UV light source for fluorescence.
4. Interrogation with genuine visa holder.

III. Stolen Visa: Generally blank visa is stolen from the embassy without issuing to anyone. The visa carries all security features.

***Action to be taken by police*:**

1. Visa is to be verified from the embassy.
2. Interrogation with the airline staff.
3. Interrogation with the ticket issuing agency.

IV. Obtaining Visa from Abroad without Travelling to Abroad: It is an offence as the passport cannot be sent abroad by post.

***Action to be taken by police*:**

1. Person is to be identified who arranged the journey.

V. Obtaining Visa from Embassy by Fradulent Means : - In this case visa is genuine but travel agent arranges the visa by submitting managed/forged document of the passport holder like bank account, property paper, salary, etc.

VI. Change of Boarding Card

In such case, a person has domestic ticket and obtains a boarding card. Another person possesses an international ticket and thus has an international boarding card. After immigration clearance, they both exchange their boarding card in transit hall, e.g. sometimes in aircraft, if flight is going to Delhi-Bombay-London. Pax possessing international boarding card will drop at Bombay and domestic Pax will drop at London. The airline has full knowledge in this case.

VII. Material Evidence at SOC

(i) The buckram material used for stiffening of the cover of the booklet, gold foils, booklet size paper, computer, scanner and colour laser/inkjet printers should be searched and seized.

(ii) Rubber stamps, ink pad and physical photograph should be searched and sealed. Pen drive/storage media having digital photographs should also be searched.

(iii) Heat activated UV film, laser plate and passport laminator should also be searched and sealed.

(iv) Cutters, packing materials and envelopes should be searched and sealed separately.

(v) Logo, embossing stamps, stitching threads, guilloches, etc., if found at crime scene should be sealed and preserved.

(vi) Numbering machine and security fibre may also be searched and sealed.

(vii) Look for mechanical or laser perforation machines and seize them, if found.

(viii) The metallic plate having criss-cross lines and Ashoka Emblem embossed in it may be seized. This is used to create corresponding impressions on HAUV film during lamination.

Note**:**

The above security features are not permanent but are changed from time to time as per Ministry of External Affairs (*MEA*) *directions. The updates can be obtained from MEA/ISP* (*in case of passports*) *and CNP/BNP/ RBI* (*in case of Indian bank notes*).

Note:

(i) For detail examination of fake passports/visa and other security documents, ISP Nashik/MEA may be referred.

(ii) All foreign passports/visa suspected to have been forged should be sent to the respective embassies/high commissions/consulates for verification.

Questionnaire: Some of the sample queries:

1. Whether the passport is original or fraudulently prepared.
2. If it is fraudulent, what features have been tampered with? This information would be useful to the IO for linking with the crime, modus operandi, etc., for detailed investigation.
3. Whether any alterations have been done in the visa and data page of the passport and in visa sticker.

Note: *Specific queries would depend upon the nature of the crime and exhibit seized.*

16.9 Judicial/Non-Judicial Stamp Papers:

1. The quality of UV inactive paper, windowed security UV fluorescent thread and cylinder mould water marks of Mahatma Gandhi in the stamp paper may be checked. Absence of these features will indicate fake document which should be seized.

2. Presence of dual coloured security fibers (red-yellow and blue-green).

3. The base paper of Judicial/Non-Judicial stamp paper is sensitive to 14 different types of commonly known ink-eradicators. Application of any one of such ink-eradicator on paper will immediately detect alterations in these security documents.

4. Quality of printing (Rainbow and Guilloche pattern), presence of serial number, micro perforation of high value and name of the state for which such non-judicial stamp papers are being used should be verified and checked. The denomination of stamp papers should be checked for any alterations.

5. Symbol for year of printing may be seen.

6. Look for mechanical/laser perforation machines and seize, if found in higher denominations.

16.9.1 Fake Judicial/Non-Judicial Stamp Papers:

1. The quality of UV inactive paper, windowed security UV fluorescent thread and cylinder mould water marks of Mahatma Gandhi in the stamp paper may be checked. Absence of any of these features indicates its counterfeit nature.

2. Absence of dual coloured security fibres (red-yellow and blue-green).

3. Chemically non-sensitive to ink-eradicates.

4. Absence of printing (Rainbow and Guilloche pattern), absent or duplicate serial number, absence of micro perforation of high value.

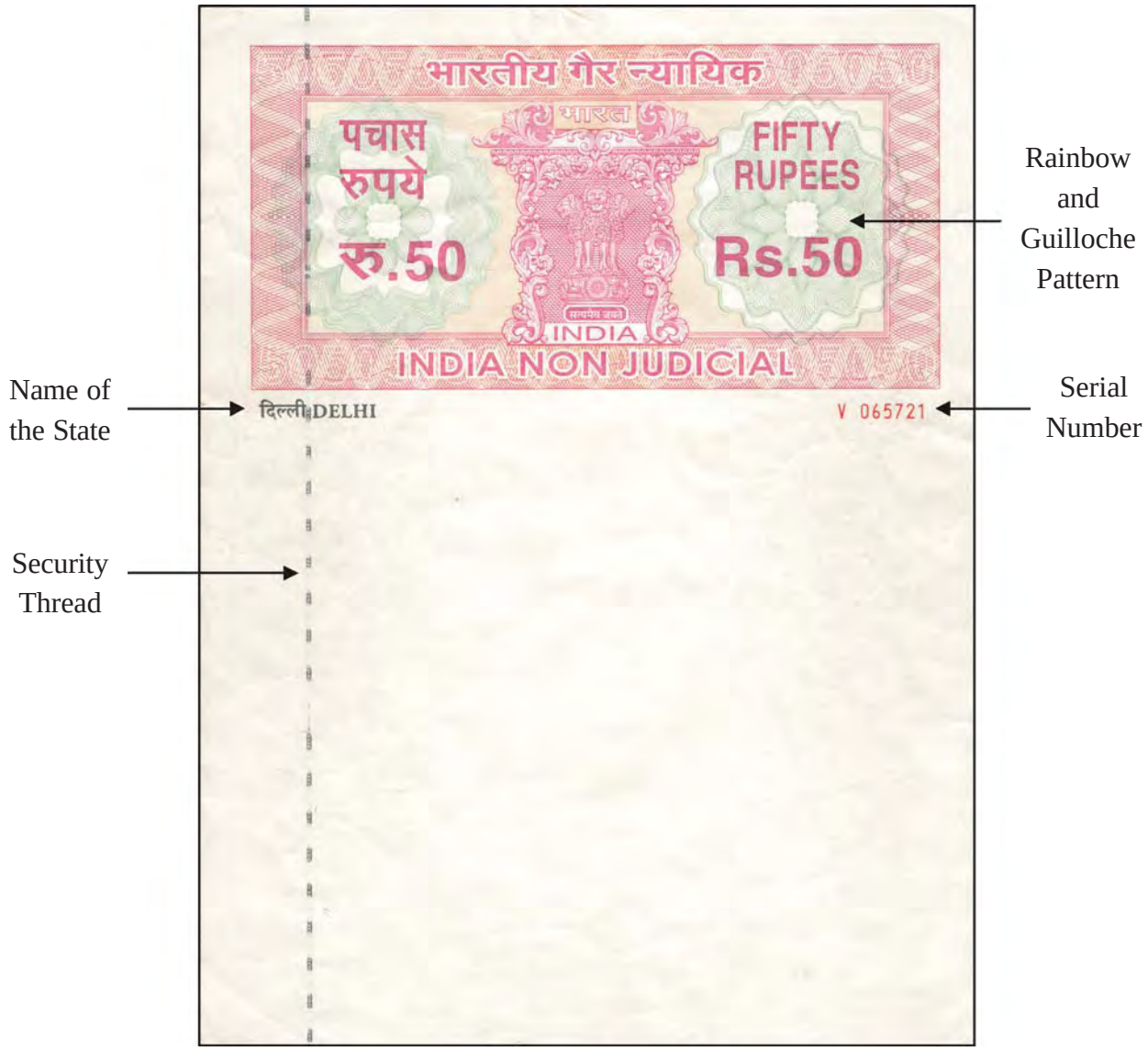


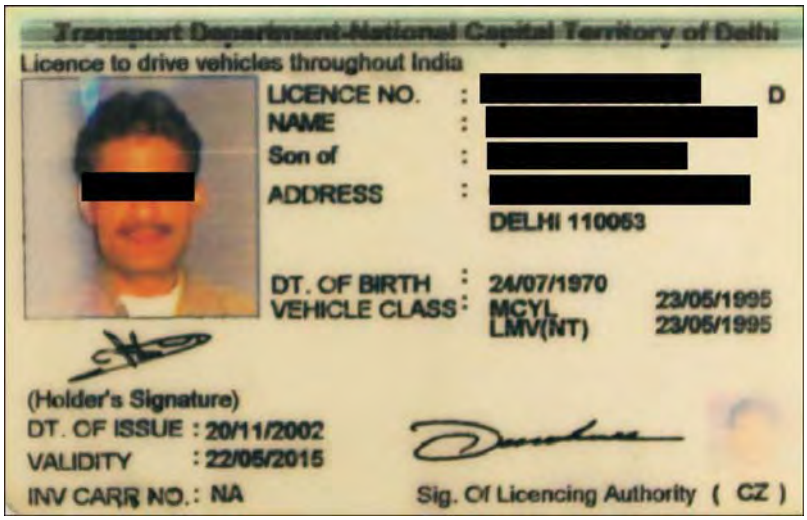
Figure 16.11: Genuine non-judicial stamp paper

Questionnaire: Some of the sample queries

1. Whether the non judicial stamp paper is genuine or fake.
2. Whether there are any alterations in the non judicial stamp paper.
3. What type of printing process has been used?

Note: *Specific queries would depend upon the nature of the crime and exhibit seized.*

16.10 Driving License



16.12: Driving license card

Security Features of Driving License

(a) Each card is the size and shape of a standard credit card but is more flexible and has a somewhat different texture.

(b) On the front of the card, a virtual image of a loon appears to float above or sink below the surface of the card as the viewing angle changes.

(c) A digital image of the cardholder is fused with heat into the card plastic. Fine line printing over the image reveals tampering attempts. The image always appears on the left.

(d) A holographic state seal that appears on the front of the card is visible only under ultraviolet flight.

(e) If the cardholder is under 18, the date of 18th birthday appears in red.

(f) The new cards have a rainbow print pattern.

Questionnaire: Some of the sample queries

1. Whether the questioned security document is genuine or fake.
2. Whether there are any alterations in the questioned security document.

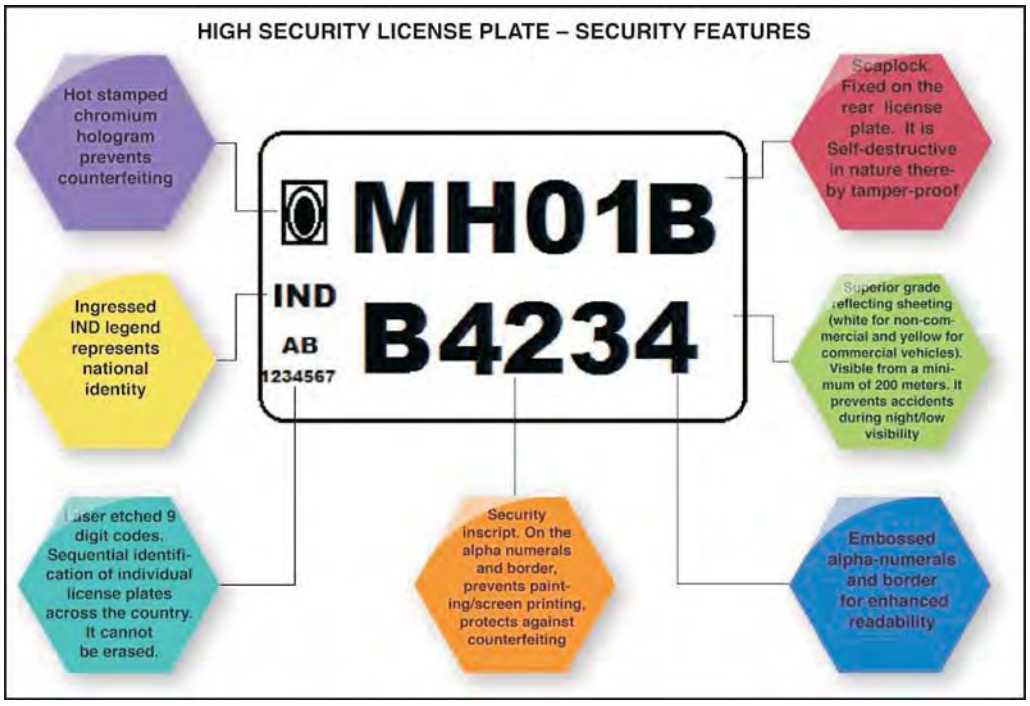
Note: *Specific queries would depend upon the nature of the crime and exhibit seized.*

16.11 Registration Certificate



1. The vehicle can be driven or allowed to be driven in public place only after registration by the registering authority under the provision of section 39 of the Motor Vehicles Act 1988.
2. Since September 2001, Delhi and Maharashtra have instituted new cards known as 'Registration Certificate (RC) Books' for all existing and new motor vehicles.
3. The 'RC Book' vehicle registration document is a multi-technology, advanced card incorporating optical media with a data capacity of 1MB and a 4KB IC chip. The optical media digitally stores the vehicle owner's portrait, demographics and fingerprint image plus scanned images of certification and taxation documents, etc. This information cannot be erased or altered.

16.11.1 High Security License Plate



16.13: High security license plate: Security Features

Questionnaire: Some of the sample queries

1. Whether the questioned security document is genuine or forged. If so, what features have been tampered with?
2. Whether there are any alterations in the questioned security document.
3. Whether there is any physical tampering of data in the security document.
4. Whether the chip, if any has been tampered with or replaced.

Note: *Specific queries would depend upon the nature of the crime and exhibit seized.*

16.12 Plastic Cards-Master Cards



Figure 16.14: Master card

Courtesy: Master Card

Security Features on a Credit Card (Master Card)

(a) Account numbers begin with figure '5'.

(b) The pre-printed Bank Identification Number (BIN) must match the first four digits of the embossed account number.

(c) The valid date lists the last day on which the card is valid.

(d) Master Cards have a stylized 'MC' security character embossed on the right of the valid dates.

(e) The back side of the card must bear signatures.

(f) A three dimensional hologram of interlocking globes should reflect light and seem to change as you rotate the card.

(g) The magnetic stripe on the back of the card should appear smooth and straight with no signs of tampering.

(h) The word 'Master Card' is printed repeatedly in multi-colours when viewed at an angle on a tamper-evident signature panel.

Note :

(i) The visa card number starts with figure '4' and American Express Card with '37'.

(ii) The visa and Master Cards have a total of 16 figures whereas American Express card has 15 figures.

Questionnaire:

A. Some of the sample queries for the Issuing Bank/Card Provider:

1. Whether the given credit/debit card is original or fabricated/cloned.
2. If so, provide the information about the original card holder along with transaction/ location of the card used for the relevant period.

B. Some of the sample queries for the Forensic Science Laboratory:

1. Whether the signature on the signature panel of the card belongs to the card holder or not.
2. Whether there are any alterations in the given security document.

Note: *Specific queries would depend upon the nature of the crime and exhibit seized.*

16.13 ATM Card

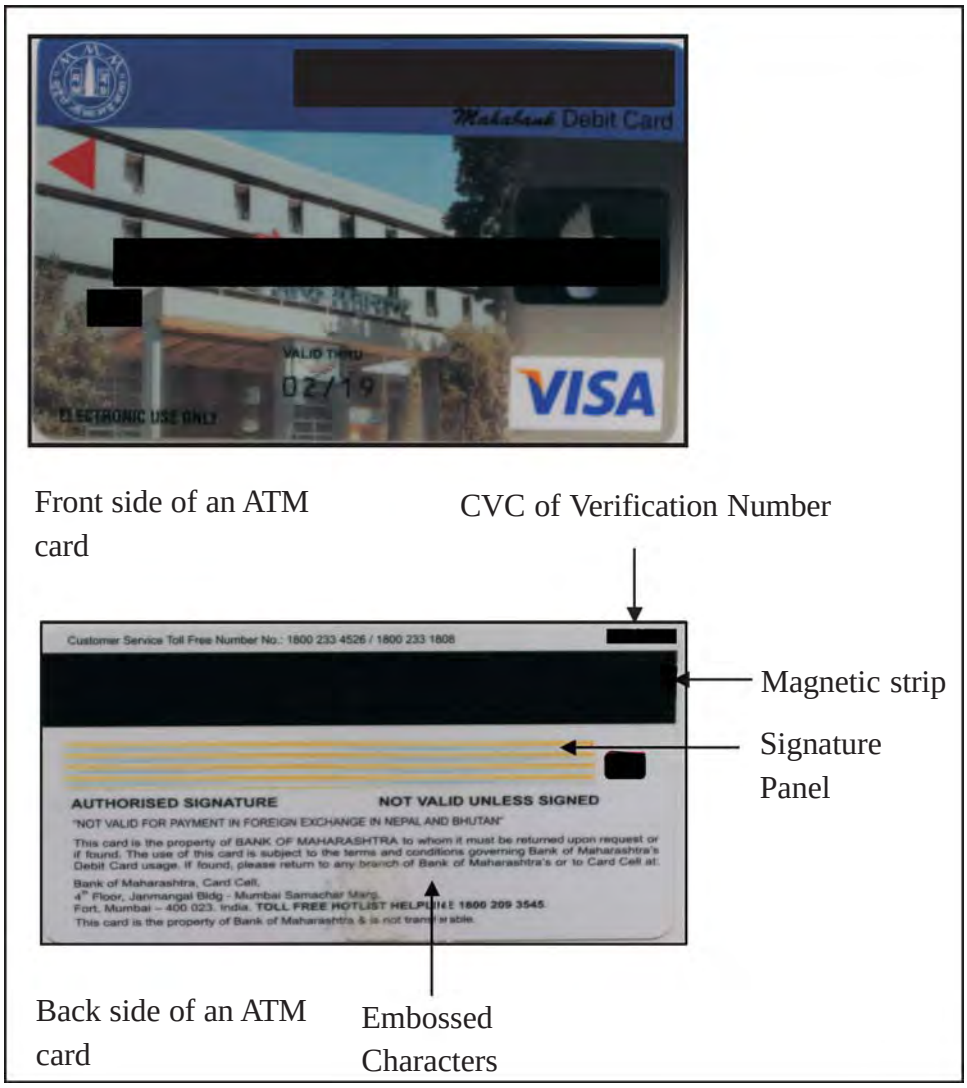


Figure 16.15: Sample of an ATM card

Security Features of ATM Cards:

(a) Card Design: The actual design of the card is upto the card issuer. It may have features like flexibility, flammability, toxicity. It can be as unusual as they like.

(b) Chip: The microchip present in a debit or credit card provides highly secure processing capabilities. This includes verification that the correct PIN has been used. The personal data, i.e. cardholder's name, card number and expiry date as found on the magnetic stripe, provides additional security features to safeguard against counterfeiting. The four digit PIN (Personal Identification Number**)** are not held as a set of numbers on the chip.

(c) Card Number: Generally 16 digits (but can be upto 19 on certain cards) – this identifies the account, with the first six digits comprising what is known as the BIN (Bank Identification Number) and this identifies your card issuer and the card scheme.

(d) Card Scheme Logo: This indicates which of the card scheme will be applicable for clearing payments and that which retailers will accept your card.

(e) Hologram: An additional security feature to identify that the card is genuine.

(f) Expiry Date: The card number and the card's expiry date are essential for processing card payment.

(g) Name: The cardholder's name is displayed at the bottom of the card.

(h) Magnetic Stripe: The magnetic stripe holds some of the same information as the chip.

(i) Card Security Code (CSC): This three digit number on the signature panel gives the retailer indications that you actually have the physical card in your possession. In case of an American Express Card, this code will be four digits on the front of the card.

16.14 Identity Card

The design and security features of I-cards of different organizations vary considerably. There is no standard format of I-cards like passport and visa.

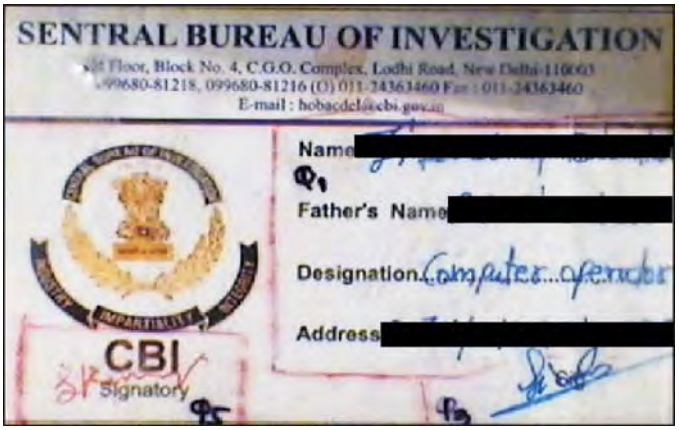


Figure 16.16: Sample of a fake card

Source : FSL, Delhi.

16.15 Aadhaar Card

(a) It has 12 digit unique number.

(b) Biometric feature consisting of thumb impression, photograph and iris.

Questionnaire: Some of the sample queries for UIDAI in cases of impersonation/misuse:

1. Whether the given document/Aadhaar card belongs to the user or not.
2. If not, who is the original allottee of this Aadhaar number?
3. Details of the bank account/other utility account linked with this Aadhaar card may be provided.

Note: *Specific queries would depend upon the nature of the crime and exhibit seized.*

16.16 Handling of Security Documents

After seizure of the security documents, they must be handled with care without disturbing their original condition.

I. Photography or photocopying of the security documents should be done to know their physical condition at the time of seizure.
II. They must be kept in celluloid envelopes and preserved properly.
III. The series and serial numbers of the security documents should be noted before wax sealing in a proper envelope.

16.17 Do's and Don'ts

Do's	Don'ts
Check the quality of paper and printing in a disputed document.	Do not ignore the inferior quality of paper of bank notes/travel documents.
Look for abnormality in printing, text of the security documents and micro printing.	Do not ignore inferior printing and security features and inks in security documents.
Buckram substrate and gold foil stamping in passports be checked.	The qualities are generally inferior and should not be ignored.
Look for any alterations in data pages.	Do not ignore tampering of data and visa pages.
Verify if HAUV film has been properly laminated and printing in it is transferred to the data sheet below.	Any irregular or missing UV printing over photograph & data page may indicate a fraudulent passport.
Micro printing of page number in vertical and horizontal lines and UV page number in visa pages are to be seen carefully.	Absence of micro printing and UV page numbers will indicate change of visa pages in Indian passports.
Look for the UV features and printed image in an Indian visa.	Absence of UV features indicate fake visa.
Examine if the thread, serial number and state name are indicated in the non-judicial stamp papers.	Absence of these features indicates fraudulent nature of the present judicial, non-judicial stamp papers.

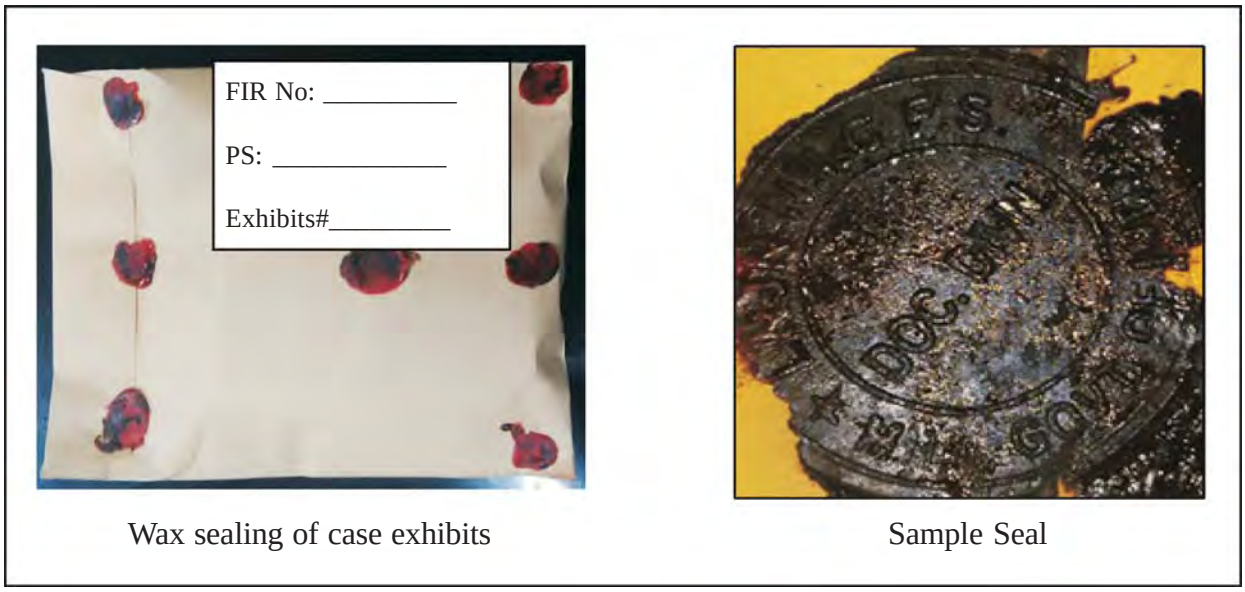
16.18 Seizure List

I. The seizure list and memo must be prepared on the spot itself in the presence of two independent witnesses.

II. The witnesses should sign (with date) the lists and memos giving their full details including temporary and permanent addresses in their own handwriting.

16.19 Sealing of Security Documents

All security documents should be wax sealed in a cloth lined or celluloid envelope using special metallic seal of the officer concerned. The metallic seal sample impressions should also be sent in a clean wet cloth or coarse paper separately to the laboratory.



Wax sealing of case exhibits

Sample Seal

Figure 16.17: Seals impressions

16.20 End of Search

Before announcing formal termination of a search operation, the officer-in-charge must ensure that:

I. Every potential witness is safely escorted to a police station with an officer deputed for the task.

II. All evidence collected at a SOC is properly packed, sealed and marked.

III. All memos are duly filled in and all other formalities in respect of procedures mandated by the law are completed.

16.21 Scrutiny of Evidence Collected from SOC

A thorough evaluation of the evidence collected from a SOC provides highly relevant and useful information for the purpose of investigation including crucial information about:

16.21.1 Accused

I. Identity of accused (photo, documentary record, testimony).

II. Information and/or details about other members (photo, documentary record, testimony).

16.21.2 Crime

I. Items and/or description of items used for commission of crime (documents, instruments, etc.).

II. Nature of exploitation (record, testimony).

III. Modus operandi.

16.22 Plan of Investigation

A thorough scrutiny of the evidence collected from a SOC provides highly relevant and useful information for the purpose of investigation including crucial information about:

I. The process of re-construction of a scene of crime.

II. Developing understanding about the sequence of events.

III. Collection of relevant evidence in a systematic manner.

16.23 Submission of Charge Sheet/Complaint

Depending on the nature of offences, either a charge sheet or a complaint should be filed at the end. A legal review of the charge sheet or complaint should be obtained from the concerned public prosecutor.

The IO must adhere to the timeline stipulated in CrPC for investigation and submit a charge sheet against an absconder only after completion of the entire process of proclamation by a court. A complaint should include details about all the offences made out in a case including the ones under IPC, and must only be filed after securing authority from a competent authority as identified or appointed under the relevant Act.

16.24 Case Studies on Passports and Visa

Case Study 1

New Delhi: The stolen passports and the possibility of a passenger or some passengers using fake passports on the missing Malaysian airlines MH370 had triggered an alarm all over the world. Security and intelligence agencies fear that the flight may have been hijacked or bombed by the terrorists. No trace of the plane after days has increased the fear across the globe.

Two passengers on the flight MH370 were found travelling on stolen passports as confirmed by the Malaysian officials. The passengers — travelling with Italian and Austrian passports that had been stolen in Thailand—purchased their plane tickets at the same time, and were both booked on the same onward flight from Beijing to Europe on Saturday.

Source: www.ibnlive.in.com

Case Study 2

New Delhi: Air India plane from Dubai crashed at Mangalore airport on 22 May, 2010 with the loss of 158 lives; as many as 10 fraudulent passports were recovered.

Local media had reported that two 'dead' passengers were actually found alive in a village in neighbouring Kerala. Later, it was revealed that their identities were stolen to create fake passports.

Source: Indiankanoon.org

Case Study 3

Case related to use of fake passport and Visa stickers : Gujarat High Court Dhiren Shivabhai Patel vs State Of Gujarat on 30 June 2006

JUDGMENT A.L. Dave, J.

The applicant is facing charges for offences punishable under Sections 417, 420, 465, 467, 468, 471 and 120-B of the Indian Penal Code. The allegations against the applicant are that several passport and visa stamps (stickers) were seized from the room occupied by the applicant in the hotel, at Rajkot. Out of the seizure, the visa stickers were found to be counterfeit or spurious. Even from the office of the applicant, seven passports and one bogus visa sticker have been seized. During investigation, it was found that Dinesh alias Shetty Patel produced two bags which, according to him, were given to him by the applicant. Those bags contained several passports, leaving certificates, visa stickers, etc. One of the bags also contained a receipt issued by Ahmedabad Municipal Corporation in the name of the applicant, which, prima facie, can be considered to be sufficient to connect the bags with the applicant. In short, the applicant's involvement is, prima facie, found in a serious offence.

Source: Indiankanoon.org

Case Study 4

Case related to forged non-judicial stamp paper and signatures thereon.
Delhi High Court
Prahlad vs State on 19 December, 2013
The FSL report clearly establishes that the documents prepared by the accused are forged one and signatures of the Sub-Registrar was also found to be forged and fake. As per the information provided by the Treasury Officer, Delhi Treasury to EOW, the non-judicial stamp papers which were used for forging the sale deeds of the complainant's property were also found to be fake..The applicant is one of the signatories and has witnessed the agreement to sell the complainant's property through forgery and fabrication of documents dated 12 July 2011, executed between the accused Gurmeet Singh, Narender Pal Singh and Pritpal Singh for a value of Rs. 5,50,00,000 and Rs. 1,00,00,000 were received by the accused persons as advance money.

Source: Indiankanoon.org

Case Study 5

New Delhi: Most IT professional in India aspire for US jobs and dollar salaries. However, working in the US requires one to clear the stringent visa requirements, one of which is to find an employer first, who is ready to take your case to the US Consulate.
However, finding an employer in the United States who is willing to hire an individual Indian IT worker and get into the legal work of obtaining a work permit for him is not an easy task. So, there are numerous visa agents and consultants in India that help these H1B visa seekers get the work permit/H1B visa through fraudulent means.
Once these fake employers get an H1B visa with a work permit, he/she will give you a NOC saying you can work with any other employer. Your job of landing up in the US with a work permit is done as promised by the agent.

Source: www.ibnlive.in.com

References

1. *Covert and Overt Protection for Valuable Documents*, *ISSA*, November 2006.
2. http://www.immihelp.com/visa-waiver-program/passport-requirements.html
3. Hilton Ordway, *Scientific Examination of Questioned Document*, *Elsevier*, New York, 1982.
4. Harrison R. Wilson,*Suspect Documents: Their Scientific Examination*, Delhi, rpr.,2001.

5. Davin Ellen, *Questioned Documents: Scientific Examination*, Washington, 1991.

6. Kelly Seaman Jan & Lindblom S Brian: *Scientific Examination of Questioned Document*, London, 2006.

7. Jacobson E.R., Rar F.S., Attridge G.G., N.R.Oxford, *The Manual of Photography*: *Photography and Digital Imaging*, 9th edn, London, 2000.

8. K.A. Bapuly, *Forensic Science: Its Application in Crime Investigation*, 1st edn., Hyderabad, 2006.

9. Huber A. Roy & Headrick M.A., *Handwriting Identification: Facts and Fundamentals*, Washington D.C., 2000.

10. Morris N. Ron, *Forensic Handwriting Identification: Fundamental Concepts and Principles*, New York, 2001.

11. Koppenhaver M. Katherine, *Forensic Document Examination: Principles and Practise*, New Jersey, 2007.

12. Renesse Van L. Rudolf, *Optical Document Security*, 2nd edn., 1998.

17 TORN DOCUMENTS

Any document which is deliberately made into two or more pieces or fragments by tearing, shredding it apart physically constitutes a torn document. Examination of the torn or serrated edges of paper pieces and comparison with counterparts helps in determining if the torn pieces had once formed the same sheet of paper or not.



Torn document can be expected in cases of leaking of competitive examination papers, intentionally destroying the important document, etc., for excluding the evidence, viz., anonymous/ransom letters, suicide notes etc.

Ancient manuscripts may be damaged due to poor storage conditions, loss of moisture content, mishandling or documents manually torn to make information unreadable.

17.1 Sections of the IPC

Sections 477 under IPC for tampering the document

Whoever fraudulently or dishonestly, or with intent to cause damage or injury to the public or to any person, cancels, destroys or defaces, or attempts to cancel, destroy or deface, or secretes or attempts to secrete any document which is or purports to be a will, or an authority to adopt a son, or any valuable security, or commits mischief with respect to such document,

shall be punished with [imprisonment for life]*, or with imprisonment of either description for a term which may extend to seven years, and shall also be liable to fine.

* Subs. by Act 26 of 1955, sec. 117 and sch., for "transportation for life" (w.e.f. 1-1-1956)

Section 204 IPC

Destruction of document or electronic record to prevent its production as evidence

Whoever secretes or destroys any document or electronic record which he may be lawfully compelled to produce as evidence in a court of justice, or in any proceeding lawfully held before a public servant, as such, or obliterates or renders illegible the whole or any part of such document or electronic records with the intention of preventing the same from being produced or used as evidence before such court or public servant as aforesaid, or alter, he shall have been lawfully summoned or required to produce the same for that purpose, shall be punished with imprisonment of either description for a term which may extend to two years, or with fine, or with both.

17.2 Crime Scene Investigation (CSI) in Case of Torn Documents

It is a thorough inquiry of the crime by conducting systematic study of various investigative methods. It involves recovery of physical and documentary evidence for the purpose of identifying and arrest of perpetrators for prosecution. It is an integral part of scientific investigation and is a very important step for collection of evidence. The IO should conduct CSI at each such location to collect scientific physical evidence.

A SOC can be investigated in more than one ways depending on the circumstances of a case. However, the following basic guidelines for CSI should always be followed meticulously:

17.2.1 Basic Guidelines for Search at Scene of Crime (SOC)

(i) Defining control boundaries of a SOC for protecting and securing it.

(ii) Preserving a SOC with minimum possible contamination and disturbance of any physical evidence.

(iii) Restricting the number of persons accessing a SOC.

(iv) Controlling, identifying, verifying and removing persons from a SOC after proper and self-attested recording of their name, address, contact numbers, etc.

17.2.2 Pre-search Planning and Preparation to Examine Scene of Crime

Clear assessment of the place where search is to be conducted for collection of physical evidence is utmost necessary. It may be in the form of closed or open spaces.

17.3 Crime Scene Kit

As per basic integrated kit for document related cases (as mentioned in Chapter 15).

17.4 General Guidelines for Carrying out Search at Scene of Crime

(i) Collection of all possible, relevant and authentic information required for making assessment about the planning and preparation for search should include:

- (a) Exact location and accessibility of a SOC
- (b) Modes of communication, transport, CCTVs, private security at a SOC.
- (c) Entry/exit from a SOC, and its nearby place.
- (d) Population and community located in the neighbourhood.

(ii) Assessment of all available information for planning and preparing for the correct timing of search.

17.4.1 Constituting Team Required for Handling the Crime Scene:

(i) Outer cordon

(ii) Inner cordon

(iii) Search and seizure

(iv) Handling of eye-witnesses

(v) Handling of suspects/accused

- (a) Communication network suited for the area
- (b) Forensic teams
- (c) Logistical requirements

17.4.2 Composition of Team Members and their Role

(i) Search should be led by a senior police officer.

(ii) Role of an informant/source/identifier must be clearly identified for an operation.

(iii) The roles and responsibilities of police and non-police personnel must be clearly defined.

(iv) The details including the timing and purpose of search should be informed to the team members only on a need-to-know basis.

(v) The identity of an identifier must be established ascertaining from a genuine identity card such voter ID card/aadhaar card, ration card, driving licence, etc.

17.4.3 Briefing Team Members

Members of a search team, including non-police personnel, should be briefed on following points:

(i) The purpose of search.

(ii) The outlines of the plan of action.

(iii) The role and responsibilities of teams and its members.

(iv) The coordination among various team members.

(v) Maintaining complete secrecy about the operation.

(vi) Maintain confidentiality about the identity of persons involved.

17.4.4 Protection and Security of a SOC

The scene of crime should be protected with utmost care and precautions such as cordoning of the area, restricting entry/exit and access to unauthorized persons, disallowing tampering of evidence, photography and videography of the crime scene.

All telephones and mobiles must be taken charge by team member.

17.4.5 Documentation of the Crime Scene

Location of torn documents found at the scene should be documented by way of sketching and photography at SOC.

17.4.6 Photography of the Crime Scene

The crime scene should be photographed from all corners and centre to cover each and every objects present there. Wide angle photography should be used to cover area whereas close-up photography should be used to capture minute details of objects of evidential value.

17.4.7 Search for Evidence

The search team should be divided into sub-teams which should systematically start searching the place from one end to another in each room/open space as it is expected that the torn

pieces are scattered randomly. Depending upon the nature of a case, three types of evidence may be found at a SOC, namely-

(i) Documentary evidence

(ii) Forensic evidence

(iii) Material evidence

Depending upon the case, following documents may also be searched:

(a) Documentary evidence

(i) Registers carrying details such as money transaction, visitors, personal details of victims, tasks assigned to people connected with the case, etc.

(ii) Letters/memos/confidential correspondence

(iii) Contact diaries/business cards

(iv) Business related registers/documents

(v) Account related registers

(vi) Property documents

(vii) Employment papers

(viii) Identity documents (passport, ration card, voter's card, aadhaar card, etc).

(ix) Educational documents

(x) Bank documents

(xi) Copies of leaked examination paper

(b) Material evidence

(i) Instruments used for work (scissors, knife, blade)

(ii) Shredders

17.4.8 Photography of the Torn Documents

After the crime scene is secured, photography of torned document is required for their location. Each location containing torn pieces should be carefully photographed or video-graphed. An enlarged photograph print (with magnification of 2X) provides the best evidence of matching through the uneven tearing of perforations/serrations.

17.5 Collection, Handling and Packaging of Torn Documents

At the scene of crime, torn documents can be searched in and around the garbage bins; near the working areas such as table, chair, drawers, etc; inside the narrow gaps between two objects; in the collection bin of shredder (paper shredding machine).

(i) In case torn documents are located at the scene of crime then switch-off the fan and carefully pick all the fragments of torn sheets. Gloves should be worn while picking the torn pieces preferably with forceps. Even the blank pieces of paper should also be collected.

(ii) *Marking of torn document*: Each torn/shredded piece of document should be carefully marked in seriatim as $p_1, p_2, p_3 \ldots p_n$.

(iii) The torn pieces should be collected and kept in a dry shallow box made of cardboard or plastic. The box should be properly sealed and then sent to the laboratory for further examination.

(iv) Before keeping the torn pieces in the box, a photograph of all the torn pieces should be taken individually including markings.

(v) To reconstruct the document, each piece may be fixed to a glass or plastic sheet with a tiny speck of adhesive and then another sheet of glass or plastic is kept over it to hold the paper fragments sandwiched and placed between the two sheets.

17.6 Transportation of Torn Documents

All torn pieces should be collected and preserved from the place of occurrence and then transported in a corrugated box or cardboard box.

17.7 Examination of Torn Documents

Paper rarely tears evenly along the perforations. The slight irregularities in tearing may prove that a sheet was torn into pieces from a particular document. Combine approach of document analysis and shape (contours) matching is necessary for solving this type of problem. In this process, orientation of the fragments and content like paper colour, colour of the ink, images and text is analyzed. Matching the serrated edges of paper containing texts and images is very helpful in the reconstruction of torn documents. Reconstruction of torn documents is like solving a puzzle. The wet pieces, if any, are dried, flattened, and then the time-consuming and patient process of document reconstruction is started by matching serrated edges.

A few steps in some designer softwares can create a realistic look of the original paper.

Reconstruction of Shredded Document



Figure 17.1: Shredded documents and shredded pieces of different documents

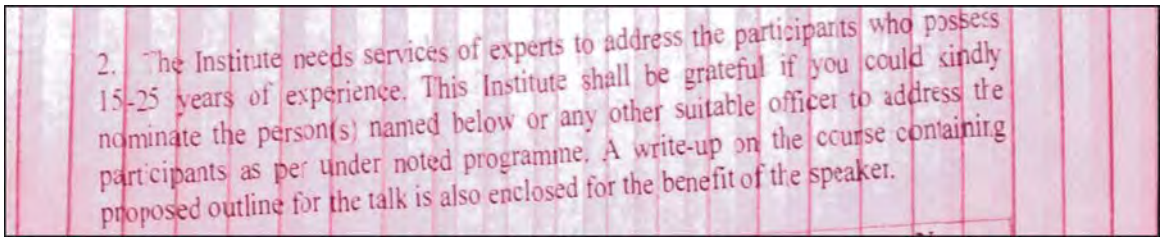


Figure 17.2: Reconstruction of a shredded document into a sheet

17.8 Seizure List

The seizure list and memo must be prepared on the spot itself in the presence of two independent witnesses. The witnesses should sign the lists and memos giving their full details including their temporary and permanent addresses/contact numbers, etc., in their own handwriting including signature and date.

17.9 End of Search

Before announcing formal termination of a search operation, the SHO must ensure that:

(a) Every potential witness is safely escorted to a police station with an officer deputed for the task.

(b) All evidence collected at a SOC is properly packed, sealed and marked.

(c) All memos are duly filled in and all other formalities with respect to procedures mandated by the law are completed.

17.10 Scrutiny of Evidence Collected from SOC

A thorough evaluation of the evidence collected from a SOC provides highly relevant and useful information for the purpose of investigation including crucial information about:

17.10.1 Accused

(i) Identification of accused (photo, documentary record, testimony).

(ii) Information and/or details about other members present at scene of crime (photo, documentary record, testimony).

17.10.2 Crime

(i) Items and/or description of items used for commission of crime (documents, instruments, etc).

(ii) Modus operandi.

(iii) Commercial transaction (record, testimony).

17.11 Plan of Investigation

A plan of investigation greatly facilitates:

(i) The process of re-construction of a scene of crime.

(ii) Developing understanding about the sequence of events.

(iii) Collection of relevant evidence in a systematic manner.

17.12 Submission of Charge Sheet/Complaint

Depending on the offences made out in a case, either a charge sheet or a complaint should be filed at the end of investigation. A legal review of the charge sheet or complaint should be obtained from the concerned Public Prosecutor before submission.

A complaint should include details about all the offences made out in a case, including the ones under IPC, and must only be filed after securing authority from a competent authority as identified or appointed under the relevant law/rules.

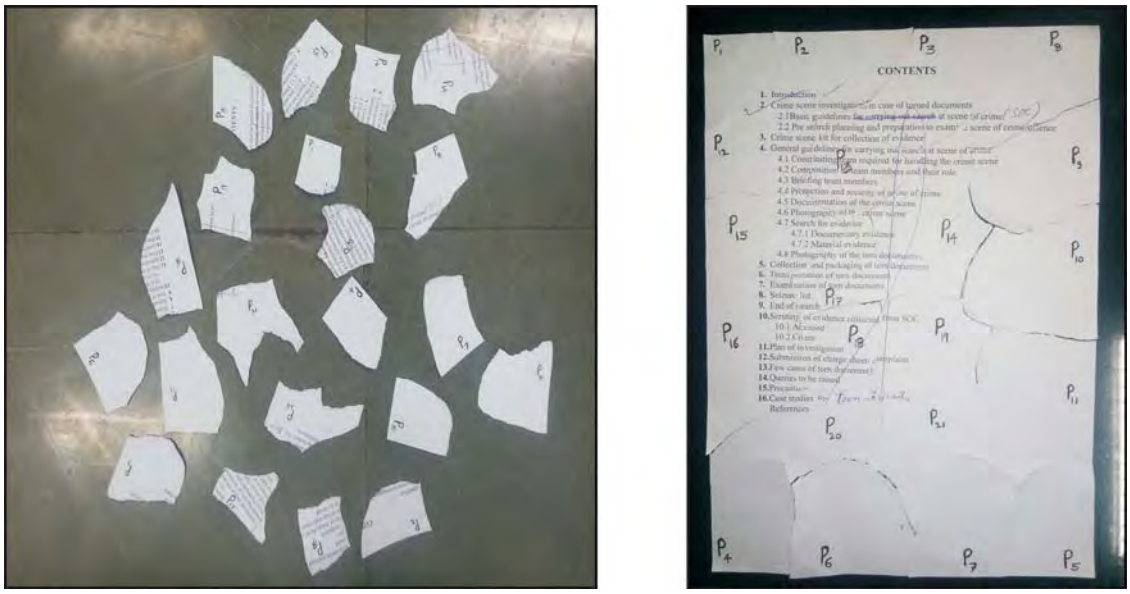


Figure 17.3: Matching the serrated edges of torn pieces of a document marked P1 to P21

17.13 Likely Queries to be raised

Some of the sample queries

(i) Whether the torn pieces marked $P_{1,}$ $P_{2,}$ P_{3} ... P_{n} once constituted same sheet of paper.

(ii) What are the contents of the sheet on both sides of reconstructed paper?

(iii) What is the size of the paper so reconstructed?

(iv) Is the torn paper a security document?

(v) Whether the writings of the torn document marked P_1, P_2 … P_n are written by the person who wrote the specimen writings marked S_1 … S_n.

(vi) Any other observation related to the case.

Note: Specific queries would depend upon the nature of crime and exhibits seized from the crime scene.

17.14 Precautions

(i) Protect the crime scene.

(ii) Don't allow unauthorized persons to enter the crime scene.

(iii) Switch off the fans and close the windows of a place of occurrence in case of closed room/area to avoid dislocation and misplacement of torn pieces.

(iv) As far as possible all pieces should be collected and preserved properly after thorough search.

(v) Missing pieces may contain crucial information. Even blank pieces should be collected.

17.15 Case Studies

Case Study 1	
In one of the competitive examination conducted by a State Public Service Commission, the first page of answer sheet had two portions separated vertically containing details of the candidate appearing for examination. Subsequently, the entire answer sheet was replaced by the same candidate in connivance with officials of the State Public Service Commission. However, the record portion which was lying	with the Controller of Examination could not be replaced by the candidate or his accomplice. On forensic examination, it was found that the serrated edges of the record portion of the first page of first answer sheet did not match with the serrated edges of the remaining portion of the first page of second answer sheet replaced with the connivance of the officials.

Case Study 2	
In one of the State lottery schemes in 1970, there were two claimants for a winning lottery ticket. The serrated edges of the winning lottery ticket and its counterfoil perfectly matched indicating genuineness of the lottery ticket. The serrated edges of other	lottery ticket did not match with the counterfoil indicating its fraudulent nature. The part of rubber stamp impression of the vendor was found to be impressed on the counterfoil as well as on the lottery ticket.

Source: B. R. Sharma, *Forensic Science in Criminal Investigation and Trials*, 4th edn., New Delhi, 1999.

Reconstruction of Torn Document Proved the Undisclosed

Case Study 3	
Delhi High Court S.K. Gupta vs Deputy Commissioner of Income Tax on 28 February, 1998. ORDER J.P. BENGRA, J.M.: This is an appeal by the assesse against the block assessment made under s. 158BC(c) of the IT Act, 1961 determining undisclosed income of the assesse at Rs. 5,62,13,938. The search and seizure operation was conducted against the assesse on 17th Nov., 1995, along with other Aerens group of cases. Notice under s. 158BC dt. 20th May, 1996, was served on the assessee. In compliance of the notice the assesse filed his return for the block period on 14th Aug., 1996, declaring nil income.	However, the AO after scrutinising the seized material, at the inquiry stage of the assessment and after making inquiries, sustained three major additions given as under : (a) 3.80 crores on the basis of loose sheet which was listed at p. 13 of the Annexure A-1. (b) 1,71,53,938 on the basis of torn papers seized by the raiding party from toilet and sewerage line. (c) 10,60,000 on account of gifts received from NRI staying outside India. Unaccounted receipt receivable money to the tune of Rs. 9,50,00,000 .

Source: http://indiankanoon.org/doc/333837/ (date of access 16 February 2015)

References

1. Albet S. Osborn, *Questioned Documents*, 2nd edn., Delhi,1998.
2. Ordway Hilton, *Scientific Examination of Questioned Documents*, New York, 1982.
3. Wilson R. Harrison, *Suspect Documents: Their Scientific Examination*, Delhi, 2001.
4. Ellen David, *Questioned Documents-Scientific Examination*, Washington, 1991.
5. Jan Seaman Kelly & Brian S. Lindblom, *Scientific Examination of Questioned Documents*, Taylor Francis Group, London, 2006.
6. Wilson R. Harrison, *Suspect Documents: Their Scientific Examination*, Delhi, 2001.
7. Roy A. Huber & M.A. Headrick, *Handwriting Identification: Facts and Fundamentals*, Washington, D.C., 2000.
8. Morris N. Ron, *Forensic Handwriting Identification: Fundamental Concepts and Principles*, New York, 2001.
9. Katherine M. Koppenhaver, *CDE, Forensic Document Examination: Principles and Practise*, New Jersey, 2007.
10. B. R. Sharma, *Forensic Science in Criminal Investigation and Trials*, 4th edn., New Delhi, 1999.

18 CHARRED DOCUMENTS

A document that has become blackened and brittle by burning or exposure to excessive heat is classified as charred document. Accidentally burnt documents or those intentionally destroyed are referred to the forensic laboratories for restoration and decipherment of writings on them. Burnt documents being highly fragile do not usually remain in their original shape and get broken into small fragments. Curling is also observed around edges. It is, therefore, necessary that utmost care should be taken in handling, preserving and transporting the charred documents to the forensic laboratories.

Charred document can be expected in cases of accidental fire, intentional fire and arson, insurance and financial matters and leaking of examination papers, etc.



Figure 18.1: A case of arson–Burning of important bank documents

18.1 Crime Scene Investigation in Case of Charred Documents

18.1.1 Crime Scene:

A place where the alleged crime/fire and arson has taken place or an effort made by an accused to destroy the evidence through burning.

18.1.2 Crime Scene Investigation:

It is thorough inquiry of the crime by conducting systematic study of various investigative methods. It involves recovery of physical and documentary evidence for the purpose of identifying and arrest of perpetrators for their prosecution. Crime scene investigation shall technically commence upon the arrival of first responder and conclude with the lifting of security cordon and release of crime scene by IO.

18.1.3 Basic Guidelines for Carrying out Search at Scene of Crime

(i) Defining control boundaries of a SOC for protecting and securing it.

(ii) Preserving a SOC with minimum possible contamination and disturbance of any physical clue material.

(iii) Safety and security of all persons in and around a SOC.

(iv) Taking custody of records, maintaining details of documents available or stored at the scene of crime.

(v) Restriction on the number of persons accessing a SOC and recording their movement.

(vi) Controlling, identifying, verifying and removing persons from a SOC after proper and self-attested recording of their details, names, addresses, contact numbers, etc.

(vii) First remove unburnt evidential documents from scene of crime and take them in your custody.

(viii) Always photograph the document on arrival at the scene of crime, on ‘as it is and where it is’ basis to prove in the court that these documents were actually recovered from the scene of crime.

18.1.4 Pre-Search/Planning and Preparation to Examine Scene of Offence

Assessment of the place where search is to be conducted for collection of physical evidence. It may be in the form of closed or open places.

Response to a Crime Scene

Procedure for the first police officer visiting the crime scene

(i) Call for the fire brigade.

(ii) Assistance to the injured person, if any, should be extended first.

(iii) Identification of witness and suspect.

(iv) Securing the crime scene.

(v) Documenting the condition of crime scene.

(vi) Identify and protect the documentary and material evidence.

(vii) Photography/videography of SOC.

The investigation officer visiting the crime scene subsequently should:

(i) On arrival contact the police officer who had attended the crime scene initially.

(ii) Collect evidence at crime scene.

(iii) Record statements of eye witness and suspects.

18.2 Crime Scene Kit for Collection of Evidence

(i) Forceps/flat bladed tweezers

(ii) Spatula

(iii) Cardboard boxes

(iv) Cotton

(v) Corrugated boxes

(vi) Polyvinyl acetate solution(2-3 per cent in acetone)

(vii) Sprayer

(viii) Safety gloves

(ix) Thin glass sheets

(x) High intensity light source

(xi) High resolution camera (minimum 16 megapixels)

(xii) Humidifier, if available

(xiii) Dehydrator, if available

(xiv) Marking pens of different colours

(xv) Plastic tape

(xvi) Staplers

18.3 General guidelines for Carrying out Search at Scene of Crime

(i) Collection of all possible, relevant and authentic information required for making assessment about the planning and preparation for search.

(ii) Assessment of all available information for planning and preparing the correct time of search.

18.3.1 Constituting Team Required for Handling the Crime Scene

(i) Outer cordon

(ii) Inner cordon

(iii) Search and seizure of physical clues

(iv) Rescue of victim, if any

(v) Handling of eye witnesses

(vi) Handling of suspects/accused

18.3.2 Composition of Team Members and their Role

(i) Search should be led by a senior police officer.

(ii) Role of an informant/source/identifier must be clearly identified for an operation.

(iii) The roles and responsibilities of police and non-police personnel must be clearly defined.

18.3.3 Briefing Team Members

Members of a search team including non-police personnel should be informed on following key points:

(i) The purpose of search

(ii) The outlines of the plan of action

(iii) The role and responsibilities of teams and its members

18.3.4 Protection and Security of SOC

The scene of crime should be protected with utmost care and precautions such as cordoning of the area, restricting entry/exit and access to unauthorized persons, disallowing tampering of evidence, photography and videography of the crime scene.
All telephones and mobiles must be seized.

18.3.5 Documentation of the Crime Scene

Location of charred documents found at the scene should be documented by way of sketching and photography.

18.3.6 Photography of the Crime Scene

After the crime scene is secured, photography of charred document is required for their location and neighbourhood. Close up photography of charred document using high intensity light source and high resolution camera is also required.

18.3.7 Medical Assistance

In case of accidental fire, immediate assistance/first aid should be extended to the burnt or injured person and then shifted to the nearest hospital for further treatment.

18.3.8 Search for Evidence

The search team should be divided into sub-teams which should systematically start searching the place from one end to another in each room/open space depending upon the nature of a case.

Three types of evidence may be found at a SOC, namely

(i) Documentary evidence

(ii) Forensic evidence

(iii) Material evidence

18.3.9 Documentary Evidence

(i) Registers carrying details such as money transaction, visitors, personal details of victims, tasks assigned to people connected with the case

(ii) Letters/memos

(iii) Marriage certificates

(iv) Contact diaries/business cards

(v) Business related registers/papers

(vi) Account related registers

(vii) Property documents



Figure 18.2: Charred document at crime scene

Courtesy: A.K.Bapuly

(viii) Employment papers

(ix) Identification documents (passport, ration card, voter's card, aadhaar card etc.)

(x) Educational documents

(xi) Bank documents

(xii) Copies of leaked examination paper

18.3.10 Material Evidence

(i) Material used for fire (fuels like kerosene/petrol/diesel, etc.)

(ii) Matchbox/lighter/electric wires, heaters, etc.

(iii) Computers, desktop, laptop, palm top floppies/CDs/pen drives

(iv) Mobile phones

(v) Video or still cameras

(vi) CCTV footage

18.4 Procedure for Handling and Transportation of Charred Documents at the Scene of Crime

(i) Protect the crime scene.

(ii) Switch off the fans and close the windows of the room in case of indoor crime scene. This will restrict flow of air and thereby burning of materials.

(iii) Do not disturb the container in which the document is burnt until and unless the container is transported to the laboratory.

(iv) Stabilize the charred mass as far as possible using polyvinyl acetate in acetone solution (2-3 per cent) by spraying it gently over the charred masses as the charred documents are highly fragile.

(v) When there is a heap of charred mass, try to procure partially burnt documents from the inner middle part of the heap as unburnt documents may be available due to lack of oxygen/incomplete burning.

(vi) Do not try to remove the pages of stacks of paper. Lift them as it is. Scattered pages should be lifted using spatula and transfer to the glass sheet. Keep cotton over it and then transfer it to the cardboard box one by one.

(vii) Get archival plastic sheets for preserving.

(viii) Transport the cardboard box or corrugated box containing charred exhibits in the middle of vehicle as there is least chance of damage in this position.

(ix) Great amount of patience is required to handle burnt or charred documents.

18.4.1 Collection and Packaging of Charred Documents

(i) At the scene of crime, charred documents can be found in the dust bins, garbage bins in the backyard, inside the washroom or toilets, at the corner of the room, etc. In cases of arson, charred documents can be found in drawers, cupboards, racks, on the table or any other platform, on the floor or in the cupboard.

(ii) Close up photography of the charred document with high resolution camera should be done on the spot.

(iii) The destructive effects of heat are often closely associated to excessive dryness as a result, paper becomes very brittle and fragile. Not all papers can be regenerated after suffering (mutilating) from excessive heat.

(iv) In case of wet and charred documents, transport it to a chilled storage to prevent mould formation.

(v) To remove moisture, documents be put in dehydrator with controlled air circulation.

(vi) Documents are dried, restored and refiled.

Table 18.1: Effect of temperature on writing

S No.	*Temperature at which the paper was burnt (°C)*	*Colour of charred paper*	*Visibility of charred writing*
1.	90	Brown	Legible
2.	280	Black	Invisible
3.	350	Grey	Visible
4.	400	Cream-White	Visible

18.4.2 Handling and Preservation of Charred Documents

In case the charred mass is difficult to handle, then it should be transferred to a glass sheet pre-treated with silicon water repellent. A solution of 3 per cent polyvinyl acetate in acetone (3 gm. polyvinyl acetate dissolved in 100 ml. of acetone) or methyl methacrylate (commercially known as Bed acryl 40 per cent) should be sprayed on charred mass carefully. This solution is a powerful adhesive and forms a transparent sticky layer on the document which gives strength to the charred mass.



Figure 18.3: Charred document stabilized by Polyvinyl Acetate solution

(i) Charred document can be fixed either between two transparent sheets or between two transparent glass sheets to carryout examination.

(ii) Practically all the charred documents consist of twisted fragile masses. These are required to be separated and flattened out for further treatment. No forceful attempt should be made to unfold the burnt papers or to flatten curled sheets.

(iii) Charred document should be kept in humidified chamber for a while in order to replenish its moisture. This humidity treatment results in straightening of the curled edges.

(iv) After this treatment the fragments of charred document would gain some weight to form body and lose brittleness. These pieces may now be directly placed on the glass plate for examination.

18.4.3 Transportation of Charred Documents

1. The charred pieces should be transported properly preferably in a corrugated box whose bottom is covered with layer of cotton and then with tissue paper to avoid any further damage.
2. To handle single burnt document, flat bladed tweezers are useful for picking up the fragments. When only parts of whole documents are found they may be segregated according to the area of container in which they are found and then placed in flat boxes. Stationary or candy boxes with top covers are very useful.
3. The charred pieces should be covered with a layer of tissue papers. Pack cotton wool in between charred document and the sides and bottom of the container forming a protective layer against damage. The box is then filled with loose cotton and followed by packing, sealing and transporting the box to the laboratory for examination.
4. Transporting the container undisturbed to the laboratory is a better option, wherever possible. Material of the original paper has much to do with the fragility of the charred fragments.



Figure 18.4: Charred documents

18.5 Seizure List

The seizure list and memo must be prepared on the spot itself in the presence of two independent witnesses. The witnesses should sign the lists and memos giving their full details including temporary and permanent addresses/contact numbers, etc., in their own handwriting including signatures with date.

18.6 End of Search

Before announcing formal termination of a search operation the officer-in-charge must ensure that:

(i) Every potential witness is safely escorted to a police station with an officer deputed for the task.

(ii) All evidence collected at a SOC is properly packed, sealed and marked.

(iii) All memos are duly filled in and all other formalities with respect to procedures mandated by the law are completed.

18.7 Scrutiny of Evidence Collected from SOC

A thorough evaluation of the evidence collected from a SOC provides highly relevant and useful information for the purpose of investigation including crucial information about: -

18.7.1 Accused

(i) Identity of the accused (photo, documentary record, testimony).

(ii) Information and/or details about other members (photo, documentary record, testimony).

18.7.2 Crime

(i) Items and/or description of items used for commission of crime (documents, instruments, etc).

(ii) Nature of exploitation (record, testimony).

(iii) Modus operandi.

(iv) Commercial transaction (record, testimony).

18.8 Re-visit the Crime Scene if Required

It is possible that some pieces of charred paper or any other burnt material is lying stray in and around the crime scene. This must be properly searched and collected for further evidence.

18.9 Flaws by IO

(i) Charred documents should be handled separately. In case of wet and charred documents, moisture contents should be reduced as advised.

(ii) Transporting charred documents to a FSL after stabilizing them is a challenge for IOs which is not taken seriously.

18.10 Plan of Investigation

A thorough scrutiny of the evidence collected from SOC provides highly relevant and useful information for the purpose of investigation including crucial information.

A plan of investigation greatly facilitates:

(i) The process of reconstruction of the scene of crime.

(ii) Developing understanding about the sequence of events.

(iii) Collection of relevant evidence in a systematic manner.

18.11 Submission of Charge Sheet/Complaint

Depending on the offences made out in a case, either a charge sheet or a complaint should be filed at the end of the investigation. A legal review of the charge sheet or complaint should be obtained from the concerned Public Prosecutor before submission.

18.12 Few Cases of Charred Document

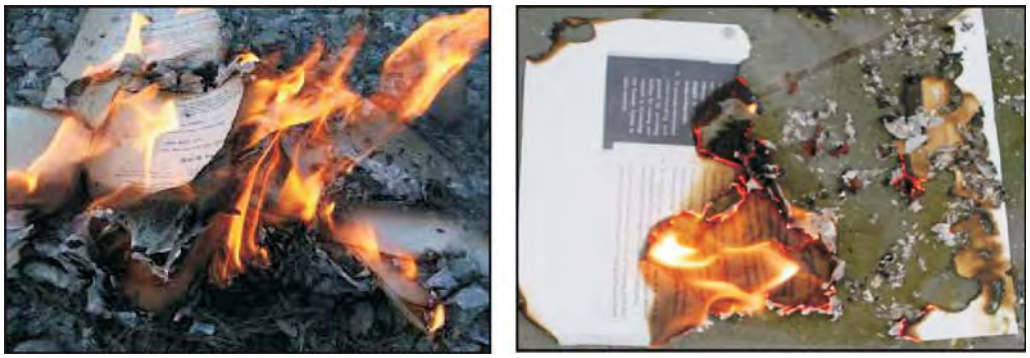


Figure 18.5: Various stages of charred documents. Some writings are visible and legible (right) on charred document whereas the invisible writings on completely charred documents (left) can be deciphered using IR photography on the spot.

18.13 Likely Queries to be Raised (may vary from case to case)

(i) Detect and decipher the matter of the charred documents.

(ii) Is there any signature on the charred document? If yes, can it be identified?

(iii) Whether the document contains handwriting/printed or typed matter.

(iv) Whether the charred mass is a currency paper or ordinary paper.

(v) What is the size and colour of the burnt documents.

(vi) Whether the paper of the charred document is same as that of partially burned document.

(vii) Any other observation related to the case.

Note: Specific queries would depend upon the nature of the crime and exhibits seized at crime scene.

18.14 Relevant Sections

A instigates B to set fire to a dwelling. B, in consequence of the unsoundness of his mind, being incapable of knowing the nature of the act, or that he is doing what is wrong or contrary to law, sets fire to the house in consequence of A's instigation. B has committed no offence, but A is guilty of abetting the offence of setting fire to a dwelling, and is liable to punishment, provided for that offence under section 108 (c).

Section 425 of the Indian Penal Code—-Mischief

425(a) X voluntarily burns a valuable security belonging to Y intending to cause wrongful loss to Y. X has committed mischief.

18.15 Case Studies

Case Study 1	
A bank manager of a nationalized bank had defrauded huge amount from the bank by manipulating a number of bank documents. He then tried to destroy all the crucial documents by setting them on fire, so that the vital evidences are lost. A thorough search of the crime scene revealed presence of an intact gas cylinder at an unusual place, but all the valuable documents of the bank were found burnt/partially burnt around the area, along with the dead body of the bank manager. It was also found that the crucial documents relating to frauds committed by the	bank managers were also destroyed along with other bank instruments. Decipherment of some of the charred documents led to the conclusion that huge fraud was committed, involving large amount of transactions by the bank manager. The fire was intentional rather than accidental due to the presence of a gas cylinder. As the record room was closed and probably the manager could not escape in time, he died due to suffocation caused by poisonous gases released by the burning of documents/lack of oxygen, etc.

Source: A.K.Bapuly, Director, FSL, Odhisa

Case Study 2	
In case of fire in an office, it was alleged that currency notes worth several thousands of rupees were accidently burnt. When the ashes of charred documents were examined, it was found that only a few hundreds of	rupees could be accounted for from the remnants of charred one-rupee bundles. The correct estimate of the total loss could not, however, be estimated.

Source: A.K.Bapuly, Director, FSL, Odhisa



Figure 18.6: Crucial documents intentionally set on fire. Partially burnt documents can be seen

References

1. Albert S. Osborn, *Questioned Documents*, 2nd edn., Delhi,1998.
2. Ellen Ellen, *Questioned Documents-Scientific Examination*, Washington, 1991.
3. Jan Seaman Kelly & Brian S. Lindblom, *Scientific Examination of Questioned Document*, London, 2006.
4. Ordway Hilton, *Scientific Examination of Questioned Document*, New York, 1982.
5. R.E. Jacobson , S.F. Ray, G.G. Attridge, N.R. Oxford, *The Manual of Photography-Photography and Digital Imaging*, 9th edn, UK, 2000.
6. Wilson R. Harrison, *Suspect Documents: Their Scientific Examination*, Delhi Indian Reprint, 2001.
7. Roy A. Huber & A.M. Headrick , *Handwriting Identification: Facts and Fundamentals*, Washington D.C., 2000.
8. Ron N. Morris, *Forensic Handwriting Identification: Fundamental Concepts and Principles*, New York, 2001.
9. Katherine M. Koppenhaver, *CDE, Forensic Document Examination: Principles and Practise*, New Jersey, 2007.
10. R.B. Sharma, *Forensic Science in Criminal Investigation and Trials*, 4th edn, New Delhi, 1999.
11. A.K. Bapuly, *Forensic Science*: *Its Application in Crime Investigation*, 1st edn, Hyderabad, 2006.

19 FINGERPRINTS

19.1 Procedure for attending scene of crime

(i) The scene of crime requiring development of fingerprints should be kept undisturbed and fingerprint expert is to be called for. Two independent witnesses may be identified.

(ii) On arrival of fingerprint expert with the photographer, the scene be photographed without moving or disturbing anything. Expert examining the scene of crime should also be photographed.

(iii) A description of the scene of crime preferably along with photograph is to be documented.

(iv) A meticulous survey of the scene of crime in a scientific way, i.e. either clockwise or anticlockwise direction should be made before starting the examination for prints.

(v) It is very important to observe anything unusual/disturbed. One of the most helpful factors in criminal investigation is incongruity.

(vi) Fingerprints of the deceased, injured and the inmates should invariably be taken for comparison and elimination.

(vii) Examination should start with strong light sources, e.g. polilight.

(viii) If prints are made on dust or by dust, it should be photographed straightaway. Any development process may cause breaking of the ridges.

(ix) Dust prints may, however, be preserved by spraying a solution of cellulose acetate, which after getting dried and firm may be peeled off and sandwiched between two plastic sheets with signatures and preserved to be used as exhibits during trial.

(x) In case of blood stained prints, blood sample should be taken by the concerned expert preferably without affecting the comparable area of the print for serological examination. Direct photography is to be taken then.

(xi) Any weapon, tool for house-breaking, torch, etc., possibly left behind should also be looked for.

(xii) The nature of the crime and the manner in which it was committed generally decide the scope of examination for chance prints at the scene of crime.

(xiii) If the crime is a murder, the manner of committing murder may indicate the field of search. Thus, in case of suspected poisoning, glasses, bottles, cups, saucers, spoons, cupboard, etc., should be carefully examined for chance prints.

(xiv) If the victim was shot, fire arms, fired cartridge cases, unfired cartridges, cartridge boxes, belts and tables where arms and ammunitions were possibly kept are to be looked for.

(xv) If the victim was stabbed, all sharp pointed or sharp edged objects are to be examined. All objects which may have figured in the quarrel preceding the crime or during the commission of crime or objects used by the criminal to destroy evidence prior to or during their flight from the scene of crime should be meticulously examined.

(xvi) In case of very old finger prints and special/complicated cases, experts from FSL/ CFSL/Finger Print Bureau may be contacted.

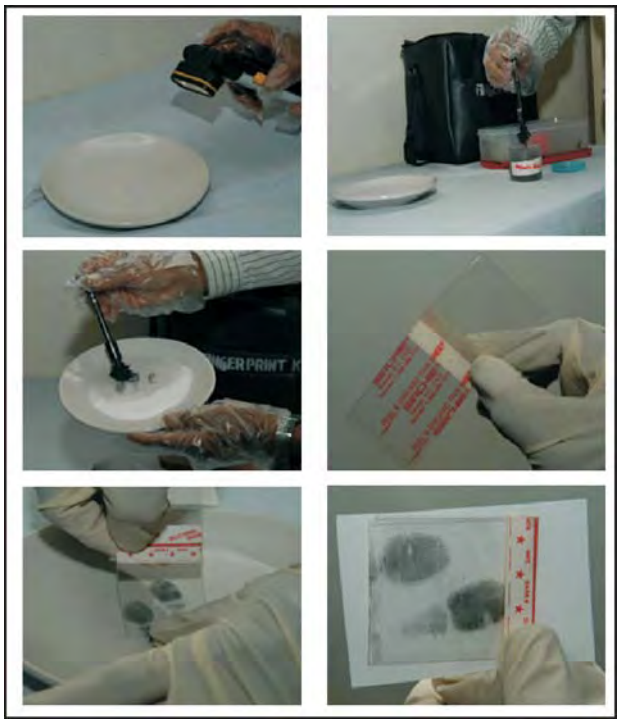


Figure 19.1: Chance fingerprints developed and lifted from a dish

19.2 Packing of Article

(i) For transit of articles for laboratory processing or photography, stout cardboard boxes or cartons provide sufficient protection. Primary consideration of packing articles is to safeguard the chance prints.

(ii) Articles should be labelled with particulars of offence, time and date of offence, address where committed and officer in the case. When applying stick-on labels, care should be taken not to obliterate or add imprints. Special kind of adhesive tapes are also used for odd shape articles.

(iii) The necessary materials for packing should be kept available, viz., few spare boxes of different sizes, assortment of screws and nails, corks, some pieces of corrugated cardboard, a stick of sealing wax, rubber washers, a ball of string, circular tin lids, and drawing pins. Cotton wool, tape, electric lamp holders of screw-on type, hammer, saw, ruler, screwdriver, pincers, carpenter's square and adhesive tapes.

Reference

1. Central Finger Print Bureau, National Crime Records Bureau, Ministry of Home Affairs, Government of India, New Delhi.

20 DIGITAL EVIDENCE

Technological advancement in electronics resulted in complexity, sophistication and state-of-the-art in digital equipments. The low cost of digital equipments are not only attracting common man but also criminals to use them and thus, crimes are becoming hi-tech today. A digital media whether used to solve a crime or seized from a crime scene has to establish its authenticity in the court whenever questioned. Digital evidence is fragile, sophisticated and complex to understand hence the need to be handled carefully. On one hand, a properly searched, identified and seized digital evidence in a case may lead to the conviction of accused. On the other hand, improperly handled digital evidence may result in acquittal.

20.1 Types of Computer Frauds and Cyber Crimes

20.1.1 Computer as Target

(i) Computer and component theft
(ii) System intrusions
(iii) Software piracy
(iv) Software theft

20.1.2 Computer as Repository of Evidence

(i) Fraud and embezzlement
(ii) Narcotics trafficking
(iii) Other traditional crimes
(iv) Terrorism

20.1.3 Computer as the Tool

(i) Financial crimes
(ii) Child pornography
(iii) Solicitation of minors
(iv) Harassment and stalking
(v) Advance fee racket
(vi) Credit card fraud
(vii) Identity theft
(viii) Internet fraud
(ix) Counterfeiting

20.1.4 Crimes Due to the Use of Computers

(i) Theft of digital devices

The Common types of Cybercrimes are:

1. Hacking—A hacker is an unauthorized user who attempts to or gains access to a computer. This is an invasion of privacy, hence, it is a crime.

2. Cyber stalking—Harassment of somebody using internet which includes false allegations, threats, complaints, etc.

3. Spamming—Unsolicited bulk emails or commercial messages which cause damage such as overloading of network and disrupting service to subscribers.

4. Cyber Pornography—The act of using cyberspace to create, display, distribute, import, or publish pornography or obscene materials. Cyber pornography is a criminal offense, classified as causing harm to persons. Section 67 of the IT Act is the most serious Indian law penalizing cyber pornography.

5. Phishing—A kind of identity theft by process of acquiring sensitive information such as username, passwords and credit card details by disguising as legitimate-looking website/portal.

6. Software Piracy—An illegal reproduction and distribution of software for business or personal use. It is a type of infringement of copy right and a violation of a license agreement.

7. Embezzlement—Illegal misappropriation of anything of value including money or property that has been entrusted to the offender's care, custody or control is called embezzlement.

8. Money Laundering—It means, moving of illegally acquired cash through financial and other systems so that it appears to be legally acquired. Internet banking may be one of the sources.

9. Password Sniffers—These are programmes that monitor and record the name and password of network users as they log in, jeopardizing security at a site.

10. Spoofing—The act of disguising one computer to electronically 'look' like another computer, in order to gain access to a system that is restricted.

11. Credit Card Fraud—Credit Card data is stolen from online databases or using a skimmer. The stolen data is further used in online purchasing and payments.

12. Web Jacking—Forceful taking of control of a website by cracking the password or using key-loggers.

13. Cyber terrorism—Violence resulted by any premeditated, politically motivated attack against information using Internet.

20.2 The Information Technology Act, 2000 (As Amended in 2008)

(i) Tampering with computer source code: (S.65).
(ii) Hacking with computer system: (S.66).
(iii) Sending offensive or false information: (S.66A).
(iv) Receiving or retaining stolen computer resource or communication device: (S.66C).
(v) Cheating using computer, cell phone, etc.: (S.66D).
(vi) Capturing transmitting or publishing the image of a private area: (S.66E).
(vii) Cyber terrorism: (S.66F).
(viii) Publishing transmitting information which is obscene in electronic form: (S.67).
(ix) Publication and transmission of data containing sexually explicit act or conduct: (S.67A).
(x) Child pornography: (S.67B).
(xi) Penalty for misrepresentation: (S.71).
(xii) Penalty for breach of confidentiality and privacy: (S.72).
(xiii) Punishment for disclosure of information in breach of contract: (S.72A).
(xiv) Punishment for publishing digital signature certificate false in certain particulars: (S.73), (S.74.) and (S.75.).
(xv) Intermediaries not to be liable in certain cases: (S.79).

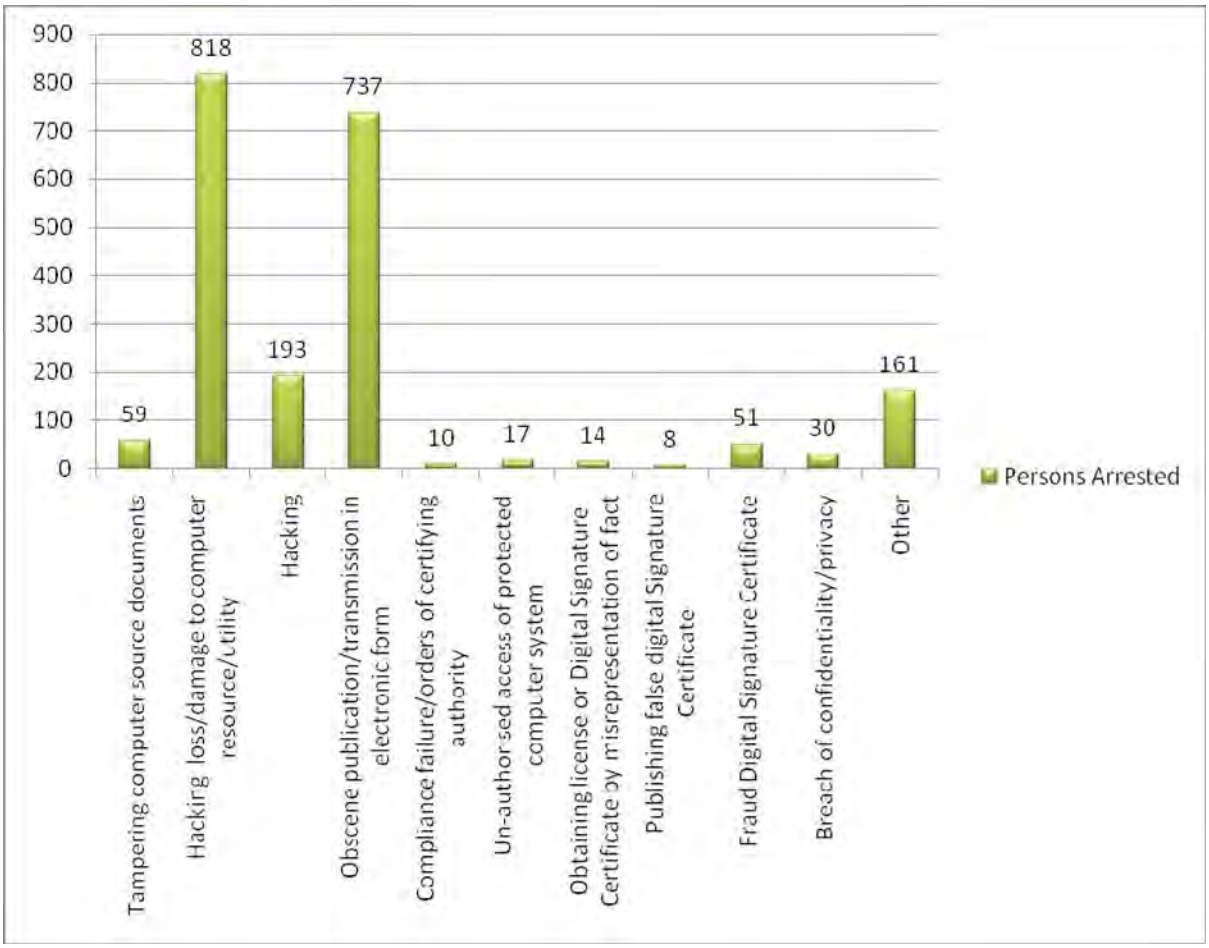


Figure 20.1: Crime statistics in India (persons arrested under cyber crime during 2013)
Source: National Crime Records Bureau

Table 20.1: Persons arrested under cyber crimes (IT and IPC sections) by age groups during 2013 (India)

Sl. No (1)	*Crime Head* (2)	*Below 18* (3)	*Years Between 18–30 Years* (4)	*Between 30–45 Years* (5)	*Between 45–60 Years* (6)	*Above 60 Years* (7)	*Total (all age groups)* (8)
A. Offences under IT Act							
1	Tampering computer source documents	1	23	24	11	0	59
2.	Hacking computer systems						
	i) Loss/damage to computer resource/utility	10	454	307	44	3	818
	ii) Hacking	2	92	91	6	2	193
3	Obscene publication/transmission in electronic form	20	457	203	53	4	737
4	Failure						
	i) Of compliance/orders of certifying authority	0	1	2	0	0	3
	ii) To assist in decrypting the information intercepted by government agency	3	4	0	0	0	7
5	Un-authorized access/attempt to access of protected computer system	0	9	8	0	0	17
6	Obtaining license or digital signature certificate by misrepresentation/suppression of fact	0	10	4	0	0	14
7	Publishing false digital signature certificate	0	4	3	1	0	8
8	Fraud digital signature certificate	0	27	19	5	0	51
9	Breach of confidentiality/privacy	0	19	8	3	0	30
10	Others	9	90	53	8	1	161
11	Total (A)	45	1190	722	131	10	2098
B. Offences under IPC		0	2	0	0	0	2
1	Offences by/ against public servant	0	6	0	1	0	7
2	False electronic evidence	0	3	1	0	0	4

3	Destruction of electronic evidence	0	263	305	54	4	626
4	Forgery	0	145	260	66	0	471
5	Criminal breach of trust/fraud	0	8	15	9	2	34
6	Counterfeiting	0	2	3	5	0	10
	i) Property/mark	0	8	15	9	2	34
	ii) Tampering	0	2	3	5	0	10
	iii)Currency/stamps	0	19	19	9	2	49
7	Total(B)	0	448	603	144	8	1203
	Grant Total (A+B)	45	1638	1325	275	18	3301

Source: <http://ncrb.gov.in/CD-CII2013/CII13-TABLES/Table%2018.5.pdf> Statistics–National Crime Records Bureau

20.3 Search Logistics

20.3.1 Considerations at Crime Scene

At crime scene be sure to consider the following:

(a) Layout: What is the layout of the location to be searched? What is the best way to approach the location under search? What are the potential escape routes? Are there any nearby structures that might pose security risks or contain evidence?

(b) Potential for Occupant Resistance: Do not assume that persons inside the place do not pose a potential physical threat to those executing the search just because computers are the focus of the search. Be sure to identify any potential threats before conducting any search.

(c) Computer Network Design: Gather information whether one or more than one computer exists. Whether networking exists, if yes, any server connected outside may be verified.

(d) Potential for Additional Searches: Are the computers likely connected to remote shares or networks? Does the legal process that permitted you to search this location allow searching another location once it is identified?

(e) Managing Search Team: The IO must be specific about the team, what it can do and what it cannot do at the scene of crime. The IO may assign following roles to his team members.

Table 20.2: Roles of Crime Scene Search Team

Role	Responsibility
Occupant control	Maintain control of all occupants
Scene safety	Prevents unauthorized access/entry
Search team	Performs searches for evidence
Evidence custodian	Take custody of documents and every seized items
Interview team	Interview all relevant occupants
Scene documentation	Document scene before and after search with photographs or videography

20.4 Pre-Search Considerations

Digital evidence: Any electronic evidence which can be stored and retrieved for demonstration in the court room.

20.4.1 Classification of Digital Evidences:

(i) Volatile: Digital evidence which remains in the digital media till it is powered. Volatile digital evidence vanishes as soon as the power supply is removed from the storage device, e.g. Random Access Memory (RAM) Data, virtual drives.

(ii) Non-Volatile: A type of digital evidence which remains in the digital storage media even after the power is removed from the non-volatile digital storage media. Examples: Hard disk, CD/DVD, floppy, pendrive, multimedia card, mobile, tablets (PC), PDA, etc.

20.5 Aim of Analysis of Digital Evidence

(i) To retrieve the information from the suspect digital media.

(ii) To prove in the court room that the information gathered from the suspect digital media is in it's original form without any tempering.

(iii) Link the digital evidence with crime scene and with the accused person.

20.6 Important Steps at Scene of Crime

(i) Search of digital evidence

(ii) Identification of digital evidence

(iii) Seizure of digital evidence

(iv) Maintain the chain of custody during transportation of digital evidence.

(v) Search for physical evidence.

20.7 Crime Scene Kit

(i) Crime scene securing tapes

(ii) Digital camera

(iii) Extra batteries

(iv) Video camera

(v) Note/sketch pads

(vi) Blank sterile storage media: Portable USB hard disks and pen drives.

(vii) Labels

(viii) Pens, permanent markers

(ix) Storage containers

(x) Anti-static bags

(xi) Faraday bags

(xii) Anti-static wand to earth static charge of human body

(xiii) Line tester to check leakage of current in the chassis of computer

(xiv) Toolkit containing screwdrivers (non-magnetic), pliers, forceps, scissors, clips, pins, cutters, etc.

(xv) Soft brush to remove dust from electronic parts in CPU chassis

(xvi) Torch and magnifying lens

(xvii) Rubber gloves

(xviii) Incident Response Toolkit (software)

(xix) Sterilized Storage Media: Hard disk and pendrives

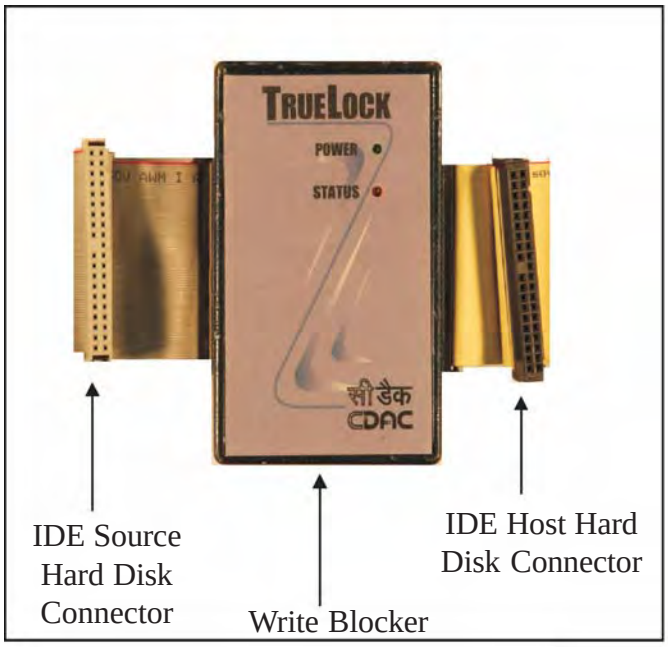
(xx) Converter / Adapter: SATA to USB, IDE to USB, SCSI to USB

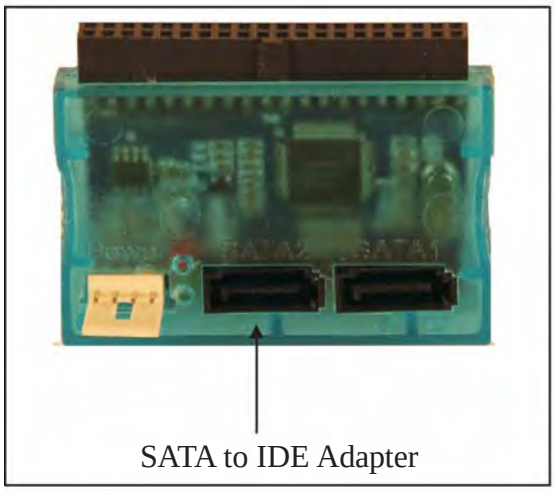
(xxi) Write Blocker : USB, SATA, IDE, SCSI

(xxii) Boot Software – used to start a computer for imaging and /or analysis without making changes to the existing hard disk files

(xxiii) Forensic imaging software

(xxiv) Tools to collect volatile data, viz., Win32DD, Win64DD, FTK Imager, Crypt Hunter, etc., (freeware tools, integrity may be verified by comparing hash value available on company / developer website)







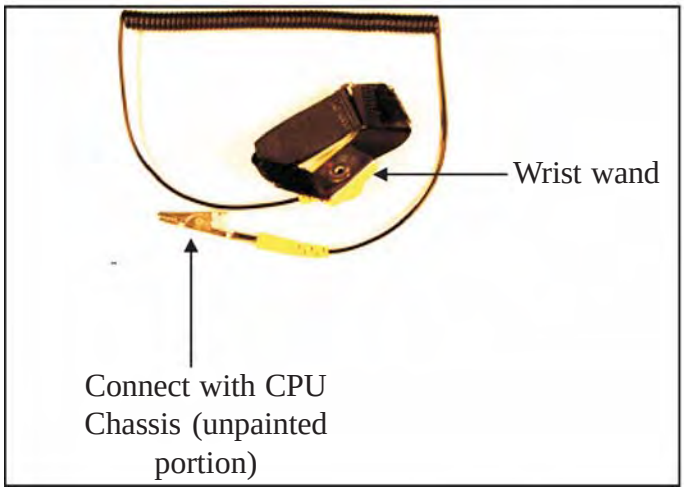


Figure 20.2: Tools used for Forensic Imaging

20.8 How to Begin Search by First Responder

(i) Ensure you have authority to search.
(ii) Ensure you have permission to seize.
(iii) Ensure you have the appropriate power backup.
(iv) Ensure your tools are ready as per the Crime Scene Kit.
(v) Collect information regarding the role of computer in crime from complainant, witnesses and informants.
(vi) Gather information about the suspect's educational qualifications particularly in computer.
(vii) Gather information whether a standalone or networked computer is involved in crime.
(viii) Prepare a comprehensive plan of action.
(ix) Decide the time when to raid the scene of crime to search.
(x) Decide what to seize.

20.9 Identification

20.9.1 Types of Exhibits

(i) Volatile Data
  (a) Data in RAM
  (b) Mounted virtual drives
(ii) Non-Volatile Data
  (a) Internal hard disk
  (b) USB portable hard disk
  (c) Flash/pen/thumb drive
  (d) Data storage card
  (e) SD card/micro SD card
  (f) CD-R/CD-RW/DVD/blue-ray disc
  (g) Magnetic tapes (used for data backup in servers)
(iii) Other Devices and Peripherals
  (a) Printer
  (b) Scanner
  (c) Camera
  (d) USB portable Read-Write Drives : ROM/DVD burner/floppy drives.
  (e) USB portable card reader/writer.
  (f) FAX machines
  (g) Ipod
  (h) Mobile phones
  (i) Tablets

20.9.2 Potential Digital Evidences (Storage Media)



CD/DVD



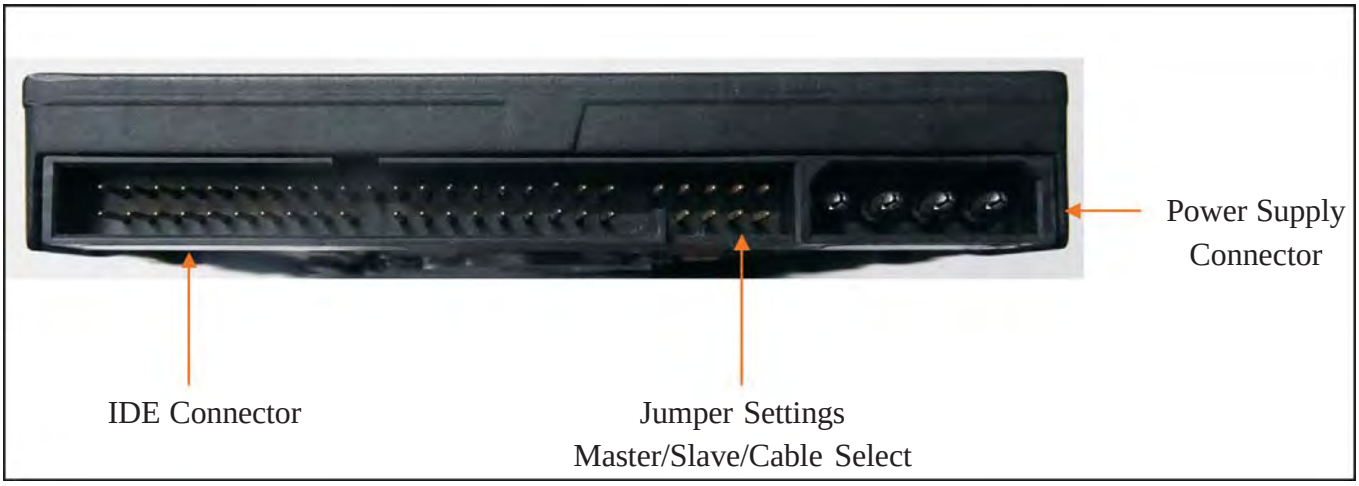
USB Portable Hard Disk inside Case

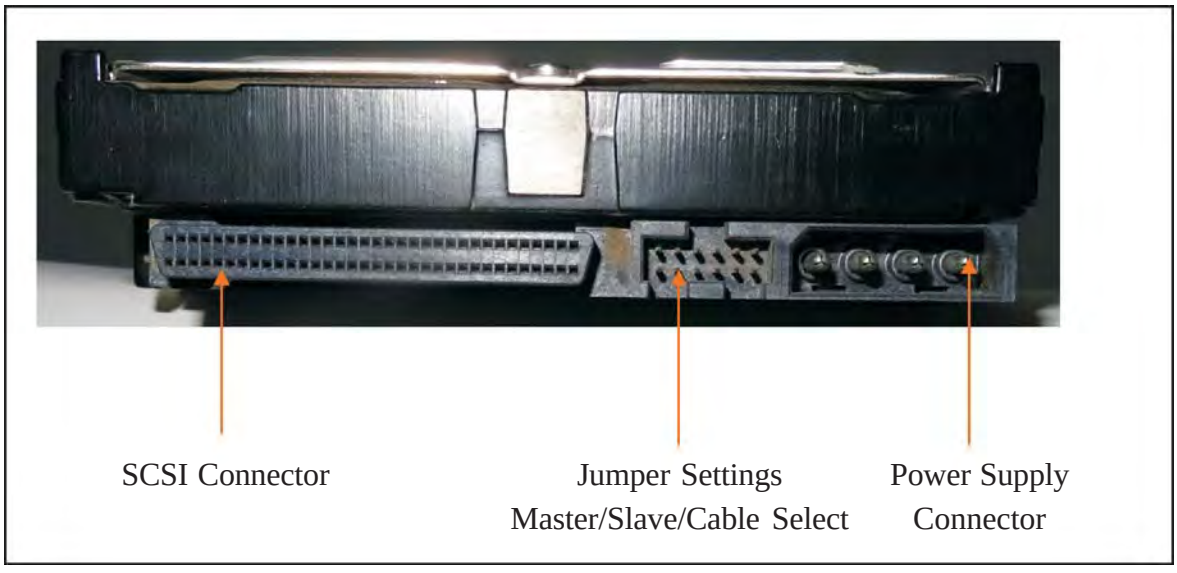


Mobile Phone as a storage media with Pre-loaded Encryption and Security Wipe softwares



USB Pen Drive A USB Wi-Fi Adaptor A USB software Dongle



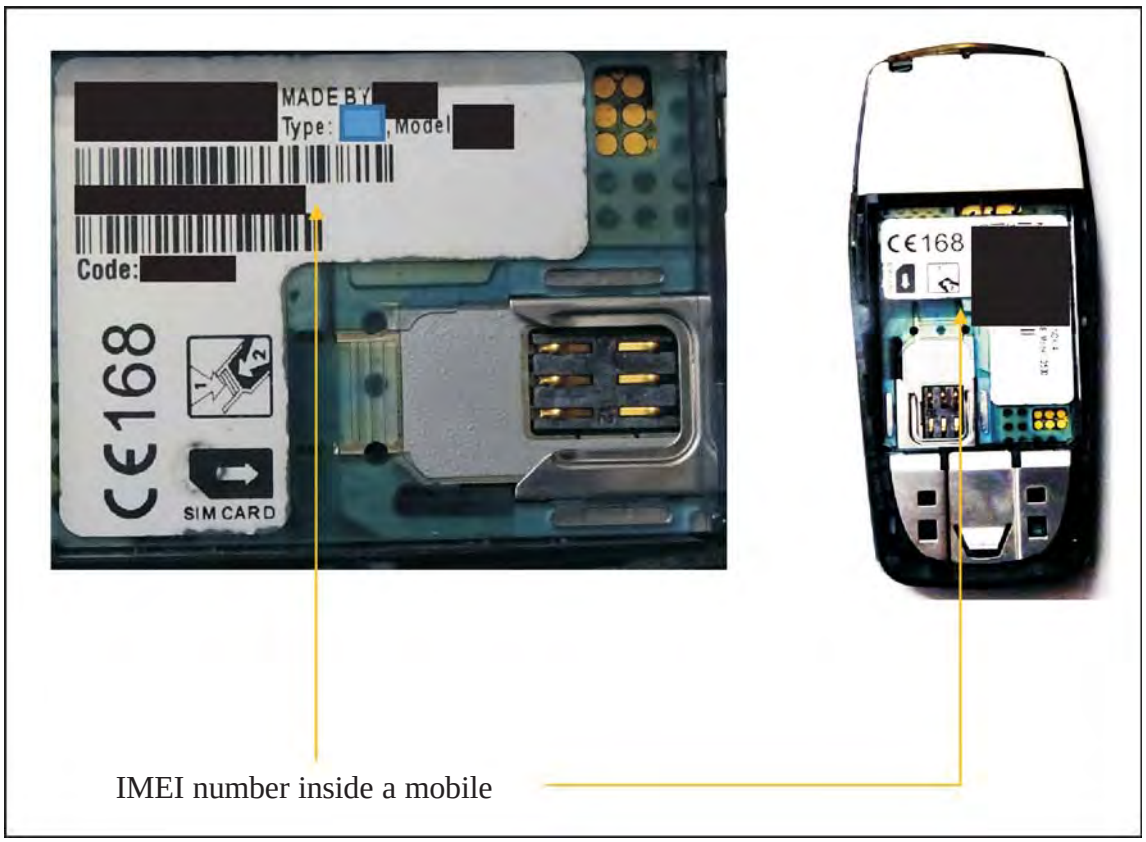




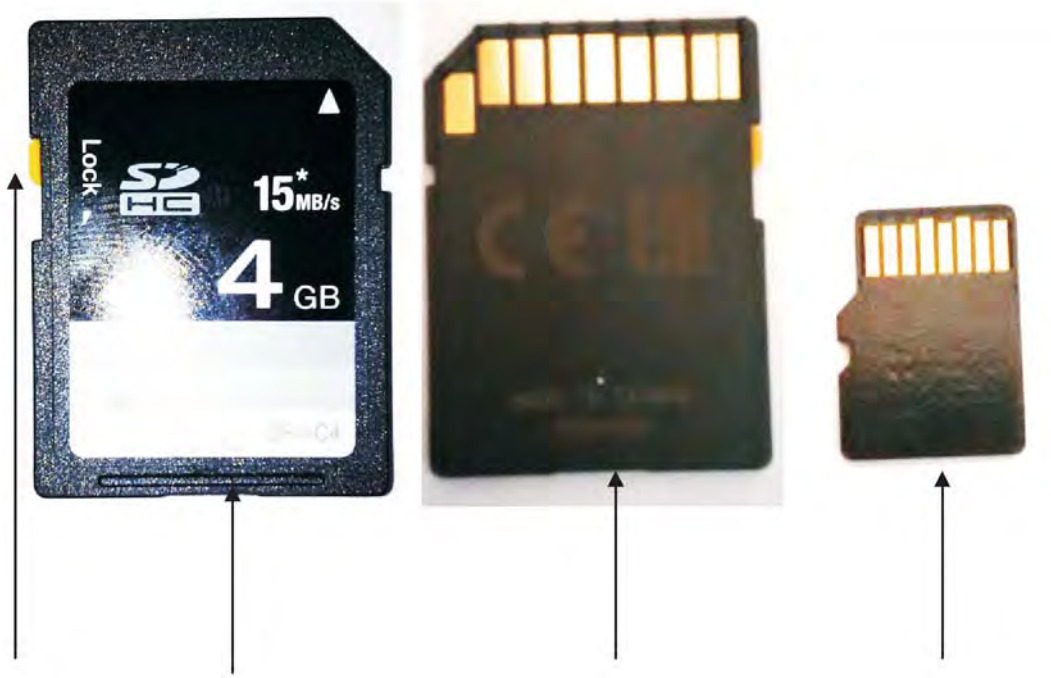
External USB Card Reader



Mobiles and Tablet



IMEI number inside a mobile



Cannot write in lock mode

Data Storage Card (Non-Volatile data)

Micro SD Card (Non-Volatile data)



Micro SD card slot

SIM slot

Wireless USB data router bearing IMEI number and serial number of the device



Modified SIM with its adapter



If a computer is already switched off, use Pin or Gem Clip to open ROM drive of the computer to check /remove DVD/CD disc.

Do *not* switch on already switched off computer

20.10 Documentation

☞ ***If you did not write it down, it did not happen***

Crime scene documentation is a very important step of investigation. It is important to record the physical arrangement of computers and peripheral and other evidences accurately. Sketch the crime scene with scale. Record statements of all those present at the crime scene including suspect. Use voice recorder to record statements, if possible. Photography (or videography, if possible) is the best source to sketch/reconstruct the SOC.

20.10.1 Computer System Data Recording Form

(Prototype —Form A)

Complaint/FIR No.	Police Station:	
DATE:	TIME:	ORGANIZATION:
Examiner Name(s):		
Location:		
Method of Evidence Received (i.e. delivered, seized, discovered)		
System Information		
Date of Purchase:		
System Manufacturer:		
System Serial Number:		
System Name:		
System Model Number:		
System Part Number:		
System Date/Time:		
Other Identifying Data (i.e. damage, label, etc):		
Processors:		
Memory:		
Video Card:		
Sound Card:		
Network Card:		
SCSI Card:		
Modem:		
Keyboard:		
Monitor:		
Mouse:		
Floppy Disk Drive(s):		
CD ROM Drive(s)		
DVD Drive(s)		
Printer(s):		
Other Cards:		
Other Drives:		
Hard Drive Information		
Manufacturer:		
Serial Number:		
Part Number:		
Hard Drive Size: (GB/TB)		
Hash Value obtained –Yes		
S/W for Hash Value used		
Hash Value obtained- No	Reason:	
Witness 1		
Witness 2		

20.10.2 Seizure Note

(Prototype—Form B)

Complaint/FIR No.	Police Station:
Date:	Time:
Received/Seized From:	
Received/Seized By:	
Reason Seized:	
Location of Seized Evidence:	
Description of Evidence (Manufacturer, Model #, S/N, condition, marks/scratches, distinguishing characteristics, etc):	
Hash Value obtained –Yes	
Hash Value obtained- No	
Witness 1	
Witness 2	

Page _____ of _____

20.11 Document the Chain of Custody

Ensure that the evidence chain of custody is well documented and protected during all phases of evidence collection.

20.11.1 Authenticity of the Digital Evidence

(i) Make forensic image

(ii) Verify by hash values of all digital information

(iii) Preserve digital information as originally acquired.

(iv) Use write blockers

(v) Note CD-ROMs with serial number

20.11.2 Security of Digital Evidence

(i) Logging of all actions must be part of the documentation

(ii) Describe possession of data, equipment, data carriers etc.

(iii) Use dedicated forms for documentation (Reference 20.10.1 and 20.10.2)

(iv) Have written statements of the company to declare the seized digital information is in its original state

☞ *Remember that entire sources of evidence can be invalid in a legal proceeding if the evidence chain of custody is faulty.*

20.12 Seizure of Digital Evidence

Once digital evidence is identified, it should be seized by First Responder/IO using appropriate forensic tools. Seizure of evidence involves creating a digital fingerprint of the data by calculating hash value of the suspect storage media at SOC so that any tempering with digital data, after seizure to court room can be detected. It is also recommended that forensic image of suspect hard disk should be made at SOC and hash value of both suspect and forensic image should be computed.

Acquisition of data is the process of acquiring data by making a forensic image of suspect storage media. A preferably new sterile hard disk should be used for making the image.

Always use higher capacity hard disk for forensic imaging purpose.

20.12.1 How Digital Evidence is to be Handled by IO from SOC to FSL

In the case of digital evidence also IO has to provide:

(i) Physical storage media, e.g. USB, CD, DVD, hard disk, etc. (Note: *If you open any file without using write blocker, time stamping will change and that would amount to tempering of the evidence contents hence strictly avoid this*). The new physical storage media may be a permanent sterile storage media. In case a used hard disk is taken as physical media for storage of alleged information, it is necessary to wipe off the previous data from this hard disk.

(ii) Immediately after transfer of data image to the new physical media as per FLOW CHART OF DATA ACQUISITION AND IMAGING, Figure 20.3., the first thing is to give number to this new physical media (i.e. evidence/exhibit number).

(iii) The second thing for an IO to perform is to give a 'unique number' to the contents of the physical storage media duly computed through Hash Algorithm, i.e. in terms of hash value.

(iv) In order to give a 'unique number' to the contents of the physical media the IO should transfer the alleged data to a new sterile permanent storage media as soon as possible, as per FLOW CHART OF DATA ACQUISITION AND IMAGING, Figure 20.3.

(v) Unique identification number to the contents of the physical media can be given by use of a software called Hash Algorithm. [Unique identification number is software generated fixed length number. Though it is a randomly generated number but it does not change if read in any computer.] This number should be mentioned in panchnama to authenticate the evidence subsequently.

(vi) Seizure and acquisition will be over if the hash value of evidence in original marked as N1 and its imaged copies marked as N2, N3 and N4 are all same. [Refer to Figure 20.3]

(vii) Finally, the seizure memo is to be prepared as follows and evidence is sent to FSL after proper packaging and sealing along with seizure memo.

20.12.1.1 Seizure Memo

(PROTOTYPE-FORM C)

1.	Name of Investigator :
2.	Rank of Investigator:
3.	Police Station :
4.	Crime Number :
5.	Seizure Memo Number :
6.	Place of Seizure :
7.	Time of Seizure :
8.	Suspect Name :
9.	Address :
10.	Name of Witness-1
11.	Address :
12.	Name of Witness-1
13.	Address :
14.	Evidence File Name:
15.	Signature of Investigating Officer

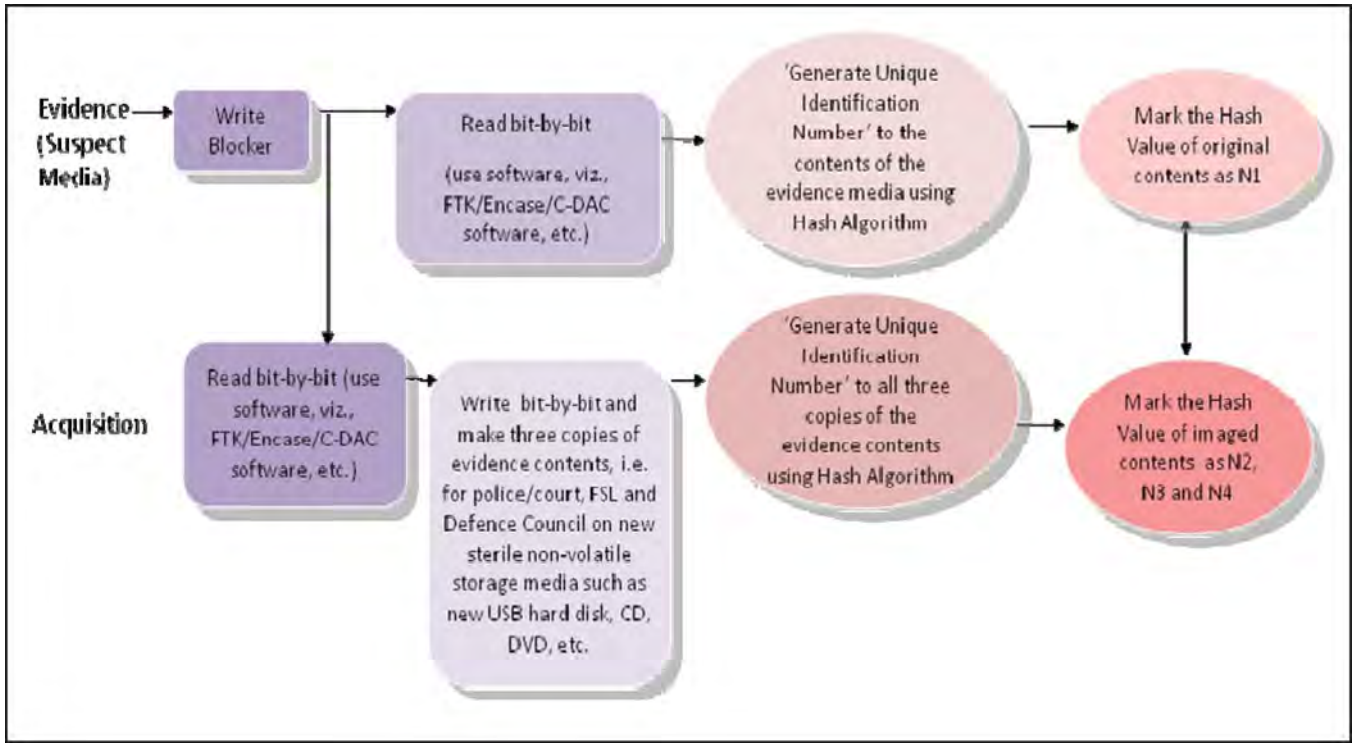


Figure 20.3: Data acquisition and imaging

20.12.2 Seizure of a Powered 'ON' Computer

(i) Photograph the screen.
(ii) Collect volatile data as per data in Table 20.5.
(iii) Collect data present in the 'RAM' of the computer.
(iv) Check for virtual drives: If yes, collect logical copies of mounted data.
(v) Label all connections and ports.
(vi) Photograph them.
(vii) Disable network connectivity to prevent remote access.
(viii) Disconnect the power/shutdown (as per decision making table 8.1).
(ix) Open CPU chassis to locate Hard Disk and disconnect it.
(x) Seize and package all evidence in bags.
(xi) Tag/label each bag.
(xii) Transport evidences to forensic laboratory.
(xiii) Maintain chain of custody.

20.12.3 Seizure of a Powered 'Off' Computer

(i) Photograph the screen.
(ii) Label all ports connecting peripherals/external devices.
(iii) Photograph them.
(iv) Open CPU chassis to locate hard disk.
(v) Collect non-volatile data, i.e. storage media (including, e.g. data storage cards, pen drives, etc.) to be seized with hash value.
(vi) Collect peripherals and software CDs/DVDs.
(vii) Seize and package all evidence in bags.
(viii) Tag/label each bag.
(ix) Transport evidences to forensic laboratory.
(x) Maintain chain of custody.

20.12.4 Also Seize in Addition to Digital Evidence

To assist with the examination:

(i) Manuals and computer software.
(ii) Paper with passwords.
(iii) For comparison of printouts: printers, printouts and printer paper.

20.13 Collection of Digital Evidence

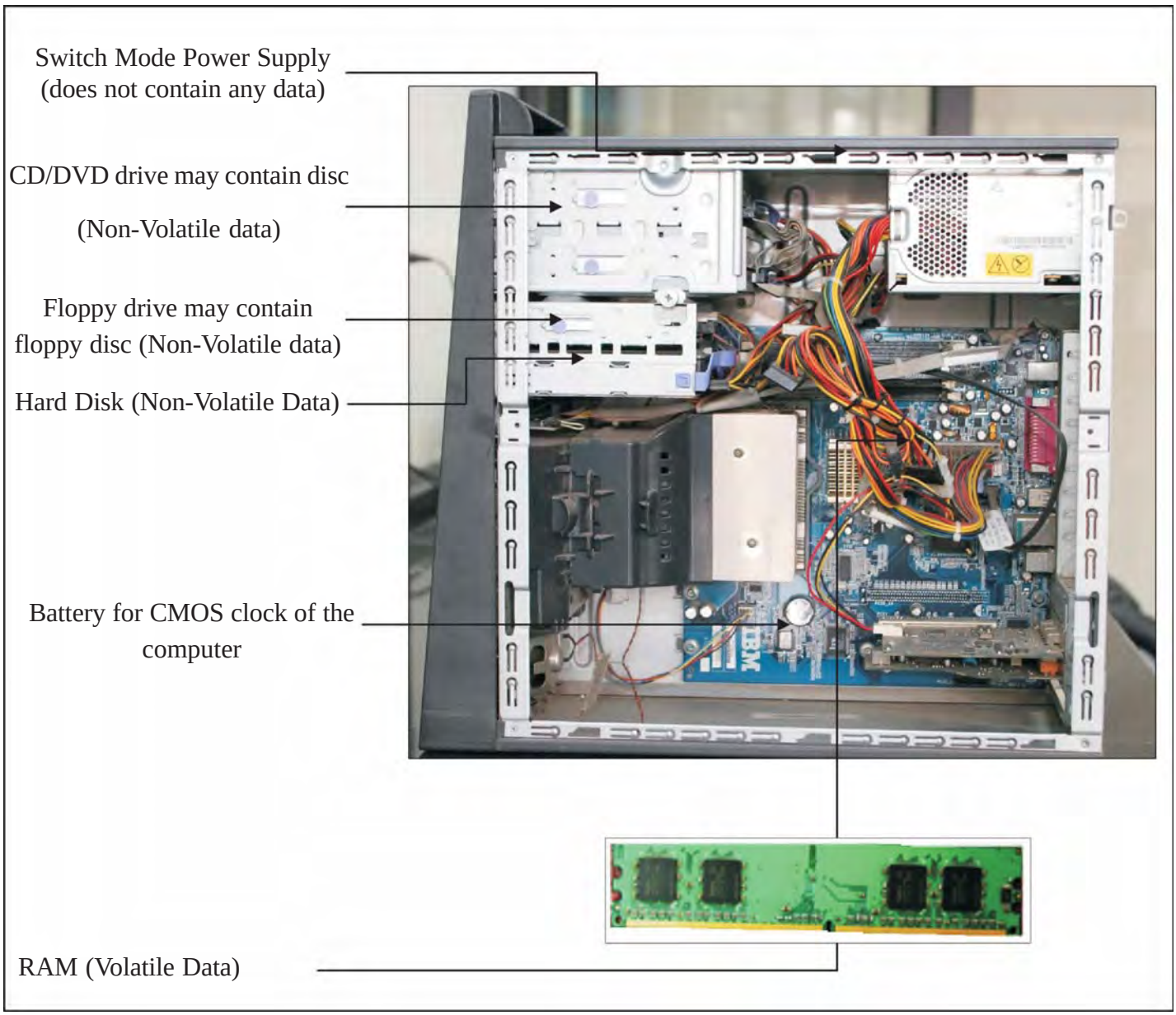


Figure 20.4: Inside a CPU chassis

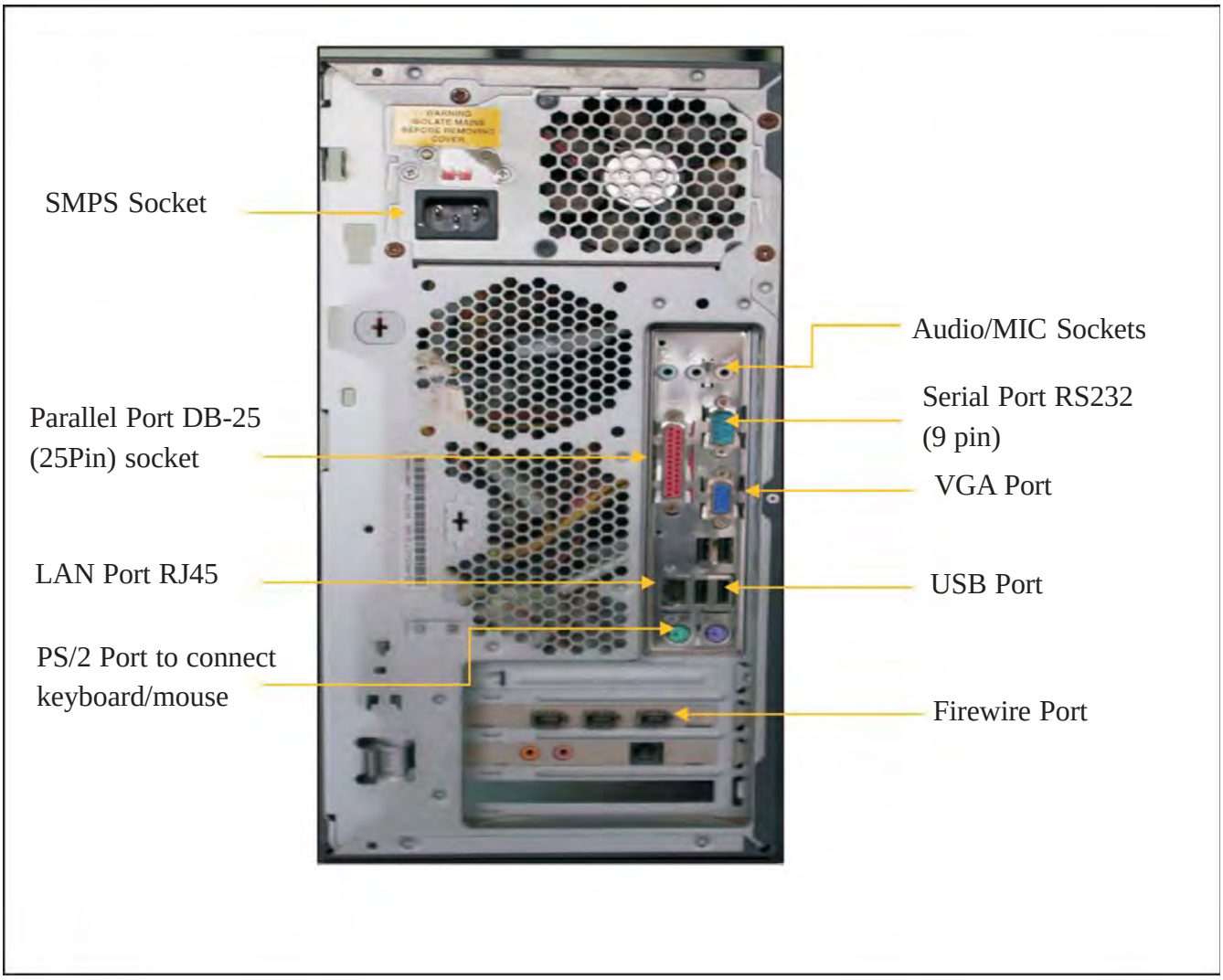


Figure 20.5: Rear side of a CPU chassis

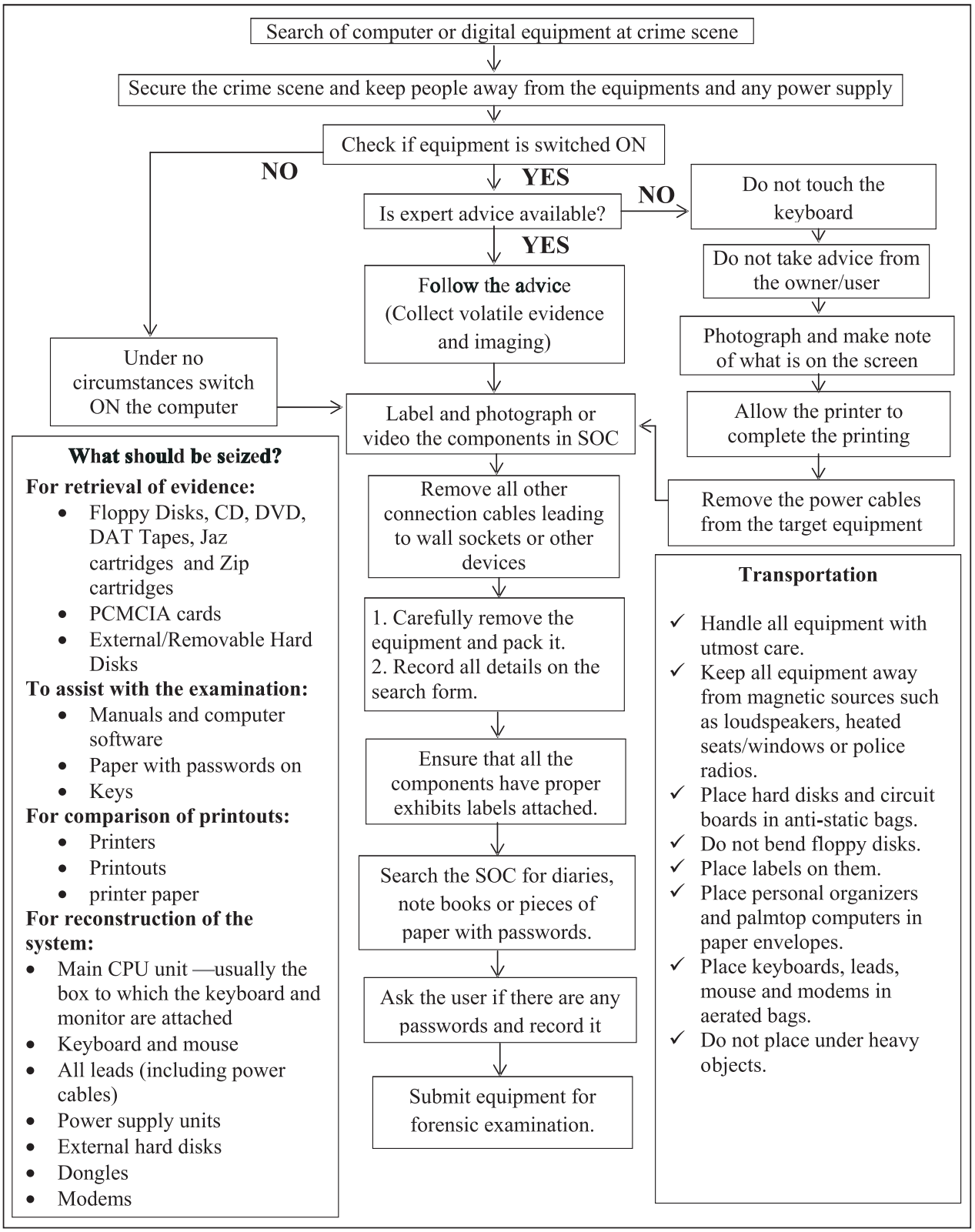


Figure 20.6: Search, seizure and transportation of electronic evidence



Figure 20.7: Steps for Imaging of a suspect hard disk

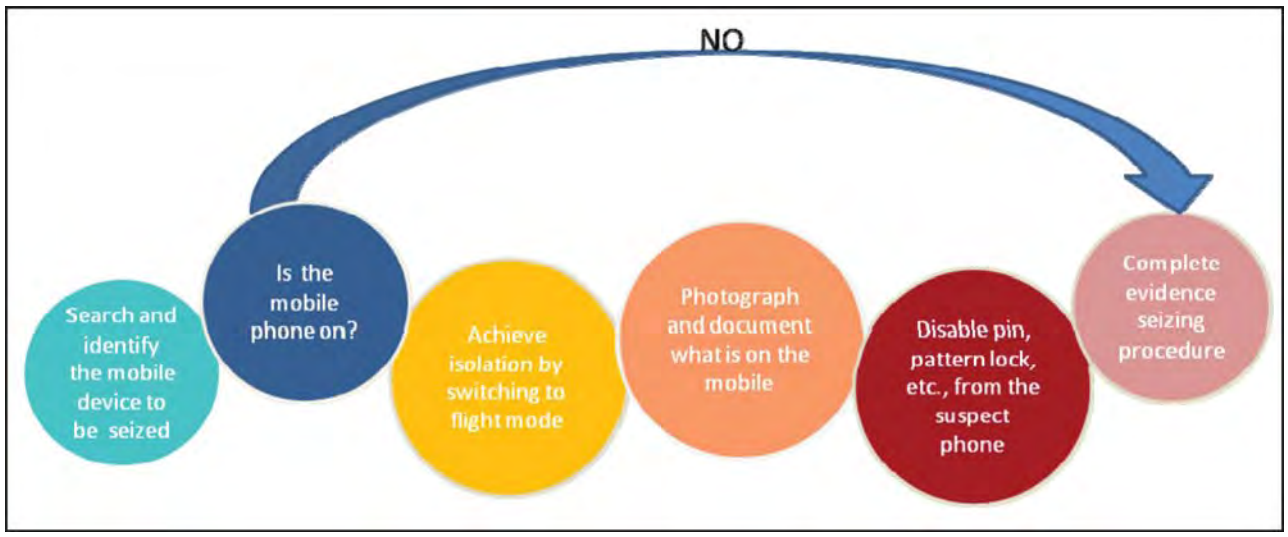


Figure 20.8: Steps for the seizure of mobile phone

Table 20.3: Precautions to be followed at the time of seizure of mobile phone

Precautions	*Reasons*
Don't insert any SIM or replace SIM.	Risk of data transfer from mobile to SIM and vice versa.
	Risk of data loss.
Incase 'on' mobile transfer it to laboratory as soon as possible.	'On' mobile in a faraday bag is unable to connect with a network and it tries to search for a network at an interval which consumes more battery than normal condition.
Avoid accidental or deliberate security wipe.	Data once wiped is almost impossible to recover.
Avoid accidental touch on screen.	Risk of data loss or data overwritten.
Do not connect charger in faraday bag.	It acts as an antenna.

20.14 Photography at Crime Scene: (Especially Collection of Evidence)

(i) Ensure that memory card of camera use for photography does not contain remnants of other crime scene.

(ii) Ensure to have extra batteries and memory cards.

(iii) Photograph crime scene from all angles including all corners and center. Use wide angle lens.

(iv) Do not use flash light while photographing screen of a computer.

(v) Label all items which you are going to be seized.

(vi) Photograph items with label.

(vii) Use close-up photography to capture each and every detail of individual item.

(viii) Note serial number, make, model, item description and purpose of seizure (whether contains volatile data, non-volatile data or any other physical evidence, viz., fingerprint, blood, etc.).

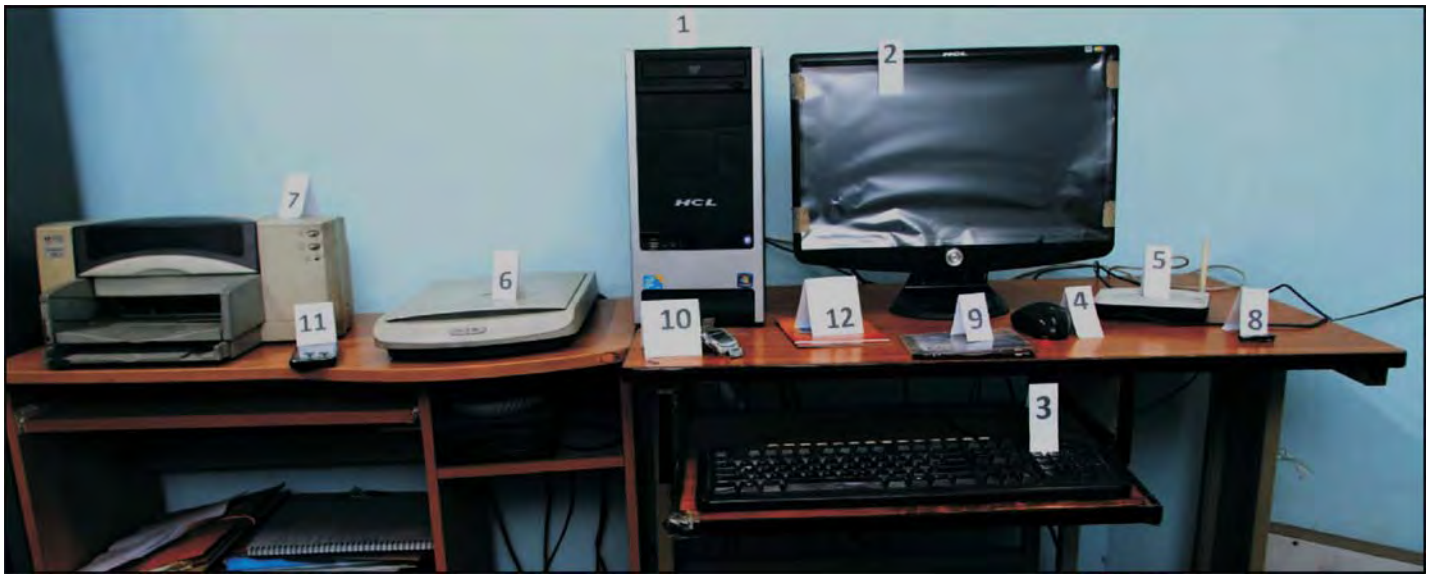


Figure 20.9: Collection of evidences from simulated SOC

20.15 Decision Making Tables

Table 20.4: Decision making table: (Operating system and required action)

Operating Software	*Required Action*
DOS	Disconnect power supply
Windows: 3.1 /95/98/NT	Disconnect power supply
Macintosh upto OS 9	Disconnect power supply
Macintosh upto OS 10	Proper shutdown
Windows XP	Proper shutdown
Linux /Unix	Proper shutdown
Windows Server: NT/2000/2008	Proper shutdown

Disconnect power supply, in case of laptop, remove the battery

Table 20.5: Decision making table: Data acquisition

Condition	*Required Action*
Computer is powered 'on'	Volatile data exists-Volatile Data Acquisition required
Computer is powered 'off'	No volatile data exists
RAID/SAN/NAS Storage	Relevant data acquisition

Table 20.6: Decision making table: Compatibility of forensic tools with operating software

Product	*Croner's Toolkit*	*Encase Forensic*	*Forensic Toolkit*	*Mandiant First Response*	*Pro discover Incident Response*	*Sleuth Kit with Autopsy Browser*
Supplier	Open Source	Guidance Software	Access Data	Mandiant	Technology Partners	Open Source
Operating S/W: Unix/Linux	Yes	No	No	No	No	Yes
Windows OS	No	Yes	Yes	Yes	Yes	No
Analyzes : Windows Unix/Linux	Linux/Unix	Windows Linux/ Unix	Windows Linux/ Unix	Windows	Windows Linux/ Unix	Windows Linux/ Unix

Table 20.7: Decision making table: Blank screen-whether computer is actually off

Condition	*Reason*	*Action Required*
Blank screen	i) Monitor is switched off ii) Computer in sleep mode ii) Black screen saver is activated	i) Check CPU Box LED ii) Check monitor LED iii) Press monitor 'ON/OFF' switch iv) Check power supply to CPU box v) Check power supply to monitor vi)Move mouse and press up and down arrow key on the keyboard

☞Remember 'OFF LED' does not mean that equipment is in switched off condition. (The LED may be faulty)

☞ Do *not* 'switch on' already 'switched off' computer**.**

Table 20.8: Decision making table: To know Operating System in case a computer is 'on'

1.	Logo represents Window Operating System	
2.	Logo represent Linux or Unix Operating System	
3.	To know version in Windows Operating System	Click START then right click My Computer/Computer Icon then click Properties OR USE your own tested CMD command prompt 'Systeminfo' C:\>systeminfo

Table 20.9: Decision making table: Potential evidence in computer

Hardware	*Type of Data*	*Contains Evidences*
RAM	Volatile (Powered 'ON' condition)	System date System time Open files Logged on users Running processes Loaded Windows DLL Files Windows Registry Hives Network Connections: Open and closed Network configurations Internet history Chat conversations Emails Passwords Encryption keys Command history Clipboard contents Mapped drives
Encrypted volume	Volatile (Powered 'ON' condition)	Collect mounted encrypted volumes as plain text Collect whole disk encryption on running system
Hard disk and other storage media	Non-Volatile Data	Installed softwares Types of files stored therein Date and time of each file (MAC stamping of files) Password protected files Deleted files Hidden files Renamed extension files or bad extension
Bootable hard disk (Windows OS)	Non-Volatile Data	Information that can be recovered through Windows Registry Forensics include: System configuration Devices on the system User names Personal settings and browser preferences Web browsing activity Files opened Programs executed Passwords

Table 20.10: Potential evidence related to mobile devices

Baseline Phone	*Hardware*	*Handset date and time;* *International Mobile Equipment Identity (IMEI)* *Make and Model*
	Information created by user	Address book; SMS; calendar, memos; to-do lists
	Phone software created information	Call logs (received, sent, missed) SMS logs (received and sent)
Smart Phone	Information created by user	Photographs video/audio, SMS, MMS; GPS waypoints; stored voicemail; files stored on system; connected computers Paired devices
	Information related to internet	Online accounts; purchased media e-mail; Internet usage; social networking information APP/APK installed BBM , Whatsapp data MAC address of the device
	Information related to usage of internet / data usage, etc.	Billing information; call register Internet/data usage;
SIM card	Identifiers	Subscriber identifier (IMSI) SIM card identifier (ICC-ID)
	Information created by user	SMS Contact numbers Stored names Last dialed numbers; Location areas

20.16 What should be seized?

20.16.1Aim of Seizure

(i) Exhibit should be preserved in safe custody to avoid any tempering in it.

(ii) Some information can be gathered or confirmed from the digital device/storage media only in the forensic laboratory.

(iii) Reconstruction of criminal activity from seized exhibits.

20.16.2 What should be taken?

1.	Hard Disk
2.	Any external expansion units or cards
3.	All connecting leads
4.	Dongles, if any
5.	Power adaptors of laptops and peripherals
6.	External backup devices such as jaz, zip and tape drives
7.	Printers with output documents
8.	Modems with telephone memory
9.	FAX units with memory and its printouts
10.	Scanners with power adaptor and connecting cable
11.	PCMCIA cards and leads
12.	External hard disk with connecting leads
13.	CD/DVD
14.	Backup tapes
15.	Personal Organizers
16.	Palmtops
17.	Tablets/Phablets
18.	Mobile phones
19.	Landline telephones with storage
20.	Dictating machines and tapes
21.	Printers, Scanners

20.17 Some of the Sample Queries

(i) Whether the suspect hard disk (or pen drive) contains any deleted text file on *specific dates* relevant to this case, if yes retrieve the contents of the file or otherwise.

(ii) Whether the suspect hard disk (or pen drive) contains any renamed file on *specific dates* relevant to this case, if yes what was the original file and what are the contents of file or otherwise.

(iii) Whether the suspect hard disk (or pen drive) contains any password protected file of *specific dates* relevant to this case, if yes what are contents of the file or otherwise.

(iv) Whether the suspect storage media contains any pornographic photo or video relevant to this case, if yes what are the contents of the file or otherwise.

(v) Whether the suspect storage media contains any scanned image of banknote or security document relevant to this case, if yes what are the contents of the file or otherwise.

(vi) Whether the suspect hard disk (or pen drive) contains any spreadsheet file modified on *specific dates* relevant to this case, if yes what are the contents of the file or otherwise.

(vii) Whether the suspect hard disk contains email message(s) sent or received relevant to this case, if yes what are the contents of the file or otherwise.

(viii) Whether the suspect hard disk contains chat logs relevant to this case, if yes what are the contents of the logs or otherwise.

(ix) Whether the suspect hard disk contains any data relevant to this case.

☞ Specific queries would depend upon the nature of crime and exhibit seized from the scene of crime.

20.18 Packaging of Digital Evidence

(i) Remove all connections.

(ii) Make sure CD/DVD ROM drives are empty.

(iii) Use Gem Clip or pin to open ROM drive.

(iv) In case of multiple computer systems, label each CPU system along with their keyboard, mouse and attached peripherals in order to reconstruct the scene as found.

(v) Magnetic storage media should be packed in antistatic packaging plastic bags with bubble wraps.

(vi) Containers use to hold evidences including connecting wires should be properly labelled.



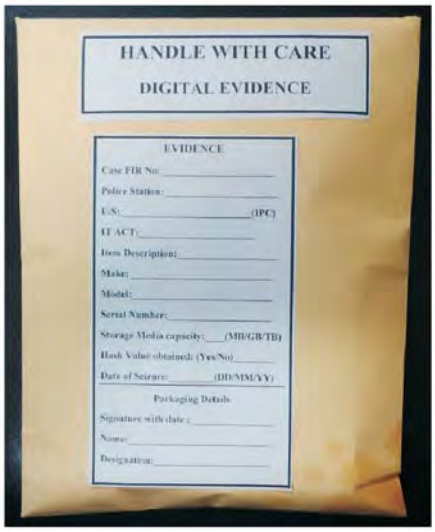
Step 1: Suspect Hard disk



Step 2: Wrap in antistatic envelope



Step 3: Wrap in bubble wrap envelope



Step 4: Place in inner clothing/ laminated paper envelope. Fill information in self-adhesive labels and affix on envelope along with instructions.



Step 5: Seal the envelope



Sample seal impression

Figure 20.10: Steps for packaging a digital evidence-hard disk

20.19 Transport and Preservation of IT Equipment

Preservation: The original digital evidence should be placed in secure storage to prevent it from getting altered or tampered. An image copy should be stored into appropriate media or reliable mass storage. Optical media can be used as the mass storage.

Do's and Don'ts

Do's	Don'ts
Keep all items away from magnetic sources.	Do not expose to excessive UV radiation.
Store at room temperature.	Do not expose to excessive heat.
Protect from dust.	Do not bend or fold floppy disks/CD/DVD.
Avoid physical shocks.	Do not store digital equipment in damp cellar or garage.
Use breathable , paper bags and sacks.	Do not label the connecting point of device.
Use aerated plastic bags.	Do not label the item which already contains label.
Keep main system unit in upright position.	Do not switch on any device which is already powered off.
For hard disks use anti-static bags.	
Use Faraday bags for mobiles.	
First write on label than fix it on device.	

20.20 Precautions

(i) Always use a good quality line tester to check any leakage of current to the equipment chassis.

(ii) Use anti-static wand while opening chassis of a switched off CPU unit. Static charge of human body is sufficient to damage CMOS (Complementary Metal-Oxide Semi-Conductor) chips of the equipment.

(iii) Do not use aluminium powder for lifting finger prints from digital equipment as it is good conductor of electricity. It can damage the equipment circuit.

(iv) Always use soft brush to remove dust from the electronic parts inside the CPU unit.

(v) Never boot a computer with its original hard disk, if it is already off.

(vi) Data collected should be stored only on external USB portable Hard disk/pen drive.

(vii) Do not remove any part of digital equipment forcefully.

(viii) While collecting volatile data from a 'switched on' computer use your own tools from a trusted command prompt. Never log into a compromised system as root.

(ix) Do not switch on suspect computer which is already switched off.

(x) Before seizure of a computer ensure that drives/ports/slots do not contain any suspect storage media, viz., CD/DVD disc, floppy, multimedia cards , SD cards, etc.

(xi) Ensure that CPU chassis seized contains suspect hard disk.

(xii) Before seizure of a mobile phone always check number of SIM present in it.

(xiii) In case of a modified SIM don't forget to seize SIM adapter, if available.

20.21 Some Cases in India Related to Digital Evidence Analysis

Case Study 1 :	
Delhi High Court Piyush Rastogi vs State, 6 November, 2013. The paragraph of judgment regarding forensic analysis read as: The forensic report, Ex PW-8/A, pertaining to the examination of the	computer parts revealed that CPUs were found containing stand images of Rs. 100 note apart from having software for ADOBE PHOTOSHOP, scanner software and printer software with the help of which print outs of Rs.100 were taken.

Source: http://indiankanoon.org

Case Study 2	
IN THE HIGH COURT OF KERALA AT ERNAKULAM M. Aravindakshan Nair vs State Of Kerala,24 March 2010. The paragraph of judgment regarding Forensic Analysis read as: Annexure 3 and 4 to the report of CDAC show that the properties of the file 'THRISSUR DC HOSPITAL (REPORT).doc' was modified and saved 39 times. This suggests that even if a draft was prepared on 31.12.2007, that has undergone drastic changes and if so, it is too unrealistic to say that the order should carry the date on which the first draft was allegedly prepared.	Further, Annexure 1 to the report of CDAC shows that the file Thrissur District Hospital Doc was last written and entry was modified even on 22.3.2008. This also contradicts the averments in the affidavit of Suresh Babu that final print of Ext.P12 was taken on 15.3.2008 and that the said order was signed and sent to the despatch section on 17.03.2008. The affidavit of Jerry says that after 17.03.2008, change in the address of persons to whom the order was to be sent were made. This again, if true, proves the felicity of Suresh Babu's case that the order was sent to despatch section on 17.03.2008.

Source: http://indiankanoon.org

Case Study 3

Bombay High Court
Altaf Ismail Sheikh vs The State Of Maharashtra And Ors. ... on 5 April, 2005
The paragraph of judgment regarding Forensic Analysis read as:
A computer hard-disk was discovered from the accused Farook Kadage. From the examination of the said hard-disk, it was revealed that the same not only contained the data for 1999 MPSC examination in relation to which C.R.No.33 of 2002 was filed but it contained various other data pertaining to 9 other examinations, namely, PSI Dept. Ltd. Examination 1998, PSI/ASST/STI Pre & Main Exam 1999, State Service (Pre) Exam-2000, Dy. Municipal Commissioner Scrutiny Test-1997, Clerk Typist Examination-1997, Asst. Motor Vehicle Insp. Exam 1998, State Service Examination-1998, State Service Examination-1997, and Sales Tax Inspector Examination-1997. The contents of the hard-disk also disclosed in detail the malpractices performed in the Police Sub-Inspector Ltd. Departmental Examination 1998 held on 13th September, 1998 and the 'Answer Key' of PSI Departmental Examination 1998. The final result of the said Examination was declared on 22nd September, 1999. The complaint further states that MPSC vide its report dated 20th February, 2004, after its internal enquiry informed about the malpractice conducted in the Police Sub-Inspector Ltd. Departmental Examination 1998 which was conducted on 13th September, 1998 and the final result of which was declared on 22 September, 1999. The report mentioned that out of the 38 candidates who were recommended for appointment, the answer booklets of paper-I and paper-II of only 31 candidates were available with the Commission and the remaining were destroyed in August 2000. Of those 31 answer sheets. The complaint further states that during the course of investigation it was revealed that Accused No.4 Farook Kadge was arrested in ACB CR No.33/02 was a regular visitor to the MPSC, since he was assigned the job of data entry during the period from 1995 to 1998. He thereafter had continued to visit MPSC office on one pretext or other. It was suspected that the said information revealed from the said hard disk was procured by the accused either from the candidates who were the direct beneficiaries, or through his sources in the MPSC by divulging the computer password and copying/stealing/tampering the same from the MPSC computer by effecting unauthorized entry using duplicate keys of the MPSC main door. The accused Farook Kadge, as per the directions of the accused Avinash Sanas in the year 1998, had approached the computer clerk Shri Santosh Pathare of the MPSC computer wing suggesting that he should assist Farook Kadge in carrying out certain malpractices/tampering in the MPSC computer data pertaining to the MPSC examination/selection process. However, Shri Santosh Pathare refused the offer and reported the matter to his superiors. Shri Santosh Pathare confirmed the said fact in his statement recorded on 31 August2002. It is further recorded in the complaint that during the course of investigation, it was revealed that accused Avinash Sanas had been continuously indulging in the unlawful activity of manipulating the MPSC Examination result for the preceding 10 years for monitory and economic gain to himself and for others by recruiting new members to his organized crime syndicate. Accused Avinash Sanas is now a suspended Class-I officer, was then working in Mantralaya, Mumbai. He was earlier arrested in a case vide GB CB CID CR

candidates answer sheets of paper -I of 28 candidates were found to be bogus or forged on account of difference in print paper, ink, fonts and signature of invigilators. Further answer sheets of 3 candidates were suspected to be bearing forged signature of invigilators. MPSC had obtained the opinion of the handwriting expert Shri Mahesh Wagh, Examiner of Documents (Retired) who had opined on 24 January, 2004 that the said 31 answer sheets are forged. On 6 February 2004, MPSC had also informed that out of the said 31 answer sheets, the 28 answer sheets were not printed by their agency. From the said facts, the modus operandi adopted in the Police Sub-Inspector Ltd. Departmental Exam-1998 appeared to be similar to the one adopted by the accused persons in the Asst./STI/PSI-1999 Examination i.e. printing of bogus answer sheets, marking them with correct answers, replacing them with the genuine MPSC answer sheets in the MPSC office by effecting unauthorised entry and committing theft of original answer sheets prior to the scanning of the said	No. 93 of 1993 u/s 409, 34, 120(B) of Indian Penal Code r/w 4, 7 of the Maharashtra Prevention of Malpractices at University, Board and other Specified examination Act of 1982. It was pertaining to the MPSC paper leakage case. He was later discharged for want of sufficient evidence. The complaint then refers to the involvement of each of the accused persons named in the FIR and the same also invariably refers to examination of the year 1998 as well as information regarding earlier charge-sheet and involvement of some of them in malpractices conducted in relation to the earlier examinations as well as in relation to the examinations held in the year 1999, in respect of which separate C.R. has been registered. The paragraphs 11 and 12 of the said complaint relate to the arrest and seizure of the accused persons and the paragraph 13 relates to CR No. 33 of 2002 which is an independent C.R. The paragraphs 14 and 15 of the said complaint are the ultimate conclusions arrived at in the said complaint.

Source: http://indiankanoon.org

Case Study 4	
Delhi High Court Dharambir vs Central Bureau Of Investigation ... on 11 March, The paragraph of judgment regarding forensic analysis read as: The four computer systems containing the HDs and the CDs were then sent to the Andhra Pradesh Forensic Sciences Laboratory (APFSL) for certification for two purposes. First, that the HDs were in working condition as required by Section 65B(2)(c) EA and secondly, that the conversations transferred to the CDs were true copies of their original recording on the HDs. The CDs certified by the APFSL were thereafter forwarded to the learned Special Judge, New Delhi along with the charge sheets.	The four HDs have been retained at the APFSL, Hyderabad. The certificate dated 22 July 2003 issued by the APFSL on examination of the 3 hard discs, i.e. A, D and E and 3 CDs containing the 62 calls in the DLF case, was to the effect that the data in 62 telephone calls tallied with the respective files in the hard discs. The certificate was therefore in compliance with Section 65B(4) EA and had to be treated as evidence within the meaning of Section 3 EA. Therefore the 3 CDs fell within the definition 'computer output' being an electronic record within the meaning of Section 65B(1) EA and had to be treated as an original document.

Source: http://indiankanoon.org

Case Study 5 :	
Delhi High Court Sambhaji Lal Surve vs Central Bureau Of Investigation on 9 April, 2009 The paragraph of judgment regarding Forensic Analysis read as: According to the prosecution, the Petitioner while working as JDAD (Operations) Indian Air Force (IAF) was suspected by the Air Force Intelligence of leaking vital information. Consequent thereto, his house and office were searched by the Air Force Intelligence on 21 st May 2005. During this search, one Kingston pen drive was seized. This when analysed was found to contain the active Standard Operating Procedure (SOP) Pechora (a surface to air missile used in the IAF) file which was classified information. The remaining part of the pen drive when analysed showed that it had contained a large number of deleted files pertaining to the DNO. It was further found that the petitioner had unauthorisedly carried a JSSG presentation, which was a top secret document, from the office to the home personal computer (PC) in a pen drive.	A Court of Inquiry was constituted by the Air Force on 25 May 2005. It is stated that during this Court of Inquiry, another Sandisk pen drive was recovered from the Petitioner. The forensic analysis revealed that the deleted layers of the first pen drive of Kingston make contained sensitive defence information pertaining to the Directorate of Naval Operations (DNO). Consequently, information was given to the Naval officials along with the seized pen drive for examination and necessary action. As regards the Sandisk pen drive, the petitioner admitted that this pen drive was collected back from Lt. (Retd) Kulbhushan Parashar, a former Indian Navy Officer with whom he had contacts. On forensic analysis this pen drive was found to have been tampered with in order to destroy all the data therein which was not possible to be recovered forensically. After the conclusion of the Court of Inquiry, the Petitioner was dismissed from service on 20 October 2005 with due approval of the competent authorities.

Source: http://indiankanoon.org

Case Study 6

Chattisgarh High Court
Asit Kumar Sen Gupta vs State Of Chhattisgarh on 16 December, 2011
The paragraph of judgment regarding forensic analysis read as:
On receiving secret information, the appellant's premises was raided on 22-1-2008 and in the search, huge volumes of naxal literatures were recovered. Apart from printed literatures, one computer, CPU was also seized, which was sent for forensic examination to the Central Forensic Science Laboratory, Hyderabad and the report received from FSL Hyderabad whose print out is part of the record, contained huge volumes of naxal literatures.
Volume-V of the paper books is transcript of the material by the Central Forensic Laboratory stored in the CPU found from the possession of the appellant which contains the documents regarding building and development of People's Guerilla Army in India at page 1102. The press release issued by the CPI (Maoist) on 4-12-2004 is available at page 1138. This press release has been issued by "Ganapati, General Secretary, Central Committee (Provisional) of CPI (Maoist). The name of this Ganapati is found in two other letters which this Court has already discussed in the preceding part of this judgment. At page 1141 of Volume V of the paper books, the details of meeting of the Joint Central Committee held in September, 2004 is provided and the points of differences for the debate in the forth coming Congress of the CPI (Maoist) have been highlighted. This document is dated 10-10-2005. Elsewhere also, the activities, minutes, points of debate etc. of the meeting of CPI (Maoist), a terrorist organization as also a banned organization are contained in this volume. In most of the documents, the revolutionary path undertaken by the Maoist which are popularly known as Naxalites waging Guerrilla war in the interior forest areas of the State has been appreciated and louded. The appellant claims himself to be a writer and has also published a book namely `A World to Win', the only issue of which was published probably in the year 2006, though the entire book is conspicuously silent as to the date of publication or the date of printing, etc. Neither before nor after this issue, any other issue of the magazine has ever seen the light of the day and this fact is candidly admitted by the appellant in his examination.
To sum up the evidence discussed above, witnesses PW-2 Ramesh Dewangan, PW-6 Santosh Paul and PW-7 Maksudan Paul have admitted in their case diary statements which they have given without any pressure from the police and this Court has found corroboration from other witnesses that the appellant used to incite and invite them to join CPI (ML) People's War and CPI (Maoist) Organizations. The volumes of documents concerning the activities of such organizations have been found in the CPU, transcript of which has been made available by the Central Forensic Science Laboratory, Hyderabad as discussed above. The documents contain minutes of meeting, points of debate in meeting, letters by the General Secretary to its comrades, louding of Terrorist/ Naxal/Maoist activities in India, the ultimate goal of Maoist/Naxal of wresting powers by revolutionary means in India and then the appellant admits that he is a member of CPI (ML) (Naxalvadi), which is not a registered organization anywhere in India and in fact, he is a member of CPI (ML) People's War and/or CPI (Maoist).

Source: http://indiankanoon.org

References

1. Albert J. Marcella & Jr. Doug Menedez, Cyber Forensics : *A Field Manual For Collecting, Examining*, and Preserving Evidence of Computer Crimes, Florida, 2008.
2. Thomas A. Johnson, CRC Taylor & Francis, *Forensic Computer Crime Investigation*, Florida, 2006.
3. Bill Nelson, Amelia Phillips and Christopher Steuart, *Guide to Computer Forensics and Investigations*, Cengage Learning, 2010.
4. Eoghan Casey, *Handbook of Computer Crime Investigation: Forensic Tools and Techniques*, 2004.
5. <http://www.coe.int/t/dghl/cooperation/economiccrime/cybercrime/Documents/Electronic%20Evidence%20Guide/2467_EEG_v18_short.pdf>29.11.2014
6. <http://www.cps.gov.uk/legal/assets/uploads/files/ACPO_guidelines_computer_evidence [1].pdf>28/11/2014
7. <http://booksite.elsevier.com/9780123742681/Chapter_20_Final.pdf> 29/11/2014
8. <http://www.iaac.org.uk/media/1347/iaac-forensic-4th-edition.pdf> 29/11/2014
9. <http://www.internationalcompetitionnetwork.org/uploads/library/doc627.pdf> 29/11/2014
10. <https://www.ncjrs.gov/pdffiles1/nij/199408.pdf>29/11/2014
11. <http://www.ojp.usdoj.gov/nij>29/11/2014
12. <http://www.crime-scene-investigator.net/SimplifiedGuideDigitalEvidence.pdf>30/11/2014
13. <http://ncrb.gov.in/CD-CII2013/CII13-TABLES/Table%2018.5.pdf>29/11/2014
14. <http://oag.ca.gov/sites/all/files/agweb/pdfs/cci/reference/peb_18.pdf>30/11/2014
15. <http://indiankanoon.org>30/11/2014
16. Identification & Seizure of Digital Evidence - Participant Guide, U.S. Department of State, Office of Antiterrorism Assistance, 2010

21 IMAGE ANALYSIS (CCTV FOOTAGE)

Closed circuit television (CCTV) is a valuable device used to capture video images round the clock and may have valuable and relevant evidence in crime investigation. Images can be used to help to identify the suspect(s), show the actions of someone at a scene, or indicate areas/ spots where presence of an individual can be ascertained. Electronic data from CCTV systems plays a vital role in the investigation, so should be treated as priority evidence. Due to its value in the evidentiary process, it is imperative that Law Enforcement agencies recognize its potential value for intelligence and security matters so need to collect Video and/or Images from CCTV system accurately.

CCTV data retrieval is the collection of relevant video data, image data and associated metadata from a video recording system. CCTV information may exist at the crime scene, at nearby locations and/or at a remote off-site location. While dealing with such evidences general forensic principles and standard process should be applied for collecting, packaging and transporting the CCTV data.

This chapter is intended to provide the standard operating procedures for the CCTV data retrieval, to be used for forensic examination and analysis.

21.1 Relevant Sections of Various Legislative Acts

The following sections are applicable for electronic record evidences including video contents obtained from CCTV. For details the quoted sections may please be referred to.

Information Technology Act, 2000

Section 2: Definitions 2. (1). (t) 'electronic record'.
Section 3: 3. (2) 'Authentication of electronic records'.
Section 4: 'Legal recognition of electronic records'.
Section 79A: The Central Government may for the purposes of providing expert opinion on electronic form of evidence.

The Indian Evidence Act, 1872

Section 65A: Special provisions as to evidence relating to electronic record. The contents of electronic records may be proved in accordance with the provisions of section 65B.

Section 65B: Admissibility of electronic records to be a document is subject to certain conditions of computer output and certificate, (may refer to relevant provisions of the Indian Evidence Act, 1872).

Section 45A: Opinion of examiner of electronic evidence.

The Criminal Procedure Code (Cr. P.C.)

Section 29A: 'Electronic record'- Same as in clause (t) of sub-section (1) of section 2 of the Information Technology Act, 2000.

21.2 Types of Digital Video Recording System (DVRs)

CCTV system, also called Digital Video Recording System (DVRs), found in residential, commercial or governmental institutions may include two major types:

(i) Stand-alone digital video recorder

(ii) PC based digital video recorder

21.3 Equipments Required

To enable retrieval from a variety of systems that will be encountered, a range of equipment is recommended. The following is a suggested list of equipment that should permit video data retrieval from the most commonly encountered system.

(i) Laptop with CD/DVD writable drives, USB ports, fire wire ports, wireless access, media card reader (multi-format), USB floppy drive, four port network switch/hub.

(ii) External CD/DVD writeable drive – USB/SCSI/fire wire.

(iii) USB and fire wire storage devices in multiple sizes.

(iv) Hard drives of suitable memory capacity.

(v) Cables to include: Network cables (crossover cable and straight patch cable), composite and s-video cables, as well as RCA to BNC adapters, audio cables (RCA, stereo, and mono mini) USB cables, fire wire cables (i-Link, 400, 800), power cables, and extension cords.

(vi) Write blockers (IDE, Fire wire).

(vii) Blank Media (CD-R, DVD-R, DVD-R, DVD-Ram, CD-RW, DVD-RW, DVD+RW).

(viii) Blank compact flash cards in varying sizes.

(ix) Video monitor, still camera with extra film or media.

(x) Toolkit containing: Flashlight, mirror, assorted screwdrivers, pens, permanent marker (appropriate for marking media).

(xi) Digital/analog video recorder.

(xii) Appropriates forms (chain of custody, notes, consent).

(xiii) Appropriate evidence packaging bags (anti-static bags).

21.4 Police as First Responder at the Crime Scene

(i) Notes should be kept with details of the methods used and steps taken.

(ii) Check if a manual of the device is available to assist with system information (e.g. password, output options).

(iii) Establish that relevant video has been recorded by reviewing the recording. (Preferably, a person with knowledge of the recording device should operate it during playback to avoid accidental deletion).

(iv) Determine the earliest recorded data. This will determine approximately how much time you have to retrieve the data before the system begins to overwrite it.

(v) Determine if retrieval can be performed by the venue owner/security system's operator.

(vi) Determine if the CCTV installer company or a trained operator is available to assist in the retrieval.

21.5 Documentation: Pre-evidence Collection

Before collecting electronic data from the system, following information should be documented:

(i) Photograph the system and its components.

(ii) Sketch the camera, system placement and position.

(iii) Make, model and serial number of Digital Video Recorder (DVR).

(iv) Whether system is PC based or stand-alone embedded.

(v) Whether system is networked.

(vi) Recording capacity of the system and overwriting.

(vii) Number of camera(s) installed and number of camera(s) active.

(viii) Make and model of each camera.

(ix) System password, if any.

(x) Date and time displayed by the system.

(xi) Actual current time and date.

(xii) System setting

a. Image quality

b. Frames/picture per second

c. Recorded image/frame size

d. Number of hard disk and storage capacity.

(xiii) Playback software name and version.

(xiv) Password of software to open the concerned file, if any.

(xv) Scene information: Address, operation hours, CCTV system installer's contact details.

(xvi) Remove network cable, if necessary.

(xvii) Determine the native/proprietary file format of the system.

(xviii) Determine best method for retrieval.

(xix) Other information of importance.

21.5.1 Retrieving of the CCTV Images Data

(i) Determine the amount of data needed to be retrieved from the CCTV recording system.

(ii) Perform a test retrieval to assess time and size of the data to be retrieved.

(iii) Decide the best method of retrieval based on 'Retrieval Test'.

(iv) Consult administrator to prioritize collection of the native/raw video file.

(v) Use 'Write-once' and not 'Multi-session' mode CD-R or DVD-R media for recording.

(a) Use only Write-once CD-R or DVD-R for creating master evidence/copy.

(b) Verify the retrieved file(s) for proper dates and times and for proper playback.

(c) Consult experts, if facing difficulty in creating master evidence, in subsequent playback and to verify the correctness of recording.

(d) Call for expert advice in case hard drive removal appears only solution.

(e) Document the drive configuration and shut down the system before removing hard disk.

(f) Prepare a cloned hard drive of the original hard disk by 'bit-by-bit' duplication.

(g) Check original/duplicate drive using a write blocker on another computer.

21.5.2 Handling of Evidence

(i) Collected evidence should be checked for integrity as per Evidence Act 65A and 65B.

(ii) Detailed notes and course of actions taken should be documented.

(iii) Ensure the evidence are packed and sealed appropriately before transportation (refer to the Chapter number 2).

21.6 End of Search and Collection

Before leaving the scene, ensure that:

(i) All necessary documentation has been completed.

(ii) All required video data have been collected.

(iii) The retrieved video data plays back correctly on another system, and that the proper dates and times were retrieved.

(iv) The proprietary playback software, network viewer, backup player, and/or archive software have been collected/retrieved.

(v) The recording system has been returned to its original state and verified as operational.

(vi) If removing the recording system, ensure that all necessary peripherals have been collected.

21.7 Forwarding of Evidence Material

The exhibits requiring forensic examination and expert opinion are sent to the designated laboratory in strong and sturdy packaging and in sealed condition along with duly filled in forwarding proforma (FSL/CFSL form), specimen seal impression, and other relevant documents useful for the laboratory examination (for details check Chapter no. 2).

21.8 Queries

(i) Whether video recording is in continuity or otherwise.

(ii) Whether the photograph of the person in exhibit is seen present in the video footages in exhibit.

(iii) To provide authorized judicial edited copy of relevant video recording.

(iv) To enhance the image of the vehicle identification registration number at relevant point (to be specified by the IO).

(v) To provide video frame image at specified point of time.

(vi) Whether the device is networked, if networked, take note of the IP address.

21.9 Special Considerations

(i) Do *not* change the time and date on the DVR system.

(ii) It is recommended not to install any additional software on the DVR system. If absolutely necessary to install additional software contact the manufacturer.

(iii) If requisite video data seems to be over written check the same from back up.

(iv) Administrator/engineer access to the DVR usually allows more options for retrieval, including native/proprietary files.

(v) On the system where the time/date stamp can be moved, ensure that this overlay does not obscure critical events.

(vi) In case systems allow to auto copy the proprietary playback viewer while retrieving the video data. This should always be done when available. If the system does not allow this, steps should be taken to retrieve the correct version required for playback/ viewing.

(vii) Ensure that the frame rate upon retrieval is as near to the recorded frame rate as possible.

(viii) Working copies may be produced from the master evidence.

(ix) The data should be transferred from compact flash card to permanent memory system for further examination as soon as possible.

References

1. http://www.cttso.gov/sites/default/files/DCCTV-PocketGuide-v1-final.pdf.

2. *The Information Technology Act 2000* as amended in 2004.

3. *Laboratory Procedure Manual*, *Forensic Physics*, Directorate of Forensic Science, Ministry of Home Affairs, Government of India, New Delhi, 2005.

4. *The Indian Evidence Act*, *1872* as amended by the Indian Evidence (Amendment) Act, 2002.

5. Michael B. Mukasey, Jeffrey L. Sedgwick and David W. Hagy *Electronic Crime Scene Investigation: A Guide for First Responders*, 2nd edn.,National Institute of Justice, Washington, 2004.

6. C.P. Singh et al., *Guidelines for Collection of Physical Evidence*: Delhi, Physics Division, Forensic Science Laboratory, Delhi, 2013.

22 ROAD ACCIDENTS

India has the largest number of road accidents in the world. More than one lakh people die in road accidents in a year and the average number of deaths per day is more than 300, meaning thereby that more than ten persons die every hour.

According to the *Crime Statistics Compendium Report 2013* by National Crime Records Bureau, Ministry of Home Affairs, Govt of India, the percentage share of accidental deaths during 2013 by road vehicle accidents contributed to 34.3 per cent of the total accidental death of 4,00,517 persons in India. The deaths of 1, 37,423 persons in 2013 were mainly from road traffic accidents. The accidental death from road traffic accidents remained almost in the consistent range in the preceding years, viz. 2012, 2011, and 2010 in India. The NCRB report (2013) reveals further that 34,187 persons (24.9 per cent) riding on two-wheelers, 24,081 (17.5 per cent) were occupants of truck/lorry, 14,803 (10.8 per cent) were travelling in car and 12,055 (8.8 per cent) were killed while travelling in buses.

There is no uniform data collection formats for road accident investigation in the country. Most of the victims of the road accidents are poor people walking on the road or riding on bicycles/scooters. As a result the investigation is delayed consequently and the victim and dependents suffer heavily.

The purpose of this chapter therefore, is to provide guidance and procedures for police investigating officers for safe and efficient methods of search, identification, collection, packaging and transportation of evidences from scene in road accidents investigations.

This chapter also details **the formats and annexure prescribed by High court of Delhi for collection of requisite data available at the crime scene in respect of Modified Claims Tribunal Agreed (MCTA) Procedure in road accident claims.**

22.1 The Indian Penal Codes Sections Relating to Road Accidents

The following IPC's Sections are punishable with imprisonment and/or fine causing loss and/or damages to the property and life involved in the road accident cases. For details, the following IPC's quote sections may be referred to.

(i) **Section 279**: Rash driving or riding on a public way.

(ii) **Section 304A**: Causing death by negligence.

(iii) **Section 337**: Causing hurt by act endangering life or personal safety of others.

(iv) **Section 338**: Causing grievous hurt by an act endangering life or personal safety of others.

(v) **Section 427**: Mischief by causing damage to property of the amount of Rs. 50.

22.1.1 Road Accident: Collision

In general, a road accident collision can be described by the following types:

(i) Vehicle to vehicle

(ii) Vehicle to bicycle/rickshaw (2 or 3 wheels—no motor)

(iii) Vehicle to object

(iv) Collision with pedestrian

(v) Single-vehicle incident

(vi) Hit and run

22.2 Police as First Responder at the Accident Scene-Duties and Responsibilities

The essential functions and tasks required to be executed by the first IO deputed at the road accident site are:

(i) Arrive promptly at the scene. Find specifics, i.e. nature of collision, time and location, number of vehicles involved, severity, and traffic congestion and take remedial actions. Contact the control room and intimate the resources needed at the scene. This includes ambulance, designated IO, relevant evidence collection kits and the safety equipments.

(ii) Arrange medical assistance including ambulance. Note the position of all victims.

(iii) Actions to protect property and preserve evidence.

(iv) Check the driver's license, vehicle registration, and proof of insurance of persons and vehicles in accident.

(v) Delineate the search area using rope and traffic cones. Make passage/divert traffic to an alternative route. Identify the damages and witnesses. Record statements of potential witnesses. Identify and protect transient physical evidence. Keep away unauthorized personnel. Document the scene.

(vi) In case of a serious accident causing heavy loss of life and property, consult experts for advice and their services for evidence collection.

22.3 Evidence Collection Kits and Packing Materials

(i) First aid kits and personal protective equipment.

(ii) Crime scene barricade tapes and traffic cones,

(iii) High pixel digital camera (35mm) with flash and photographic scale.

(iv) Measuring tape, compass, chalk, directional marker.



(v) Plastic bags, plastics and card board containers, vials, small bottles or other containers of suitable size.

(vi) Exhibit tags, permanent markers, sketch paper.

(vii) Magnifying glass.

(viii) Surface gradient measuring devices.

(ix) Surgical knife with clean blades.

(x) Knives, box cutter, scalpel, scissors and tweezers/forceps.

(xi) High intensity lights.

(xii) Presumptive blood alcohol test kits.

22.4 Search Method for Physical Evidences from the Scene

(i) Search from the general to the specific for evidence and wear gloves to avoid contamination and leaving fingerprints.
(ii) Involve specialists during evidence search and collection especially for fingerprints and trace materials, evidence in vehicles involved in the accident.
(iii) Encircle evidence on the scene using chalk and evidence tag and log the nature of exhibits and place where found.
(iv) Photograph (close and wide angle lens) all items before collection.
(v) Record source and location, how and when for each exhibit collected.
(vi) Do not handle evidence excessively after recovery.
(vii) Seal all evidence packages at the crime scene before the witness.

22.5 Photograph Accident as Evidence

(i) Photograph and videograph details of the scene for evidence purposes. Photographs be marked and authenticated as true and unaltered.
(ii) Mark photograph number (for e.g.-1/10); date and time of the photograph.
(iii) Maintain log of photographs that includes the name, location, position from where taken, and camera details.
(iv) Each close-up photograph must have a L-shape scale.
(v) Identify name and signature of the photographer, rank and I.D. number, case FIR number (if available), police station etc.

22.5.1 Photographing the Road

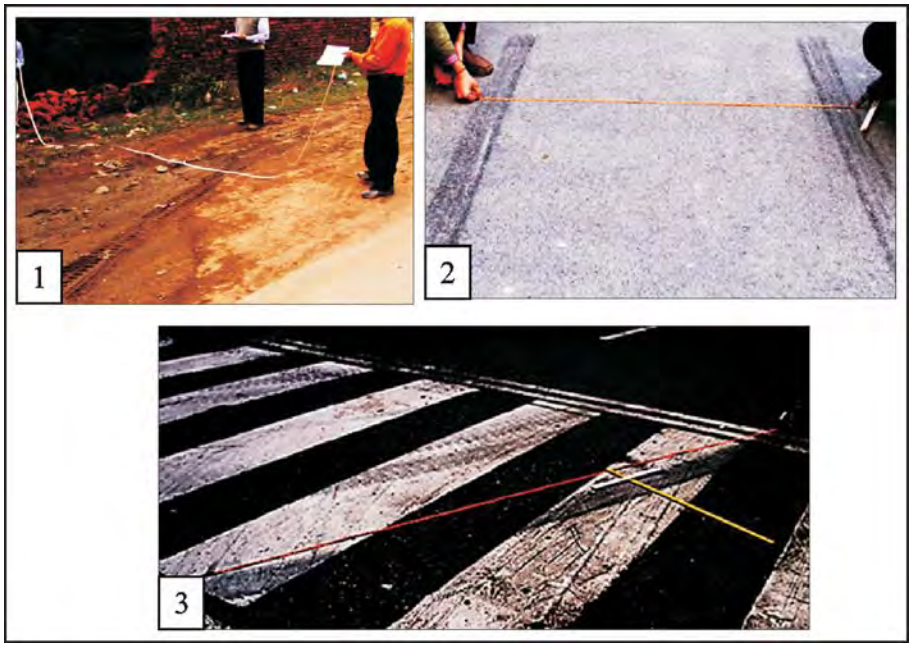


Figure 22.1: 1. Tyre marks; 2. Skid marks; 3. Yaw mark

(i) Essential photographs include the accident scene. This includes complete scene of the road such as signs, signals, control devices, and components involved in the accident.

(ii) Take more than one photograph keeping in view the seriousness and size of the accident scene. The accident scene should be photographed in the aerial photography mode. The sequences of the evidences at the scene should be photographed in overlapping manner.

(iii) Photograph road view approaching the scene. It includes the first harmful event such as pits, holes, curvet and weather conditions, etc.

(iv) More numbers of relevant photographs are typically required to document the evidences at scene from multiple directions.

(v) The location of the victim(s) (if removed from the spot), should be marked. The photograph for each victim should include location of that victim and the vehicle(s) involved in the accident.

(vi) Take photograph at the eye level.

(vii) The photographs should include resultant effect of accident on the road such as tire marks, skid marks, metal scars, debris, damage to fixed objects using wide angle lens and close range shots.

(viii) Skid marks, scuffs, yaws, and other marks will typically require a series of photographs. A few aerial photographs should be taken from an elevated point.

(ix) Photograph damages done to trees, signs, poles, road surfaces, buildings, fences, and other objects.

22.5.2 Photograph the Vehicle



Figure 22.2: Four-sided standard

(i) Take four-sided standard photograph series of the vehicle depicting all sides from center-line of the vehicle and facing towards it (as shown in Figure 22.2).

(ii) Photograph the interior and exterior of the vehicle including the vehicle identification numbers (registration).



(Left) Mid-Range photograph of Damage



(Right) Close-up photograph of

(iii) Take several photographs to indicate the type of damage in the vehicles and other components. The photographs of the damages in the vehicle may be either mid-range or close-up.

(iv) Take photograph of each major dent, blood spatter, paint transfer, scratch mark and other events resulting due to accident in each vehicle showing inter relationship.

22.6 Sketch Site and Measurements of Evidence Position

Prepare the field sketch to record the position and measurements of the items at the scene. The sketch need not be to the scale.

The field sketch should contain:

(i) The direction of north (using compass indicating) of incident site.

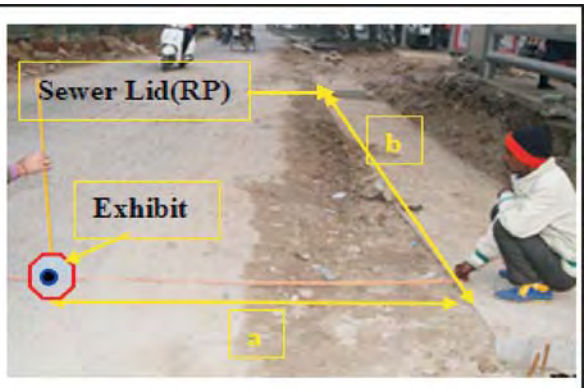
(ii) Specific locations of major evidences on the road.

(iii) Fix the baseline and reference point (RP) of the incident sites.

Fixing of baseline and reference point (RP): The first step to decide the baseline is road edge, or shoulder and a 'reference point' (RP) *as* a permanent point along the baseline. Distances are measured to fix the positions of the each evidence (shortest distance in between base line to RP and in between each evidence to the baseline).



Arrow indicating sewer lid as RP 'Reference Point'



Measurement a) From the baseline b) From the RP along the baseline

Figure 22.3: Evidence location and measurements

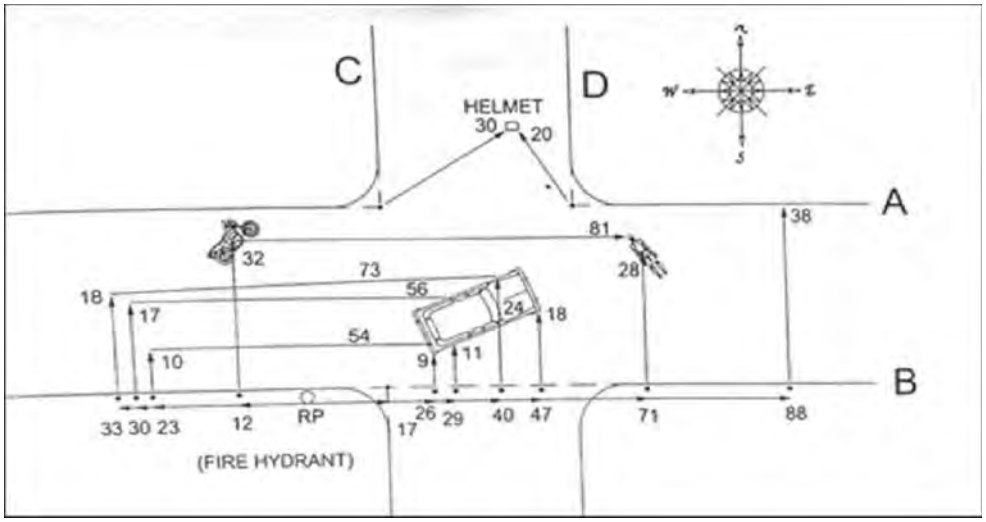


Figure 22.4: Sample sketch of the scene of accident

(i) Mark serial number of each of the evidences at the scene, e.g. Exh.1, Exh.2, Exh.3.

(ii) Mark the reference point (RP) as zero reference point on baseline.

(iii) Use metric system of units for measurement, i.e. meter/centimeter (i.e. 5.60m).

(iv) Take measurements from RP along baseline with direction (say horizontal axis) up to the baseline point (say 'b' meter south) specific for each evidence material including impression marks namely skid length, yaw radius, tire marks on the road.

(v) Write the measurements and its details alongside the sketched document in the tabular form.

(vi) Details of the case reference, name and address of person who prepares the sketch are to be documented with signature.

22.7 Examination and Evidence Collection

22.7.1 Road

22.7.1.1 Traffic Signs and Signals

Examine in detail the presence of the following evidences and record observations with photographic details (with scale):

(i) Traffic control devices, markings on road such as zebra-crossing, stop-line, median/ lane marking, speed breakers, pitches, holes and their relative measurements from RP, as per accident scene situation.



Figure 22.5: Photographs of traffic control devices, zebra crossing, pitches, holes, etc. with scale

22.7.1.2 Collision Impact

(i) Examine and record evidences and take measurements of accident marks on the road namely skid marks, yaw marks, paint chips, metal chips, blood drops, direction of all blood spatters and blood flow, gouge marks, scrap marks, furrow-marks or other mark attributing the direction and thrust on the road. The debris vehicle parts, load fallen from vehicle, water/coolant trails from a burst radiator, engine mobile oil.

(ii) Tyre marks including shape, contours, and tyre surface impression.

(iii) In case the road surface is a muddy road and bear 3D impressions on the scene, the casting of these are to be made.

22.7.1.3 Skid and Tyre Impressions

(i) Skid marks on the road help to calculate the minimum speed of vehicle(s) involved in the accident before collision. These are generally straight, parallel marks of the tyres that indicate that the brakes have been locked and the tyres are not turning. Broken skid marks caused by bumps and potholes on the road at regular intervals. Curved skid marks may be found during turning of vehicles.

(ii) Distinguish the skid marks and brake marks on the road.

(iii) Measure the lengths of each skid marks of vehicle(s) separately and average out for each vehicle.

(iv) In cases of an accident, vehicles having brakes fitted with ABS, the skid marks may not be found when the vehicle speed is below 60 km/h. Measure the vehicle(s) positions, directions, loads, position of dents and paint transfers on each vehicle are essential to compute the speed of the vehicle(s).

(v) A close up photography of the impression mark should be done keeping a scale aside the impression. Photography under oblique light gives better clarity of the impression.

(vi) Collect debris, bloodstains, and dragged material in separate and suitable containers.

(vii) Note the design and width length and location of each tire/brake marks on road/ victim clothing and their movement direction pattern.

22.7.2 Vehicle

On the Scene and on Hit and Run

(i) Mark the position and tow away the vehicle from the traffic-way for latent print, trace evidence examination.

(ii) Examine the surfaces for latent prints including the side mirrors, door handles, rear-view mirror, buckles, windows handle/button, knobs, bonnet/hood, etc.

(iii) Collect transferred trace evidences (paintchips, paint smears on dents, blood/ blood-stains, hair, tissues, fibers, glass, head/back light bulbs, etc.), wrap in paper and place them separately in the labelled containers.

(iv) Examine dent on bumper of each vehicle in the accident (front and back), scratch/ dent on the body, rim of the tires of the vehicle. Examine the evidence of paint smear/chip transfers in each vehicle.

(v) Scrap the transferred paint smear using clean blade surgical knife and take control sample of paint from close by.

(vi) Collect the transferred paints, fibers, hair in a 'Druggist fold' and in separate appropriate size paper envelope glass samples in colourless glass vials and place them separately in the labelled containers.

(vii) Suspected vehicle's tires may be transported without placing them into the container.

(viii) Tow away the vehicle from the traffic-way for mechanical inspection and report.



Figure 22.6: 1.Close shot photography of dent on the vehicle; 2.Chipped out paint

22.7.3 Drivers

From the Drivers at the Scene and Suspect Driver

Examination of the drivers/suspect drivers for drunkenness or disease, or injuries suffered:

(i) Drivers have to be subjected to examination for fitness for driving at relevant time.

(ii) The drivers clothing, shoes be collected for examination of trace evidence material such as glass, blood, or other transferred materials.

22.7.4 Special Considerations

(i) Absorb liquid blood into clean cotton cloth (2–3 inches in diameter for quick drying) leaving some portion unstained, air dry. Collect unstained control earth sample (approx. 5g) from close by in case of liquid blood from the road/ vehicle.

(ii) Dry chips of bloodstains to be lifted on clean paper and pack them separately in paper envelope. Blood stains on the vehicles can be swabbed and air dried before packaging.

(iii) Use only clean paper envelope (and not the plastic envelope to avoid decomposition).

(iv) Ensure that the hospital preserves all relevant trace evidences/autopsy samples with the victim(s) and pack them in separate containers.

(v) For toxicological use, collect 20 cc. of blood for drug/alcohol testing samples in gray top tubes.

(vi) For DNA test collect at least two 5 ml. of blood in a purple top tubes with EDTA as an anticoagulant. Only qualified personal should collect blood sample from a person and mark each test tube and fill up requisite form for authentication of specimen blood sample by the designated blood sample collector duly signed.

(vii) The adhered sheets of the wind glass(s), the inner and outer sides to be duly marked and is/are to be taken out from the respective vehicle for examining the direction of their breaking force.

(viii) Request to the hospital authorities to collect the clothings of each injured/dead victim separately after the same is air dried for their laboratory test for blood, paint examination and their comparison with corresponding evidences found on the accident spot/vehicle.

(ix) Inquest of the deceased.

22.8 Packaging and Forwarding the Case

For packaging and forwarding of evidences, the general guidelines stated in earlier Chapter no. 2 may be referred.

22.9 Likely Queries to be Raised

From Forensic Expert

(i) To examine the paint samples collected from the vehicle(s) for their source correspondence with the paint smears/chips collected from the clothings of the victim and from the scene of accident.

(ii) To examine the glass samples collected from the scene of accident, from the suspect vehicle(s), from victim and from the clothings for their source correspondence.

(iii) To examine the blood samples collected from the accident scene, from the vehicles and collected from the occupants in the vehicle/injured/dead body for their source correspondence.

(iv) To examine the filament of the light bulbs, whether these were on 'put on' mode.

(v) To examine the adhered sheets of the glass(s), to determine the nature of projectile and the direction with direction of force used to break.

From Medico Legal Examiner

(i) Cause and mode of injuries/death of victim.

22.10 Modified Claims Tribunal Agreed (MCTA) Procedure

The High court of Delhi in New Delhi has recently passed an order dated 12.12.2014 vide Delhi High Court Order dated 12.12.2014 in FAO 842/2003 in respect of (1) Rajesh Tyagi & others versus Jaibir Singh and others and (2) Sobat Singh versus Ramesh Chandra Gupta & Anr. in respect of Modified Claims Tribunal Agreed (MCTA) Procedure. It has prescribed several forms to be filled up, the details of which are given in the above referred order. The Form I and Form II of the order are to be filled up by the Investigating Officer. Form I

pertains to intimation of the road accident to the Claims Tribunal and the Insurance Company and Form II pertains to the Detailed Accident Report (DAR) consisting of eleven parts and an annexure. The Formats of the Form I and Form II as per details laid down in the High Court of Delhi Order dated 12.12.2014 are place in Appendix 1 of this chapter. Most of these details are available at the scene and therefore are required to be collected before the crime scene is released. The order of Honb'le High Court may be accessed at http://delhihighcourt.nic.in/dhcqrydisp_o.asp?pn=260300&yr=2014.

22.11 Check List

For submitting the evidence materials for laboratory tests, checks are made on the followings:

(i) Whether the Forwarding Form accompanying exhibits is duly filled in and is complete and signed by the competent authority.

(ii) Whether the queries are specific, clear and relevant to the exhibits forwarded to the laboratory.

(iii) Whether the exhibits in containers/ parcels have been sealed with tamper proof seals and seals are intact.

(iv) Whether case reference, exhibit details have been mentioned/tagged on each container of exhibit/parcel and signed by the IO.

(v) Whether the specimen seal impressions have been forwarded to the laboratory along with evidence forwarding Proforma.

(vi) Whether the given blood sample contains alcohol/drug.

(vii) Whether the road certificate/movement order for exhibits and personnel carrying exhibits to the laboratory are complete in continuity and valid in all respect.

(viii) Whether the details required for Modified Claims Tribunal Agreed (MCTA) Procedure have been collected from the scene of accident before it is released.

References

1. *Crime in India-2013*, National Crime Records Bureau, Ministry of Home Affairs, Govt. Of India, New Delhi, 2013 (website : http://ncrb.gov.in/).

2. *Law Enforcement Investigation*, Washington DC: Head Quarters, *Army Technique Publications*, Department of Army, 2013.

3. R.W. Rivers, *Evidence in Traffic Crash Investigation and Reconstruction*, Springfield: Charles C Thomas Publisher Ltd, 2006.

4. *Handbook of Forensic Services*, U.S. Department of Justice, Federal Bureau of Investigation, Laboratory Division, 1999.

5. *Scientific Aids to Investigation*, Bureau of Police Research and Development, Ministry of Home Affairs, Govt. of India, New Delhi, 1990.

6. The High court of Delhi Order dated 12.12.2014 in FAO 842/2003 in respect of (1) Rajesh Tyagi & others versus Jaibir Singh and others and (2) Sobat Singh versus Ramesh Chandra Gupta & Anr. in respect of Modified Claims Tribunal Agreed (MCTA) Procedure. http://delhihighcourt.nic.in/dhcqrydisp_o.asp?pn=260300&yr=2014

Appendix 1

FORMATS

FORM-I

INTIMATION OF THE ROAD ACCIDENT BY THE INVESTIGATING OFFICER TO THE CLAIMS TRIBUNAL AND THE INSURANCE COMPANY

1. FIR No, date and under Section
2. Name of the Police Station
3. Date, time and place of the accident
4. Source of Information (Name, Address and Tel. No.)
    (a) Driver/Owner
    (b) Victim
    (c) Witness
    (d) Hospital/Medical Facility
5. Nature of the accident:
    (a) Whether resulted in death or injury or both.
    (b) Number of persons injured/died.
    (c) In case of Injuries, whether simple or grievous.
6. Name and address of the injured/deceased
7. Details of the hospital where taken
8. Registration of the vehicle(s) involved in the accident
9. Name, address and contact no. of the owner of the offending vehicle(s)
10. Name, address and contact no. of the driver of the vehicle(s)
11. Insurance Policy Number
12. Period of Insurance Policy
13. Name and address of the Insurance Company
14. Name and contact no. of the Investigating Officer

S.H.O./I.O. _____ P.S. _____ Date _____

Enclosed- Copy of the FIR

FORM-II : DETAILED ACCIDENT REPORT (DAR)

PART I : PARTICULARS OF THE ACCIDENT

S. No.

1. FIR No., date and under Section
2. Name of the Police Station
3. Offences as per report under Section 173 CrPC
4. Date, time and place of accident
5. Who reported the accident to the Police?
   (Give name, address and contact no.)
   - (a) Driver/Owner
   - (b) Victim
   - (c) Witness
   - (d) Hospital/Medical facility
6. Name of the person who took the victim to the hospital, name of the hospital and at what time?
7. Whether any hospital denied treatment to the victim.
8. Nature of the accident:
   - (a) Whether resulted in death or injury or both.
   - (b) Number of persons injured/died.
9. Particulars of the offending vehicle(s)
10. Number of persons in the offending vehicle(s)
11. Whether the victim was:
    - (a) Pedestrian/bystander
    - (b) Cyclist
    - (c) Scooterist
    - (d) Travelling in a vehicle.If so, whether at driving seat, back seat, front seat, side car, travelling at rear guard cargo area, etc.
    - (e) Victim's vehicle no.
    - (f) No. of persons in the victim's vehicle
12. Name and contact no. of the Investigating Officer
13. Names of witnesses of the accident
14. Brief description of the accident

PART II : SITE PLAN

15. Date of preparation of the site plan
16. Site plan shall indicate:
    - (i) Place of accident
    - (ii) Position of vehicle(s)
    - (iii) Position of victim(s)
    - (iv) Skid marks

(v) Road: Whether one way or two way
(vi) Lane in which the accident took place
(vii) Permissible speed limit on the road at the site of the accident
(viii) Whether traffic control such as presence of police officer, road markings, warning sign, stop sign were there.
(ix) Location of zebra crossing or pedestrian zone
(x) Whether near traffic lights. If so, whether functional.
(xi) Distance of speed breakers, if any, from the spot of accident
(xii) Width and type of road: national highway/city road/expressway/rural road, etc.
(xiii) Direction of the vehicle(s):
    (a) Same direction (rear end)
    (b) Same direction (side swipe)
    (c) Right angle
    (d) Opposite direction (angular)
    (e) Opposite direction side swipe
    (f) Struck parked vehicle
    (g) Left turn
    (h) U-turn reversing
(xiv) Directions of movement of the vehicle
    (a) North
    (b) East
    (c) South
    (d) West
(xv) Road divided by
    (a) Barrier Median
    (b) Curbed Median
    (c) Grass Median
    (d) Painted Median
    (e) None
(xvi) Light condition
    (a) Daylight
    (b) Dusk
    (c) Dark (No Street Lights)
    (d) Dark (Street Lights On, Spot)
    (e) Dawn
    (f) Dark (Street Lights Off)
    (g) Dark (Street Lights On, Continuous)
(xvii) Visibility/Environmental condition
    (a) Clear
    (b) Fog/Smog/Smoke
    (c) Snow
    (d) Severe Crosswinds
    (e) Rain

(f) Blowing Sand or Dirt
(g) Sun Glare

(xviii) Road Character
(a) Straight and Level
(b) Straight and Grade
(c) Straight and Hillcrest
(d) Curve and Level
(e) Curve and Grade
(f) Curve and Hillcrest
(g) Under construction/maintenance

(xix) Road Surface Type
(a) Concrete
(b) Blacktop
(c) Gravel
(d) Steel Grid
(e) Dirt
(f) Pot Holes
(g) Cave in
(h) Construction material on road

(xx) Road Surface Condition
(a) Dry
(b) Wet
(c) Snowy
(d) Water (standing /moving)
(e) Sand, mud, dirt
(f) Oil

(xxi) Airbag Deployment
(a) Front
(b) Side
(c) Multiple
(d) None

(xxii) Ejection from Vehicle
(a) Not ejected
(b) Ejected
(c) Partial ejection
(d) Trapped

(xxiii) Temporary Traffic Zone
(a) None
(b) Construction Zone
(c) Maintenance Zone
(d) Utility Zone
(e) Incident Zone

(xxiv) Total number of entities involved in the crash

Crash Type: With other motor vehicle as first event:

(a) Same direction (Rear End)
(b) Same direction (Slide Sweep)
(c) Right Angle
(d) Opposite Direction (Hereon, Angular)
(e) Opposite Direction (Slide Sweep)
(f) Struck Parked Vehicle
(g) Left Turn/U Turn
(h) Backing

(i) Encroachment - With below as first event:

(a) Overturn
(b) Fixed Object
(c) Animal
(d) Pedestrian
(e) Pedal Cyclist
(f) Non-fixed Object
(g) Railcar Vehicle

PART III : PARTICULARS OF THE DRIVER(S)

(In case of more than one driver, submit separate Part III for each driver)

17. Name, address and contract no. of the driver
18. Age
19. Gender
20. Education
21. Occupation
22. Family
23. Income (monthly)
24. Account No. with name and address of the Bank in which the driver is maintaining his account
25. Driving licence:
    (a) Driving License No.
    (b) Whether learner license.
    (c) Period of validity
    (d) Issued by
    (e) Class of vehicle
    (f) Whether license suspended or cancelled.
26. In case of learner's licence:
    (a) Whether driving under supervision
    (b) Whether driving with lapsed learner license

27. Whether driver is the owner/paid driver/otherwise.
28. Whether driving with the knowledge / consent of the owner.
29. (a) Whether driving under influence of liquor/drugs.
    (b) Whether finding based on scientific report.
30. (a) Whether the driver reported the accident to the police/family of the victim.
    (b) Whether the driver took the victim to the hospital.
    (c) Whether the driver visited the victim at the hospital.
    (d) Whether the driver remained at the spot till arrival of the police.
    (e) Whether the driver did not remove the offending vehicle from the spot till the arrival of the police.
    (f) Whether the driver paid compensation/medical compensation to the victim/his family.
    (g) Whether the driver cooperated in investigation.
    (h) Whether the driver also suffered injuries in the accident.
    (i) Whether discharged duty under Section 132 and 134 of the MV Act, 1988.
    (j) If not, whether the driver has been prosecuted under Section 187 MV Act, 1988.
31. Whether the driver fled from the spot. If so, the date on which he appeared before the police/Court or was arrested.
32. Any other relevant information relating to the driver.

PART IV : PARTICULARS OF THE OFFENDING VEHICLE (S)

(In case of more than one vehicle, submit separate Part IV for each vehicle)

33. (a) Registration No.
    (b) Colour
    (c) Make
    (d) Model
    (e) Year
    (f) Engine No.
    (g) Chasis No.
    (h) Address of the Registering Authority
    (i) Private or Commercial (public service vehicle, goods carriage/educational institution bus)
34. Name, address, occupation and contact number of the owner:
    (a) In case of company, person in charge in terms Section 199 of the MV Act, 1988
    (b) In case of sale of the vehicle, give particulars of the purchaser and date of transfer
35. In case of commercial vehicle:
    (a) Particulars of fitness
    (b) Particulars of permit
36. Whether driver employed on monthly or daily basis? Attach the proof of employment of driver such as appointment letter, salary slip, duty register or other relevant documents.
37. In case the driver fled from the spot, did the owner produce the driver before the police? If so, when? Attach the copy of the notice under Section 133 MV Act, 1988 and its reply.

38. Whether the owner reported the accident to the Insurance Company. If so, when?
39. Whether the owner co-operated in the investigation.
40. (a) Whether the owner discharged his duties under Section 133 and 134 MV Act, 1988.
    (b) If so, whether the owner prosecuted under Section 187 MV Act, 1988.
41. In the case of un-insured vehicle:
    (a) Whether the owner/driver prosecuted under Section 196 of the MV Act, 1988.
    (b) Whether the owner/driver made payment of compensation to the victim or his family. Give particulars, if available.

PART V : PARTICULARS OF THE INSURANCE OF THE VEHICLE(S)

42. Policy Number
43. Period of policy
44. Issued by (give name and address of the Insurance Company)
45. Nature of policy i.e. Third party or comprehensive
46. Name, address and contact number of the Designated Officer of the Insurance Company
47. Date of intimation of the accident by the Investigating Officer to the Insurance Company
48. Date of appointment of the Designated Officer by the Insurance Company
49. Account no. with name and address of the Bank in which the Insurance company is having its account

PART VI : MECHANICAL INSPECTION OF ALL VEHICLES INVOLVED IN THE ACCIDENT

50. Name and qualification of the Mechanical Officer
51. Date of mechanical inspection of the vehicle(s)
52. Date of mechanical inspection report(s)
53. Whether the mechanical inspection report is in terms of Annexure-A. If no, give reasons thereof.
54. Whether any delay in mechanical inspection or submitting report. If so, give reasons thereof.

PART VII : IMPACT OF THE ACCIDENT ON THE VICTIM(S)

(In case of more than one victim, submit separate Part VII for each victim)

55. Death Cases:
    (a) Name and address of the deceased
    (b) Age
    (c) Gender
    (d) Education
    (e) Occupation

(f) Income (monthly)
(g) Legal heirs/Guardian:
  (i) Name
  (ii) Relationship
  (iii) Age
  (iv) Address
  (v) Contact No.

56. Injury Cases:
  (a) Name and address of injured
  (b) Age
  (c) Gender
  (d) Education
  (e) Occupation
  (f) Income (monthly)
  (g) Details of family/dependents of the victim.
  (h) MLC No. (i) Nature of injuries
  (j) Name of hospital(s) where injured treated?
  (k) Whether victim refused medical treatment
  (l) Period of hospitalization
  (m) Period of treatment
  (n) Whether treatment continuing
  (o) Name, address and contact number of the doctor(s) who treated the injured
  (p) Whether injured underwent any surgery(s). If so,give particulars
  (q) Whether suffered any permanent disability. If yes, give details
  (r) Expenditure incurred on treatment, conveyance, special diet, attendant etc. Give details, if available
  (s) Whether the injured got reimbursement of medical expenses from his employer or under a mediclaim policy. Give details, if available
  (t) Whether the injured provided cashless treatment by the Insurance Company. Give details, if available
57. Any other relevant information

PART VIII : APPARENT CONTRIBUTING CIRCUMSTANCES

58. Driving without valid driving licence
59. Driving while disqualified
60. Learner driving without supervision
61. Vehicle not insured
62. Driving a stolen vehicle
63. Vehicle taken out without the consent of the owner
64. Driving dangerously or at excessive speed
65. Under influence of liquor or drugs.Give quantity/parameters/recovery, if available

66. Dangerously loaded vehicle
67. Parking on the wrong side of the road
68. Parking at prohibited places
69. Non-observance of traffic rules
70. Poorly maintained vehicle
71. Fake/forged driving license
72. Previous conviction(s)/past history of bad driving
73. Driving aggressively:
    - (a) Jumped red light
    - (b) Abrupt braking
    - (c) Neglected to keep to the left of the road
    - (d) Driving criss-cross
    - (e) Driving too close to the vehicle in front
    - (f) Persistent inappropriate attempts to overtake
    - (g) Cutting in after overtaking
    - (h) Racing/competitive driving
    - (i) Crossing speed limit
    - (j) Disregarding any warnings
    - (k) Driving on the wrong side
    - (l) Overtaking where prohibited
    - (m) Driving with loud music
    - (n) Improper reversing
    - (o) Improper passing
    - (p) Improper turning
    - (q) Driving in no entry hours
    - (r) Not slowing down at crossing/road junction
    - (s) Turning without indication
    - (t) Not respecting stop sign on road surface
    - (u) Not respecting right of way to pedestrian
    - (v) Using mobile phone while driving
74. Irresponsible behavior:
    - (a) Failing to stop after accident
    - (b) Ran away from the spot after leaving the vehicle
    - (c) Destruction or attempt to destroy the evidence.
    - (d) Falsely claiming that one of the victims was responsible for the accident
    - (e) Trying to throw the victim off the bonnet of the vehicle by swerving in order to escape
    - (f) Causing death/injury in the course of dangerous driving post commission of crime or chased by police in an attempt to avoid detection or apprehension.
    - (g) Offence committed while the offender was on bail.
    - (h) Misled the investigation
    - (i) Post accident road rage behaviour, give details.
75. Any other contributing factor

PART IX : OTHER OFFENCES COMMITTED AT THE SAME TIME

76. (a) Sections 3/181- Driving without license
(b) Sections 4/181- Driving by minor
(c) Sections 5/181- Allowing unauthorized person to drive
(d) Sections 56/192- Without fitness
(e) Sections 66(1)/192A- Without permit
(f) Sections 112/183(1)- Over speed
(g) Sections 113/194- Over loading
(h) Sections 119/177- Jumping red light
(i) Sections 119/277- Violation of mandatory signs (One way, No right turn, No left turn)
(j) Sections 122/177- Improper obstructive parking
(k) Sections 146/196 Without insurance
(l) Section 177/RRR17(1)- Violation of One way
(m) Section 177/RRR29- Carrying High/Long Load
(n) Section 177/CMVR 138(3) - Not using seat belt
(o) Section 177/RRR6- Violation of No overtaking
(p) Section 177/CMVR 105- Without light after sunset
(q) Section 179- Misbehaviour with police officer
(r) Section 184- Driving dangerously
(s) Section 184- Using mobile phone while driving
(t) Section 185- Drunken driving/under influence of drugs
(u) Section 187- Violation of Sections 132(1)(c), 133 and 134
(v) Any other offence

PART X : DIRECTIONS REQUIRED FROM CLAIMS TRIBUNAL

77. The driver(s) involved in the accident have not furnished information mentioned in para(s) _____ [para(s) 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30 and 41(b) of Part III] and the documents mentioned in para(s) _____ [para(s) 91, 92, 93, 94, 95, 96, 97 of Part XI]. The driver(s) may be directed to furnish the requisite information on affidavit along with the original documents before the Claims Tribunal. (Copy of the letter demanding the information/documents be attached)

78. The owner(s) of the vehicles involved in the failed to furnish the information mentioned in para(s) _____ [para(s) 34, 35, 36, 38, 40 and 41(b)]of Part IV and have not produced the documents mentioned in para(s) _____ [para(s) 92, 93, 94, 95, 96 and 97] of Part XI. The owner(s) may be directed to disclose the requisite information on affidavit along with the original documents before the Claims Tribunal. (Copy of the letter demanding the information/documents be attached)

79. The Insurance Company has failed to disclose information para(s) ____ [para(s) 46, 47, 48, 49] of Part V. The Insurance Company may be directed to disclose the requisite information on affidavit along with the original documents before the Claims Tribunal. (Copy of the letter demanding the information/documents be attached)

80. The claimant(s) have failed to disclose the information mentioned in para(s) ____ [para(s) 55 and 56] of Part VII and the documents mentioned in para(s) ____ [para(s) 101 and 102] of Part XI. The claimant(s) may be directed to disclose the requisite information on affidavit along with the original documents before the Claims Tribunal. (Copy of the letter demanding the information/documents be attached)

81. The registration authority have failed to verify documents (registration certificate, driving licence, fitness and permit) within 15 days of the application in terms of Clause 5 of the modified Claims tribunal Agreed Procedure and, therefore, necessary directions be issued to the registration authority to produce the same before the Claims Tribunal. (Copy of the letter demanding the information/documents be attached)

82. _____ Hospital has failed to issue (MLC/Post Mortem Report) within 15 days of the accident in terms of Clause 6 and, therefore, the necessary directions be issued to the Hospital to produce the same before the Claims Tribunal. (Copy of the letter demanding the information/documents be attached)

83. Specify any other direction that may be necessary.

PART XI : RELEVANT DOCUMENTS TO BE ATTACHED

84. First Information Report
85. Site plan in terms of Para 16
86. Photographs of the scene of accident from all angles
87. Photographs of all the vehicles involved in the accident from all angles
88. Photograph and admitted signature of the driver(s) of the offending vehicle(s)
89. Photograph and specimen signature of the owner(s) of the offending vehicle
90. Mechanical Inspection Report in format of Annexure A
91. Driving license of the driver
92. Proof of employment of driver such as appointment letter, salary slips, duty register etc.
93. Registration certificate of the offending vehicle(s)
94. In case of transfer of vehicle, sale documents, possession letter or any other document relating to transfer, if any
95. Insurance Policy of the offending vehicle(s)
96. Permit (for commercial vehicle)
97. Fitness Certificate (for commercial vehicle)
98. Report under Section 173 Cr.P.C.
99. Statements of the witnesses recorded by the police
100. Scientific report, if the driver was under the influence of liquor/drugs
101. In case of Death
    (a) Post Mortem Report
    (b) Death certificate
    (c) Photograph and proof of the identity of the dead

(d) Proof of age of the deceased which may be in form of :
  (i) Birth certificate
  (ii) School certificate
  (iii) Certificate from Gram Panchayat (in case of illiterate)
(e) Proof of Occupation and income of the deceased which may be in form of :
  (i) Pay slip/salary certificate for salaried employees.
  (ii) Bank statements of the last six months.
  (iii) Income Tax Returns
  (iv) Balance Sheets
(f) Proof of the legal representatives of the deceased
  (i) Names
  (ii) Age
  (iii) Address
  (iv) Relationship
  (v) Contact no.
(g) Photographs, specimen signatures attested by the bank and identity proof of the legal representatives of the deceased
(h) Treatment record, medical bills and other expenditure
(i) Bank Account no. of the legal representatives of the deceased with name and address of the bank

102. In case of Injury
(a) MLC
(b) Multi angle photographs of the injured
(c) Photographs, specimen signatures attested by the bank and identity proof of the injured
(d) Proof of age of the injured which may be in form of :
  (i) Birth certificate
  (ii) School certificate
  (iii) Certificate from Gram Panchayat (in case of illiterate)
(e) Proof of occupational income of the injured at the time of the accident which may be in form of:
  (i) Pay slip/salary certificate for salaried employees.
  (ii) Bank statements of the last six months of the deceased.
  (iii) Income Tax Returns
  (iv) Balance Sheets
(f) Treatment record, medical bills and other expenditure. In case of long term treatment, the SHO/IO shall also record the details so that the claimant may furnish documents before the Claims Tribunal
(g) Disability certificate
(h) Proof of absence from work where loss of income on account of injury is being claimed, which may be in the form of:
  (i) Certificate from the employer
  (ii) Extracts from the attendance register
  (iii) Proof of reimbursement of medical expenses by employer or under a Mediclaim policy, if taken

103. Copy of the letter of the Investigating Officer demanding the relevant information/ documents from the driver as mentioned in para 77 above
104. Copy of the letter of the Investigating Officer demanding the relevant information/documents from the owner as mentioned in para 78 above
105. Copy of the letter of the Investigating Officer demanding the relevant information/documents from the Insurance Company as mentioned in para 79 above
106. Copy of the letter of the Investigating Officer demanding the relevant information/documents from the claimants as mentioned in para 80 above
107. Copy of the letter of the Investigating Officer demanding the relevant information/documents from the registration authorities as mentioned in para 81 above
108. Copy of the letter of the Investigating Officer demanding the relevant information/documents from the hospital as mentioned in para 82 above
109. Any other relevant document(s)

VERIFICATION

Verified at _____ on this _____ of _____, that the contents of the above report are true and correct as per information and documents gathered during investigation.

Station House Officer
(Name and Stamp)

Assistant Commissioner of Police
(Name and Stamp)

ANNEXURE- A

DETAILED ACCIDENT REPORT (DAR) FORMAT OF THE MECHANICAL INSPECTION REPORT

(Submit separate Mechanical Inspection Report for each vehicle)

1. Case FIR No
2. Under Section
3. Police Station
4. Registration No. of the vehicle
5. Make, Model Name, Colour and Type of vehicle

6. In case of HTV/MGV/LGV
   (a) Whether Lateral Under Run Protective Device (LUPD) and Rear Under Run Protective Device (RUPD) installed. (For vehicle weighing 3.5 ton or more)
   (b) Whether speed governor installed and functional or otherwise
7. In case of commercial vehicle :
   (a) Particulars of fitness
   (b) Particulars of permit
8. Point of impact and damage
9. Mechanical condition of the vehicle
10. Paint marks (if any)
11. Condition of braking system i.e. working or not?
12. Whether the vehicle fitted with Anti-lock Braking System (ABS)
   (a) If yes, whether it is functioning or not
   (b) Whether trials regarding skid marks of ABS fitted vehicle have been carried out to estimate the speed of the vehicle
13. Whether vehicle modified by
   (a) Installing CNG/LPG Kit
   (b) Change of vehicle body
14. Condition of tyres: whether original or retreaded
15. Whether horn was installed and functional
16. Whether the brake lights and other lights functional
17. Condition of safety bags in the vehicle
18. Whether the vehicle properly maintained
19. Whether the vehicle had faulty number plate
20. Whether the vehicle had tinted glasses
21. If the vehicle was educational institution bus, whether the vehicle was fitted with the doors that can be shut and whether the vehicle had a suitable inscription to indicate that they are in the duty of an educational institute, as per the guidelines laid down in MC Mehta v. Union of India, (1998) 1 SCC 676 and MC Mehta v. Union of India (1999) 1 SCC 413
22. Details of damage on the vehicle

Mechanical Officer
(Name and Stamp)

SHO
Date
(Name and Stamp)

23 THEFT AND BURGLARY

Burglary cases are registered under Sections 449–460 of The Indian Penal Code (IPC) and the theft cases are dealt with under sections 379–382 of IPC.

This Chapter aims to provide guidance and procedures to the IO for search, identification, collection, packaging and transportation of evidence from the scene of burglary or theft for forensic examination.

Burglary is one of the most commonly encountered crimes investigated by the police. It is however impossible for the burglar not to leave traces behind when leaving the scene. The evidences such as tool marks and their own marks are left when the burglars use the tools / implements to break the entry doors, windows for entry or safe / store-well to steel the valuables.

The investigating office therefore must collect the evidence left by the burglar such as fingerprints, shoeprints, tool marks; also the evidence that may have been broken at the scene such as glass or wooden chips etc. and/or may have been transferred to the burglar in traces. The common tools used are cutters, drilling jimmy or locally devised tools by the burglar. The traces of evidence would have been transferred between the scene and the burglar. The investigation of the crime may be facilitated by the clue material present at the scene of crime and the clues recovered from the suspect and his environments.

Modus Oprandi adopted by the criminal may provide a significant clue to his identity if previous records (or knowledge) are available. Through the use of state DNA databases, agencies it is possible to identify suspects involved in numerous and more violent associated crimes such as rape, robbery, or murder.

This Chapter aims to provide guidance and procedures to the IO for search, identification, collection, packaging and transportation of evidence from the scene of burglary or theft for forensic examination.

23.1 List of Equipments required

23.1.1 Photography and Evidence Search kit

(i) Magnifying glass/hand microscope
(ii) DSLR (Digital Single Lens Reflex) Camera, (16 MP)
(iii) Zoom lens, macro lens
(iv) Dedicated electronic flash
(v) Dedicated PC cord
(vi) Heavy duty tripod
(vii) Polarizing filter (red, orange and yellow filters)
(viii) Camera lens cleaning kit
(ix) Miscellaneous items: batteries for camera and flash, extra memory cards, measuring scale, mini flashlight

23.1.2 Finger Prints Development Kits

(i) Master fingerprint kits
(ii) Fluorescent fingerprint power kit
(iii) Contrast finger print kit with magnetic powder
(iv) Standard feather brushes
(v) Magnifying glasses
(vi) High intensity search light with variable filters

23.1.3 Footprint/Shoe Prints Collection Kits

(i) Footprint adhesive tapes
(ii) Electrostatic dust lifter from shoe sole

23.1.4 Tool Marks Lifting Kit

(i) Silicon casting dispensing system
(ii) Cellulose acetate casting
(iii) Plaster of Paris and suitable moulds

23.2 Police as First Responder at Place of Occurrence

The IO needs to plan the essential steps for investigation to be taken at the crime scene. The following essential functions are considered as good practice.

(i) Arrive at scene as early as possible.

(ii) Immediate preservation of scene to prevent visible and invisible evidences from further contamination or loss.

(iii) Find specifics of the incidence and the modus operandi of crime from the victim/ neighbours.

(iv) The inmates should be discouraged from cleaning or moving any area where the burglary has occurred.

(v) Locate the point where from the burglars made entry into the premises. The point of forced entry will give clues to the type of instruments and tools used to break in. Look for the exit route, as well if any.

(vi) There will be enough evidence of actions leading to the impression marks of burglar's shoes/foot and fingerprints on the entry/exit routes, glassware, glass pane (of doors, windows almirah, etc.), polished furniture, mirror, trunks and suitcase, etc., or even the tyre impression/depression marks if the burglars used vehicle for transport.

(vii) There may be plenty of tool marks on entry points and forced breaking the safe for burglary of valuable and costly items in the house likemarks of crowbar, hammer. Screwdrivers, wedges, etc., can be found on doors/windows/locks/walls/trunks/cabinets/ almirah/safe, etc. Marks of the jacks or any other tool used for bending iron bars of a window may also be found. Marks of hole using drilling machine or any other tool on wooden doors, brick wall, etc.

(viii) Search for footprint/shoe print around and to the ground outdoor. Footprints can tell if there were multiple burglars, as well as estimating the size and weight of the individual. The crime scene has to be carefully searched for complete and partial fingerprints.

(ix) Check if the CCTV system is installed in the premises.

(x) Check any unusual signs at/around the crime scene.

(xi) Check whether crime is committed under dark-light/moonlight (specific feature of crime committed by a particular community).

(xii) Documentation and sketching of crime scene should be done. The place of occurrence should be photographed including different angles and close-ups.

23.3 Evidence Likely to be found at the Place of Occurrence

23.3.1 Material Left at the Crime Scene

(i) Bloodstains left behind by the suspect from the injuries to his body, including bloodstained fingerprint/footprint in rare cases.

(ii) Fingerprints/footprints left by the criminal at crime scene. Particular items like refrigerator, points of entry/exit, glassware, furniture, etc., should be checked.

(iii) Cloth such as wearing apparel or a part, handkerchief, or accidentally torn fragments of his clothing.

(iv) Hair (as a result of struggle) of suspect can be found at crime scene, they should be collected for the purpose of identification (DNA profiling).

(v) Cigarette or *beedi* stubs.

(vi) Materials transferred from the tool used on the surface of impact.

23.3.2 Materials which may get transferred to the criminal during commission of crime

(i) Glass fragments which may go into the clothing of the suspect while forcibly opening a glass pan any glass ware.

(ii) Dust or vegetation from the scene which could be carried on the footwear or clothing of suspect.

(iii) Fibers from carpets, upholstery, beds and any other material at the scene.

23.3.3 From Suspect and his Environment

(i) Traces of soil, dust, mortar, vegetation, fiber, paint, chips of wood, glass particles, etc., in the clothing and footwear of the criminal and traces of materials from the property stolen from the scene.

(ii) Traces of paint, wood, glass, rust or particles of metal transferred from the objects at the scene on the tools.

(iii) If a vehicle is used in the commission of crime: traces left by stolen property carried in the vehicle, soil, vegetation, glass, paint, fibers, and fragments of fabrics, etc., transferred from the scene or from the suspect.

23.4 Collection and Preservation of Evidence Material

23.4.1 Fingerprints

(i) The latent chance fingerprints are mostly found around and in the broken safe/ almirah, door handles, window pans, and entry/exit points.

(ii) These should be checked on priority, detected and developed using appropriate fingerprint development method.

(iii) Clear chance prints are found on smooth surfaces. This is the most valuable evidence to identify the burglar(s) and therefore must be conducted by team of fingerprint expert.

(iv) Fingerprints of inmates should also be collected for the purpose of elimination.

23.4.2 Glass Fragments

(i) Evidence should be collected from the various locations throughout the broken portion of the object in order to have representative sample.

(ii) The area from which any glass evidence is collected should be documented as specifically as possible.

(iii) Clothing, shoes and similar items contain traces of glass evidence and should be carefully examined for presence of the glass fragments. Any glass sample found should be properly documented with the source and location.

(iv) Glass fragments should be collected, wrapped in paper and kept in plastic container/ card board container, vial, small bottle or other container of suitable size.

(v) Minute glass fragments which are unlikely to break in transit should be collected in 'druggists' fold followed by keeping in a paper envelope/plastic container. Larger pieces should be kept in a box preserving its edges by soft tissue paper or similar materials.

23.4.3 Tools and Tool Marks Evidences

(i) Sometimes the burglar's tool and heavy implements for house breaking are found left or thrown within close around the premises or can be recovered from the suspect.

(ii) Tool marks should be first photographed and the place and material on which the tool mark is present, should be properly documented.

(iii) Photography should be carried out keeping the camera perpendicular to the surface of tool marks. At least two photographs, one showing the background and another as a close up, should be taken keeping a scale aside. Photography of the tool marks under oblique light can further add minute details in the photograph. These photographs after proper labelling can also be sent to the laboratory for examination.

(iv) A two-dimensional photograph of tool marks often misses the details. Casting or moulding is another option to lift the tool marks which is simply a reverse or negative-three dimensional image of the impression.

(v) The evidence material having tool marks should be collected and submitted to the laboratory for appropriate casting of tool marks. In case it is not possible to collect the material, prepare the cast of the marks at the place.
Some popular casting/moulding methods are as follows:

(a) Plastic/rubber: This is a material for lifting fine details of a tool mark. A lump of material is softened by pressing in fingers and then applied on the surface. It is pressed carefully as it is likely to be disturbed by outside pressure.

(b) Dental casting material (dental stone): This also gives fine details of tool marks.

(c) Cellulose acetate: Tool marks from stone, concrete, wood, etc., can be lifted by cellulose acetate dissolved in acetone. A layer of 1/16 inch is made. However, the cellulose acetate cast should be photographed, with scale, immediately otherwise the layer is likely to shrink.

(vi) The samples of the material deposited on the tools and around the tool marks should be collected.

23.4.4 Foot/Shoeprints/Tyre Impression

(i) The impression marks should be first photographed and documented.

(ii) If the footprint/footwear impression present on movable objects like paper, mat, planks, etc., the object should be referred for development of latent prints after proper packing.

(iii) Casting of impressions: A variety of materials like metal alloys, wax, resins, plastic powders, modelling clay, plaster of Paris, etc., are used to prepare the moulding cast.

(iv) Electrostatic dust lifting equipment: A black vinyl sheet is placed over the suspected area containing the impressions and is covered with aluminium foil through which a high voltage (1500 volts) is applied. The dust particles, which form the impressions, are attracted towards the vinyl sheet and are attached to it. This can be later photographed for a permanent record.

(v) Tracing of impressions**:** A glass sheet should be held over the impressions as close as possible but without touching the impressions. Then the contours of impression are sketched on the glass plate with the maximum possible detail. The glass plate can then be transferred to the laboratory.

23.4.5 CCTV Recording

Follow guidelines on CCTV footage from Chapter 21.

23.5 Forwarding the Exhibits for Forensic Examination

(i) Forwarding memo should be filled up giving brief history of the case, details of the sealed parcels and their contents, nature of examination required (see chapter no. 2 for details).

(ii) Certificate authorizing the Director, Forensic Science Laboratory for examination of the exhibits.

(iii) Specimen of the seal impression in wax on a piece of cloth duly attested by the concerned official, should also be sent along with forwarding memo.

23.6 Queries to be Raised: Whether the

(i) Fingerprint/footprints collected from the scene and/or from stolen articles recovered match with that of suspect's fingerprint/footprints.

(ii) Footprints collected from the scene belong to a single person or more than one person.

(iii) Blood/bloodstain collected from scene match with that of suspect(s).

(iv) Glass particles collected from suspect's clothing/shoes correspond with the crime scene glass samples.

(v) Tool marks as evidence from the scene to be compared with recovered tools.

(vi) The soil/fiber/grease/paint, etc., collected from suspected vehicle should be compared with standard crime scene samples.

References

1. Directorate of Forensic Science: *Laboratory Procedure Manual, Forensic Physics*, Ministry of Home Affairs, Government of India, New Delhi, 2005.

2. *Handbook of Forensic Services*, U.S. Department of Justice, Federal Bureau of Investigation, 1999.

3. M.S. Rao et al., *Crime Scene Management, A Forensic Approach*, Selective Scientific Books, Delhi, 2009.

4. *Scientific Aids to Investigation*, Bureau of Police Research and Development, Ministry of Home Affairs, Government of India, New Delhi, 1990.

24 SPEAKER IDENTIFICATION

Audio-video recordings in electronic form are becoming more prevalent as evidence in the investigation of a crime. Such evidences are frequently encountered as an important clue in crime cases such as terrorism, extortion, intimidation, espionage, drug trafficking, stalking, kidnapping and ransom demands, and in trap case investigations under the Prevention of Corruption Act, etc.

These 'electronic records' are synonymous to documentary evidence and requirements of section 65B of Indian Evidence Act are to be fulfilled.

The audio evidences obtained during search of the premises of suspects, help to identify the speaker(s) and their criminal intentions can be connected to crime.

In the technique of speaker identification, electronically recorded questioned audio recordings of suspect(s)/complainant is to be compared with the authenticated specimen speech sample(s) of the known speaker in order to identify the speaker of questioned audio evidence.

24.1 Crime Categorywise Possible Audio Evidence Devices

(i) Death investigation, domestic violence, threats, and extortion - mobile communication devices, PDAs.

(ii) Terrorism: Potential audio digital evidence in terrorism investigations includes computers, handheld mobile devices, mobile phones, PDAs, removable media, external data storage devices, voice over internet protocol (VoIP).

(iii) Kidnapping, ransom and bribery: Handheld mobile devices, audio recordings of conversation between suspect and victim (family members).

(iv) Theft and stalking investigations: Mobile devices, PDAs.

(v) Telecommunication fraud: Handheld mobile devices, External data-storage devices, Phone programming software and cables multiple mobile phones.

(vi) Child abuse or exploitation, computer intrusion-handheld mobile devices.

24.2 Tools and Materials for Collecting Evidence

(i) Cameras (still and video)
(ii) Anti-static bag
(iii) Bubble wrap and other packing material
(iv) Paper bags and sturdy boxes
(v) Labels, permanent marking pen, notepads
(vi) Gloves
(vii) Audio recorders/micro voice recorders/digital audio recorders/audio cassettes/mini audio cassettes, cable jacks.
(viii) New CD-Rs, write blocker and reader are to be kept ready for selective use in the collection of audio evidences.

24.3 Police as First Responder at the Scene

Police should be aware that voice evidence is mostly recorded/ stored in various electronic device, and can function independently or attached to computer systems. Handling of audio evidence, audio recording and storage devices are to be like that of digital evidence.

24.3.1 Search

Storage and recording devices that may contain audio evidences are:

(i) Hard drives installed in a computer
(ii) External hard drives removable media such as compact disc, zip disks, digital versatile disc
(iii) Pendrive, memory cards

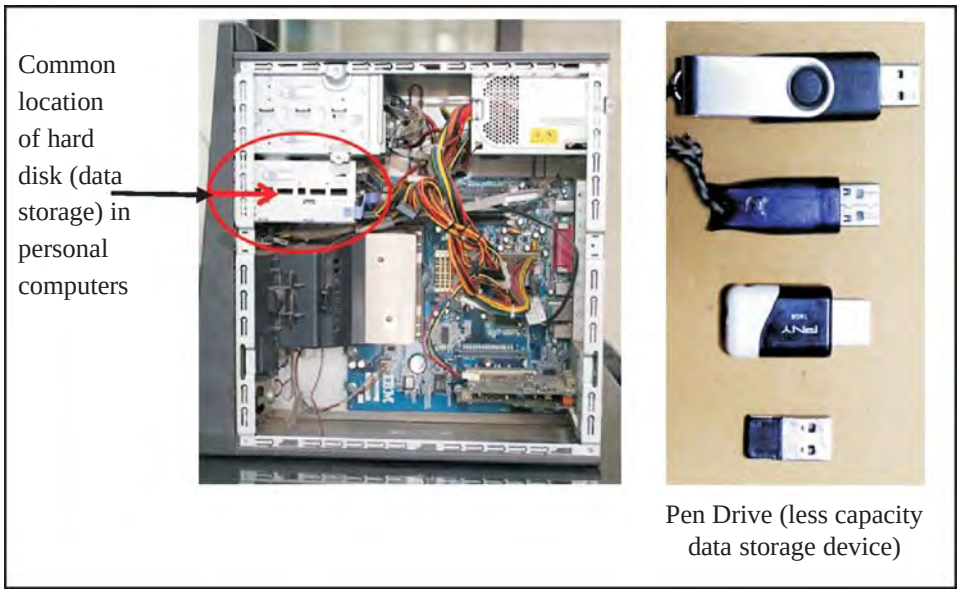


Figure 24.1: Storage and recording devices

(iv) The handheld devices such as mobile phones, smart phones, the digital multimedia (audio and video) devices, telephonic conversation interceptor, etc.

(v) The peripheral devices such as VoIP devices

(vi) The data storage tape drives-digital audio recorders, computers, etc.

24.3.2 Documentation of Scene

The following information should be documented before collecting the electronic data from the system:

(i) Document the status using photography, sketching and note taking.

(ii) Physical condition including visual damages.

(iii) Make model and serial number of digital recording devices and its storage media.

(iv) Whether system is networked.

24.3.3 Collection Criteria for Audio Evidence

(i) Check if the device is stand alone or attached to a network. If evidence is small and portable such as a cell phone, tablet or telephone interceptor, the same may be collected in anti-static bag.

(ii) If audio evidence is discovered in devices that cannot be shifted, then it may be searched there for the audio recordings and transfer the recordings through a laptop/ desk computer into CD-R/DVD-R in 'Write Once' mode, maintaining the authentication of electronic audio recordings.

(iii) Prepare seizure memo stating complete sequence of process in transferring the audio data to the CD stating all provisions as required u/s 65B of The Indian Evidence Act, including certification.

(iv) The evidence should be marked on the back side of the disk using a soft tip permanent marker pen along with the case particular and to be signed by the IO as well as the witnesses.

(v) Only half of the space on the back of the disk should be used for marking, case particulars and signature of IO and witnesses. Other half of the space on the backside of the disk should be left.

(vi) Working copy of the audio data should be separately prepared for its frequent use in investigation by IO and for preparation of an accurate transcription.

24.3.4 Recording of Questioned Conversation with Suspect(s)

(i) The IO should be well conversant with the working of instruments and accessories used for recordings. In otherwise situations, the FSL assistance be obtained for voice recording.

(ii) Questioned samples can be recorded through TIR (Telephone Information Recorder), voice logger installed at police station or police headquarters.

(iii) The digital audio recorder used for recording the telephone calls should be set at sampling rate not less than 8000 Hz. with quantization @ 8 bit or 16 bit either in unsigned mono or signed stereo.

(iv) In case of mobile to mobile and landline telephone to mobile calls, record the conversation on receiving mobile phone by inbuilt SD card/chip or through a computer or tape recording device.

(v) In case of mobile to landline telephone calls, the conversation can be recorded on telephone information recorder (TIR).

(vi) If recording is done on mobile phone, submit the mobile handset to the laboratory for its secure transfer of data to CD/DVD.

(vii) If the recording is done on mobile phone or any other device containing audio recording(s), submit the same for examination to the laboratory.

(viii) In case the authentic electronic copy is to be prepared during the recording data acquisition stage for keeping a record file or for investigation purposes, the authentication of electronic audio records is to be effected as per provision of sections 3(2) and 4 of IT Act 2000.

24.3.5 Authentication of Electronic Records

The authentication of an electronic record is to be effected by the use of asymmetric crypto system and hash function which envelope and transform the initial electronic record into another electronic record. The hash function (commonly called hash value) means an algorithm mapping or translation of one sequence of bits into another, known as 'hash result' such that particular electronic record yields the same hash result every time when the same algorithm is executed. In other words it is computationally infeasible that the two electronic records or an electronic record and its modified record can produce the same hash result using the same hash algorithm (for details the Indian IT Act 2000 section 3(2) may be seen).

The most widely used hash functions in tune with international standards are: SHA (Secure Hash Algorithm) and MD5 (Message Digest). The SHA-1 hash function is a set of cryptographic

hash functions designed by the National Security Agency (NSA), USA. In India, Centre for Development of Advanced Computing (CDAC) has developed a similar system for such functions and can be used after due evaluation. Some secured software having capability of simultaneous computing multiple hash algorithm functions are available commercially or through open sources on internet.

The hash result is computed to maintain the authenticity and integrity of the evidence when it is seized or received for the examination.

First hash result is calculated at the time of the acquisition of conversation recorded in the recording device before the witnesses and computes the hash result (hash value commonly said by regular users) by using commercially/open source software such as SHA-1, MD5) and the computed hash result is documented.

The second Hash value of the copy of the same, if prepared, is calculated and documented.

The third Hash value is calculated of the original media after imaging/copy as secondary evidence, to establish that the original media has not been altered in the preparation of forensic backup.

The inter comparison of the Hash value for an unaltered digital audio recording should remain the same.

Further, the Hash value can be calculated at any stage, pre or post examination which will not only establish the authenticity of examination process but also the forensic result.

Hash value can be used to authenticate audio recording evidence in the court of law as well as during evidence discovery process. The Hash value can be used to authenticate the integrity of the data exchanged between the parties and any alteration would result in change in Hash value.

24.3.6 Preparation of an Accurate Transcription(s)

Prepare an accurate copy of transcription of the recorded conversation, an important legal document. Each page of the transcription is to be signed as ‘Transcripted by’, ‘Checked by’ and ‘Verified by’.

24.3.7 Recording of Specimen Samples of Suspect/Complainant

(i) Prepare text for recording specimen sample of suspect/complainant containing similar text as in the questioned audio recording in the conversation. Make the suspect/ complainant conversant with the specimen text of speech before the recording starts.

(ii) Prior to recording the specimen sample, the IO will state the date, time, place, his name and the name of the suspect/complainant.

(iii) The recording is to be performed in the presence of two independent witnesses.

(iv) The witnesses will record their particulars like name, father's name, residential locality, occupation, etc., and he should also say that the speech sample of Mr X is being recorded in their presence.

(v) At least three repetitions of specimen text to be spoken by suspect/complainant during recording.



Recording of specimen voice sample using digital set-up



Analog set-up for recording of specimen voice sample

Figure 24.2: Recording of specimen samples of suspect/complainant

(vi) The microphone should be placed about 30 cm. from the mouth of the suspect in a quiet environment/room.

(vii) I.O. should ensure that the speaker speaks with normal speed and loudness.

(viii) In the event of a suspect disguising his voice, the IO should ask for the repetition of disguised words, until he feels satisfied.

(ix) IO to play back the recorded speech sample in presence of the suspect/complainant/ witness after completion of the recording.

(x) Recorded media (CD-R/DVD-R/Cassette) is signed by IO and witnesses, packed and sealed.

24.3.8 Recording of Specimen Speech Sample from the Facilities in FSLs

(i) The recording of specimen voice sample requires quite environment which is available in FSLs in some of the states.

(ii) For availing the facility of FSL, a request letter from the designated officer of investigating agencies, is to be sent to FSL for getting a scheduled date for the recording session.

(iii) After obtaining the scheduled date, the IO is to speak to the expert for requirements of FSL for voice recordings.

(iv) In case the accused is under PC remand, priority request of recording of specimen sample is to be made before the lapse of the police custody remand.

(v) In case the accused is under judicial custody, after obtaining the scheduled date, the IO is to approach the concerned court for issuing production warrant.

(vi) In view of the legal requirement, the text of specimen sample is to be prepared by the IO with the assistance of a laboratory technician.

(vii) Questioned and specimen samples, if recorded in an audio tape cassette, separate new cassettes are required with proper marking, labelling and packing. Recorded cassettes should be kept away from a 'magnet'.

(viii) Irrelevant portion of the recording should not be deleted by the IO.

24.3.9 Packaging, Sealing and Transportation and Storage of Audio Evidence

(i) Pack all digital evidence in anti-static packaging. Only paper bags and envelopes, cardboard boxes, and anti-static containers should be used for packaging digital evidence.

(ii) The audio cassette (original) is to be sealed by the seal of IO after getting signature of the complainant/witnesses and IO on the cassette.

(iii) Do not use plastic materials to preserve digital evidence.

(iv) Ensure that all digital evidence is packed in a manner that will prevent it from being bent, scratched, or otherwise deformed.

(v) Label all containers used to package and store digital evidence clearly and properly.

(vi) Pack mobile or smart phone(s) in aluminum foil to remain unaffected from external signal.

(vii) Leave cellular, mobile, or smart phone(s) in the power switch off.

(viii) The packages should be stored in dust-free, non-electrostatic area at room temperature.

24.4 Reference to FSL

24.4.1 Forwarding of Exhibits to the Forensic Science Laboratory

The exhibits requiring forensic examination and expert opinion are sent to the Forensic Science Laboratory in strong and sturdy packaging and in sealed condition along with duly filled in Performa (FSL/CFSL form), transcription, specimen seal impression, and other relevant documents useful to the laboratory examination.

24.4.2 Queries to be Asked to the Forensic Laboratory

(i) Whether the speaker in exhibit (questioned conversation) is the same speaker as in the specimen exhibit marked (say X) or otherwise.

(ii) Whether the questioned recording in exhibit is tampered or otherwise.

24.5 Check List

Before submitting the evidence materials for laboratory tests, the following checks are made by the forwarding authority:

(i) Whether the Forwarding Form accompanying exhibits is duly filled in and is complete and signed by the competent authority.

(ii) Whether the queries are specific, clear and linked to the exhibits forwarded to the laboratory.

(iii) Whether the exhibits in containers/parcels have been sealed with temper proof seals and seals are intact.

(iv) Whether case reference, exhibit details have been mentioned /tagged on each container of exhibit/parcel and signed by the IO.

(v) Whether the specimen seal impressions have been forwarded to the laboratory along with evidence forwarding Proforma.

(vi) Whether the road certificate/movement order for exhibits and personnel carrying exhibits to the laboratory are complete and valid in all respect.

24.6 Legal Status of Electronic Records

The evidences of electronic records of conversations were regulated in accordance with the provisions in the Indian Wireless Telegraphy Act (1885). With the enactment of IT Act (2000), the availability of electronic and digital technologies, the audio-video recorded evidences are

to be collected in accordance with the provisions of the Act. The admissibility of electronically recorded conversation (audio evidence) in the court of law is evaluated in the light of Indian Evidence Act u/s- 7, 62, 63, 65, 65A and 65 B.

24.6.1 Relevant Sections of Various Legislative Acts

24.6.1.1 Relevant Sections of the Information Technology Act, 2000

A. **Section 2** (1) (t) 'electronic record' means data, record or data generated, image or sound stored, received or sent in an electronic form or micro film or computer generated micro fiche.

B. **Section 3** (2): The authentication of the electronic record shall be effected by the use of asymmetric crypto system and hash function which envelope and transform the initial electronic record into another electronic record.

Explanation.—For the purposes of this sub-section, 'hash function' means an algorithm mapping or translation of one sequence of bits into another, generally smaller, set known as 'hash result' such that an electronic record yields the same hash result every time the algorithm is executed with the same electronic record as its input making it computationally infeasible—

(a) To derive or reconstruct the original electronic record from the hash result produced by the algorithm;

(b) That two electronic records can produce the same hash result using the algorithm.

C. **Section 79A :** The central government may, for the purposes of providing expert opinion on electronic form evidence before any court or other authority specify, by notification in the Official Gazette, any department, body or agency of the central government or a state government as an examiner of electronic evidence.

Explanation.—For the purposes of this section, 'electronic form evidence' means any information of probative value that is either stored or transmitted in electronic form and includes computer evidence, digital audio, digital video, cell phones, digital fax machines.'. [Reference Chapter XIIA, Examiner of Electronic Evidence of IT (Amendment) Act, 2008].

24.6.1.2 Relevant Sections of the Indian Evidence Act, 1872

A. Section 7. Facts which are the occasion, cause or effect of facts in issue

Facts which are the occasion, cause, or effect, immediately or otherwise, of relevant facts, or

facts in issue, or which constitute the state of things under which they happened, or which afforded an opportunity for their occurrence or transaction, are relevant.

Illustrations

(a) The question is, whether A robbed B.

The facts that, shortly before the robbery, B went to a fair with money in his possession, and that he showed it or mentioned the fact that he had it, to third persons, are relevant.

(b) The question is whether A murdered B.

Marks on the ground, produced by a struggle at or near the place where the murder was committed, are relevant facts.

(c) The question is whether A poisoned B.

The state of B's health before the symptoms ascribed to poison, and habits of B, known to A, which afforded an opportunity for the administration of poison, are relevant facts.

B. Section 65. Cases in which secondary evidence relating to documents may be given

Secondary evidence may be given of the existence, condition, or contents of documents in the following cases:

(a) When the original is shown or appears to be in the possession or power—of the person against whom the document is sought to be proved , or of any person out of reach of, or not subject to, the process of the court or of any person legally bound to produce it, and when, after the notice mentioned in section 66, such person does not produce it.

(b) When the existence, condition or contents of the original have been proved to be admitted in writing by the person against whom it is proved or by his representative in interest.

(c) When the original has been destroyed or lost, or when the party offering evidence of its contents cannot, for any other reason not arising from his own default or neglect, produce it in reasonable time.

(d) When the original is of such a nature as not to be easily movable.

(e) When the original is public document within the meaning of section 74.

(f) When the original is a document of which a certified copy is permitted by this Act, or by any other law in force in 40[India] to be given in evidence.

(g) When the originals consist of numerous accounts or other documents which cannot conveniently be examined in court and the fact to be proved it the general result of the whole collection.

In cases (a), (c) and (d), any secondary evidence of the contents of the document is admissible.

In case (b), the written admission is admissible.

In case (e) or (f), a certified copy of the document, but no other kind of secondary evidence, admissible.

In case (g), evidence may be given as to the general result of the documents by any person who has examined them, and who is skilled in the examination of such documents.

C. Section 65A : Special provisions as to evidence relating to electronic record

The contents of electronic records may be proved in accordance with the provisions of section 65B.

D. Section 65B : Admissibility of electronic records

(1) Notwithstanding anything contained in this Act, any information contained in an electronic record which is printed on a paper, stored, recorded or copied in optical or magnetic media produced by a computer (hereinafter referred to as the computer output) shall be deemed to be also a document, if the conditions mentioned in this section are satisfied in relation to the information and computer in question and shall be admissible in any proceedings, without further proof or production of the original, as evidence of any contents of the original or of any fact stated therein or which direct evidence would be admissible.

(2) The conditions referred to in sub-section (1) with respect to a computer output shall be the following, namely:

(a) The computer output containing the information was produced by the computer during the period over which the computer was used regularly to store or process information for the purposes of any activities regularly carried on over that period by the person having lawful control over the use of the computer.

(b) During the said period, information of the kind contained in the electronic record or of the kind from which the information so contained is derived was regularly fed into the computer in the ordinary course of the said activities.

(c) Throughout the material part of the said period, the computer was operating properly or, if not, then in respect of any period in which it was not operating properly or was out of operation during that part of the period, was not such as to affect the electronic record or the accuracy of its contents.

(d) The information contained in the electronic record reproduces or is derived from such information fed into the computer in the ordinary course of the said activities.

(3) Where over any period, the functions of storing or processing information for the purposes of any activities of any regularly carried on over that period as mentioned in clause (a) of sub-section (2) was regularly performed by the computer, whether

(a) By a combination of computers operating over that period; or

(b) By different computers operating in succession over that period; or

(c) By different combinations of computers operating in succession over that period; or

(d) In any other manner involving the successive operation over that period, in whatever order, of one or more computers and one or more combinations of computers.

All the computers used for that purpose during that period shall be treated for the purposes of this section as constituting a single computer; and references in this section to a computer shall be construed accordingly.

(4) In any proceedings where it is desired to give a statement in evidence by virtue of this section, a certificate doing any of the following things, that is to say:

(a) Identifying the electronic record containing the statement and describing the manner in which it was produced.

(b) Giving such particulars of any device involved in the production of that electronic record as may be appropriate for the purpose of showing that the electronic record was produced by a computer.

(c) Dealing with any of the matters to which the conditions mentioned in sub-section (2) relate, and purporting to be signed by a person occupying a

responsible official position in relation to the operation of the relevant device or the management of the relevant activities (whichever is appropriate) shall be evidence of any matter stated in the certificate; and for the purpose of this sub-section it shall be sufficient for a matter to be stated to the best of the knowledge and belief of the person stating it.

(5) For the purposes of this section:

(a) Information shall be taken to be supplied to a computer if it is supplied thereto in any appropriate form and whether it is so supplied directly or (with or without human intervention) by means of any appropriate equipment.

(b) Whether in the course of activities carried on by any official, information is supplied with a view to its being stored or processed for the purposes of those activities by a computer operated otherwise than in the course of those activities, that information, if duly supplied to that computer, shall be taken to be supplied to it in the course of those activities.

(c) A computer output shall be taken to have been produced by a computer whether it was produced by it directly or (with or without human intervention) by means of any appropriate equipment.

Explanation: For the purposes of this section any reference to information being derived from other information shall be a reference to its being derived there from by calculation, comparison or any other process.

E. Section 45A: Opinion of Examiner of Electronic Evidence

When in a proceeding, the court has to form an opinion on any matter relating to any information transmitted or stored in any computer resource or any other electronic or digital form, the opinion of the Examiner of Electronic Evidence referred to in Section 79-A of the Information Technology Act, 2000 (21 of 2000), is a relevant fact.

The examiner of electronic record is also treated as an expert.

24.6.1.3 The Criminal Procedure Code (Cr.P.C.):

Section 29 A: 'Electronic record': the words 'electronic record' shall have the meaning assigned to them in clause (t) of sub-section (1) of section 2 of the Information Technology Act, 2000.

24.6.2 Court Rulings regarding obtaining voice sample.

24.6.2.1 Allahabad High Court in Ritesh Sinha Vs State of UP and Anr. (Criminal Misc. Appl. 3272 of 2010) ruled that there is no illegality in asking any person to give sample of his voice for the purpose of comparison.

24.6.2.2 Double Bench of Supreme Court, however, could not decide the issue when aforementioned judgement of Allahabad High Court was challenged by applicant Ritesh Sinha. While Justice Aftab Alam reversed the order of Allahabad High Court, Justice Ranjana Desai upheld the judgement of Allhabad High Court. Due to difference in opinion, the matter referred to higher bench. The issue has not yet been decide as of 31/07/2015.

References

1. *Information Technology Act 2000* as amended from time to time.
2. *The Laboratory Procedure Manual, Forensic Physics, Directorate of Forensic Science*, Ministry of Home Affairs, Government of India, New Delhi, 2005.
3. https://www.ncjrs.gov/pdffiles1/nij/219941.pdf (date of access 19 January 2015).
4. C.P. Singh et al., *Guidelines for Collection of Physical Evidence, Physics Division, Forensic Science Laboratory Delhi*, 2013.

25 PORTRAIT BUILDING SYSTEM

25.1 Applicability and Purpose:

Portrait building system (PBS) is used by law enforcement officers/investigating officers as an investigating tool. PBS in police parlance is to prepare facial likeness of a person (suspected criminal) based on the description of facial physical features given by eyewitnesses. It is a powerful proven tool for constructing the portraits of criminals/accused with minimum expertise for controlling crime.

25.2 Why PBS?

(i) It gives face to the faceless criminal.

(ii) Whenever a crime is committed anywhere in the country, the very first thing an IO requires is the description of the suspect. IO tries to collect information about the suspect from the victim/witnesses but most of the time, the description given about the criminals/suspects is very vague and may fit any number of people. This kind of description does not help the police in apprehending or having any idea about the suspect. An example of the description given by the victim/witnesses about the suspect is illustrated in Table 25.1.

Table 25.1: Description given the victim about the suspect

• Sex	- Male
• Age	- 30-40 years
• Height	- 5 feet and 5-7 inches
• Weight/Built	- medium built
• Complexion	- wheatish
• Hair colour	- black
• Eyes/colour of eyes	- black
• Glasses	- none
• Clothing: Colour of coat/shirt/pants	- blue shirt and black pants
• Shoes	- shoes not noticed
• Accessories: hat, bracelet, earrings etc.	- none
• Tattoos	- noticed none
• Scars/Marks	- noticed none
• Any other Additional information	- none

Table 25.1 that provides description would fit thousands of people and, hence, this information is not very helpful for IO. To apprehend the suspect, the police requires some critical and unique information about the suspect and here PBS helps them in identifying the likely criminal. About 20 years ago portrait preparation was being done by expert artists in some very special cases. There were very few expert artists who could draw portraits of good quality. The witnesses were taken to the artist for the preparation of a portrait but this method entails the following difficulties:

(a) Lack of such artists who could actually draw portraits as per the description given by the witness was also one of the reason that the need for a PBS was felt.

(b) Quality of sketches prepared by such artists was not very good as there is always a communication gap between the artist and the witness.

(iii) The police have record of known criminals which run into thousands of numbers making it virtually difficult for a witness to identify the criminal. This is where PBS becomes an investigating tool which uses large number of database of human face and its various components. It enables the witness to have the description of the criminal made into a sketch.

(iv) Portrait not only gives the police a clear picture of who they are looking for but also helps in identifying the likely criminal.

(v) Portraits prepared with PBS can be printed or photographed from the screen for circulation among police officers or the media.

(vi) Face can be depicted with different disguises.

(vii) Using PBS helps produce a realistic portrait as compared to the portrait prepared by an artist.

(viii) Computerized PBS is a good aid to IOs.

25.3 Brief History of PBS

25.3.1 Manual Kit for Preparation of Portrait

In 1987, the Bureau of Police Research & Development (BPR&D) purchased a manual kit from USA. Major drawback of the kit was that features were not suited for an Indian environment. BPR&D then decided to prepare a kit, consisting of features for the Indian environment. For this photograph of local people, from different parts of the country were collected. Features were classified by anthropologists. Finally, the kit was put up for sale at the DG's conference in 1989.

25.3.2 Drawbacks of the Manual Portrait Making Kit:

(i) Quality of photographic paper was very poor and, so, strips started tearing.

(ii) Limited number of photographs.

(iii) Requires artist for making portraits.

(iv) End result was a lifeless portrait.

25.3.3 Computerization of Portrait Preparation

(i) To overcome the above limitations, the need for computerization was felt.

(ii) NCRB decided to computerize the PBS.

(iii) In 1990, computerization of the manual system was undertaken at the NCRB. A DOS-based black and white PBS was developed and released to all state/UT police.

(iv) Over the years, improved versions of the Dos version were released.

(v) In the year 2000, the system was made Windows based that was more user-friendly and runs on popular Microsoft based Operating System – MS Windows.

(vi) In the year 2011, the system was upgraded to Colour Portrait Building System and released to all state/UT police.

25.3.4 Salient Features

Portrait Building System (PBS/CPBS) helps to extract face components like head, eye, nose, mouth, chin, etc., described by witness similar to the criminal, from the digitized portraits directory and assemble these components to construct face image of accused.

By using PBS, NCRB have been assisting the IOs of states/UTs police, CBI and other police agencies by preparing the portraits of the accused based on the account given by the eye-witnesses. Now the system has been released to all State Crime Records Bureaux.

(i) PBS assists to assemble and edit face components.

(ii) Using the data of 100 faces, user can reconstruct more than 1,00,00,000 faces.

(iii) It uses advance image processing techniques like enhance, stretch, morph, integrate and rotate.

(iv) Its supports blurring to remove sharp edges to create pencil sketch which is useful for manual editing.

(v) Horizontal mirroring is supported to create left half of the face from the right half.

(vi) The following tools are also available with the application:

- (a) Change shape
- (b) Mirroring
- (c) Crop resize and paste
- (d) Text tool
- (e) Light brush tool
- (f) Dark brush tool
- (g) Tilt image tool
- (h) Rotate image tool

25.3.5 Handling of Witness/Victim for Making Portrait

Often police and investigating agencies work in such environment that they encounter witnesses unwilling to cooperate and give accurate description/information about the suspect. Sometimes, this lack of cooperation makes it impossible to positively identify the suspect/criminal.

The portrait making is not high science. Portrait experts have to be patient, vigilant and careful, and this requires training oneself to be attentive for even the smallest information which can be useful in making a portrait.

(i) The witness/victim should be handled with utmost sympathy and sensitivity and courteousness.

(ii) While talking to the witness/victim, the psychology should be observed carefully and information should be collected in such a manner that the witness remains cool and calm.

(iii) The portrait expert should be able to bring out the victim/witness from trauma and prepare her/him to cooperate in making the portrait by giving facial description of the suspect.

(iv) The portrait expert should have some informal talk with him/her so as to normalize the atmosphere.

(v) The witness may have many preconceived notions about the police and its style of investigation and if there is any kind of fear, then that should be taken care of.

(vi) Making the witness comfortable is another important factor that helps in bringing out the information required for making the portrait.

(vii) A witness initially agrees to cooperate with police investigation in giving details but when he is questioned by the police several times then normally he panics and does not fully cooperate in giving description of the suspect. This aspect should be kept in mind and questioning should not be done in such a manner that it becomes the cause of inconvenience to the witness.

(viii) Care should be taken that before actual portrait making begins, the victim/witness should feel that he is in safe hands.

25.3.6 Constraints in Making Portraits

(i) Witnesses are sometimes not willing to cooperate and do not want to give description to the police.

(ii) When the gap between the occurrence of incidence and preparation of portrait is rather long, with the passage of time, the image may become faint in memory.

(iii) Preconceived ideas about the success of portrait preparation among police as well as witnesses also act as a deterrent in the success of the Portrait Building System. Like any other investigating tool, it also has it's limitations. Normally every witness hesitates by saying that they have seen the suspect only for few seconds and that it is difficult to recall the face. However, if care is taken then this issue too can be solved. When various options of physical features of the face are placed before the witness, he is able to put his thoughts and images together. Once the witness is brought before the computer, the portrait expert open before him the menu of features for selection. With the selected components of the face the portrait is developed and the final output is made available after doing necessary editing.

25.3.7 Questions Asked to the Victim/Witness for Making the Portrait:

(i) **Sex**: Whether male or female.

(ii) **Age:** Question regarding the age of the suspect is asked.

(iii) **Hair style and its colour**: Questions regarding the colour, texture, hairline, style and also possible dyes or wigs are also asked. Database of different hairstyles is shown to the witness so that the similar hairstyle can be chosen.

(iv) **Eye description:** Colour, shape (round, slanted, big, small), squint, defect, whether clear or bloodshot, and the heaviness of eyelashes and eyebrows are also taken into account. Database of different types of eyes is shown to the witness for selection of similar eyes.

(v) **Nose description**: Nose-overall shape (long, wide, flat, pointed, etc.) and nostrils (wide, narrow, flared) are important for choosing the similar type of nose. Then database of different types of nose is shown to the witness so that the similar nose can be chosen.

(vi) **Mouth/lips description**: Witness is questioned whether lips are thin, medium, full, do corners turn up, turn down, or in level. Different mouth/lip is shown to the witness so that the similar lips can be chosen.

(vii) **Chin description**: Question like what is the shape of chin (round, oval, pointed, square) double chin, dimpled, cleft? And database of different chin is shown to the witness so that the similar chin can be chosen.

(viii) **Ear description**: Details regarding ears like size and prominence (protruding or flat against head) are asked. Database of different ear is shown to the witness so that the similar ear can be chosen.

(ix) **Forehead**: Note forehead height, and whether the skin is smooth, creased or wrinkled.

(x) **Cheeks**: Is the flesh sunken, filled out, dried or oily? Are there wrinkles around nose or mouth? Are cheek bones high or low, wide or narrow?

(xi) **Neck**: Note protruding Adam's apple or hanging jaw.

(xii) **Complexion**: Questions regarding pores, pockmarks, acne, razor rash, bumps are asked.

(xiii) **Facial hair:** Clean shaven? Unshaven? Beard, mustache, goatee, sideburns?

(xiv) **Facial tattoos**: Shape and style; on what part of the face. One may not be able to remember all of these details about any one suspect but remembering as many as possible can be particularly helpful to the police in preparing portrait.

(xv) **Making of portrait:** Once the basic selection of face components is finished then the portrait expert does the required editing as per the suggestion of the witness. The Portrait Building Software is packed with powerful editing tools.

After completing the editing, the draft portrait prepared is shown to the witness. If required the modification is undertaken to the complete satisfaction of the witness. The witness and the IO fill up the feedback form giving the feedback on the portrait preparation method, behaviour of the portrait expert, time taken and the resemblance of the portrait prepared to the suspect.

Case Study 1:

Serial Bomb Blast in Delhi during the Diwali festival (29 October, 2005).: On 29 October 2005, three days before Diwali, at around 5. 25 p.m. in Paharganj the first explosion from an unattended bag took place killing 18 people. After sometime in Sarojini Nagar, the second explosion took place , triggering off secondary explosions from the two LPG cylinders at a chaat stall and starting a blaze. No one had noticed unattended bags in Paharganj and Sarojini Nagar. The third bomb, which was in the DTC bus, reached the Kalkaji temple. The young, bearded man in a blue cap, boarded DTC bus and placed his shoulder bag under the seat. The youth wearing the cap left off the bus, leaving his bag behind. An alarm was raised by a co-passenger. The driver and the conductor of the bus stopped the bus at a less crowded area in Govindpuri where they evacuated nearly 70 passengers. Then they carefully opened the bag, they found wires inside. The driver tossed the bag away which exploded mid-air, wounding five bystanders and this act cost the bus driver his sight and hearing. Like all other portraits, this was also prepared after hours of hard
work and sitting with witness. After explaining how the portrait is going to be prepared with the help of software and making the witness comfortable with the software the real portrait preparation started. After selecting various components of face, the first draft of the portrait was prepared. The witness was asked for suggestion, modification, change in face components (eye, nose, mouth, chin, cap, etc.). The portrait was discussed in detail with the witness and required changes were made before the final portrait was prepared for media circulation and investigation. This whole process was completed in three days as the portrait expert did not want to miss out even the smallest detail while making the final portrait of the suspected bomber.

The witness had described the bomber with a French beard and a cap. Portraits in three disguises were prepared in this case, one with the French cut beard, second with a moustache and the third with a clean shaven look. In this case, the suspect and the portrait prepared were so identical that the portrait expert was called in the court and was confirmed whether the suspect was shown to the expert before preparing the portrait.

Case Study 2:	
Govindpuri Bus Bomb Blast Case–FIR NO: 1120/05 dated 29 October 2005, Special Cell Kalkaji: PBS has been successfully used in constructing the portrait of the accused of	Govindpuri Bus Bomb Blast Case of Delhi as a result of which the accused Moh. Rafiq Shah was apprehended from Srinagar.

25.4 Some of the Major Cases in which PBS was Used Successfully:



Figure 25.1: Portrait prepared with the help of Portrait Building System and the actual photograph taken from newspaper

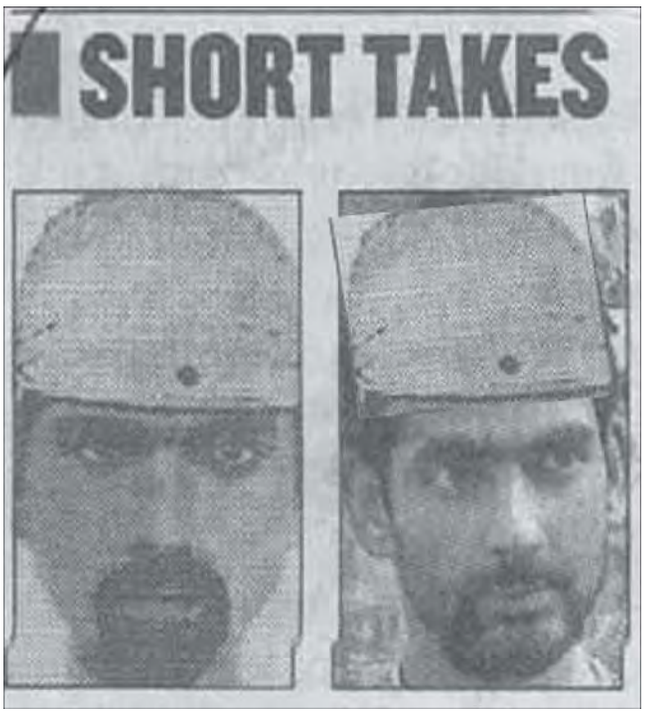


Figure 25.2: Portrait and suspect apprehended with same headgear added



Portrait and suspect apprehended with same headgear added

This system is extensively used for solving major crimes committed in India

25.5 User Manual of Portrait Building System

Present Portrait Building System has two major modules:

(i) **PBS Make**: It compiles all the components of face as described by the eyewitness and reconstructs the whole face.

(ii) **PBS Edit**: It mainly concentrates on editing the face as per description given by the witness.

A. Highlights of PBS Make:

PBS Make compiles all the components of face as described by the eyewitness and reconstructs the whole face.

(i) It uses the database created by Cam DB and Comp DB for reconstruction of desired face.

(ii) A database of hundreds of images is of a few kilobytes only. This drastically reduces the secondary database transfer time.

(iii) Even though the components are picked from different faces, their shade can be normalized by the click of a single button.

(iv) Minor colour changes like increasing or decreasing the whiteness of any component desired can be done very easily.

(v) Colours of components can be scaled in terms of their RGB (Red, Green and Blue) values.

(vi) Colour difference utility helps finding RGB colour differences between two points, thus making manual colour normalization very easy.

(vii) Each component can be sized to make them resemble the criminal's face to precision.

(viii) Slide show facility comes in handy to surf through a database of thousands of face components at a pace of your own choice.

(ix) The [More] add-on dialog box helps accessorize the face with components like hat, spectacles, beard, mustaches, etc.

(x) The [Key] button helps to use the keyboard to move around and see different components.

(xi) A reconstructed face can be saved and loaded to and from a (PBS) file.

(xii) With an enable cropping facility the individual components can be enlarged and decreased according to requirement and placed on desired location.

(xiii) There is a facility 'Choose Attributes' which allows to view the database according to the components classified in Comp DB. For, e.g. 'The Database of components having bald head, round nose and brown eyes can be viewed by selecting it in Choose Attributes and the clicking filter Images'.

(xiv) After completion of all the formatting, a click of the fuse button will produce more desirable image (bmp) by eliminating all the visible boundaries between components.

How to use PBS Make

Menus and Toolbar-File Menu:

Open Db: To open an existing database (already created database).

Open More Db: To load the database of more components (mustaches, spectacles, beard, etc.).

Save Face: To save composite face.

Print Scale Factor: It allows to set the height and width of the picture to be printed and to set the offset (margin) to be left on page. If you choose the picture position centered then there will be no need of an offset.

Print: It allows you to print the current page and number of copies to be printed.

Print Preview: It will show the print preview of the image.

Print Set Up: It allows you to set up page size and page orientation (potrait or landscape).

Exit: To exit from the application.

Open BMP : To open any BMP image.

Close BMP: To close BMP image.

View Menu:

Toolbar: To show or hide toolbar.

Status bar: To show or hide status bar.

Select Box: To show or hide select box.

Tool Tip: Enable or disable tool tips.

Load Last work : If this feature is enabled it will automatically load the last database.

Edit Menu:

Go to PBS Edit : Will open up the PBS Edit application with the same face.

Window Menu

New Window : To Open a New Window of the CompDB application.

Cascade : To separate the working window from the main window.

Tile : One can tile more than two windows.

Help Menu

About **:** Will pop up with about dialog box.

User Manual **:** To open up the User Manual Page.

Tool Bar:

New tool **:** Same as New Window in Window Menu.

Open tool **:** To open any bmp image.

Print **:** As described above in the File Menu.

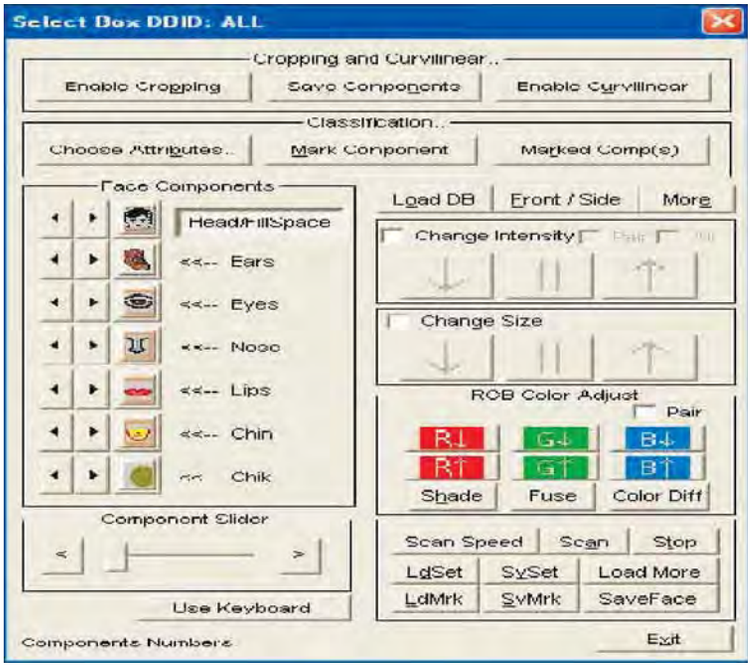
Marker tool **:** To show or hide the Marker Dialog.

Fit Window **:** Works same as Zoom in View Menu.

Components tool: To show or hide Components dialog.

Help Doc **:** Same as User Manual in Help Menu.

About **:** Same as About Box in Help Menu.

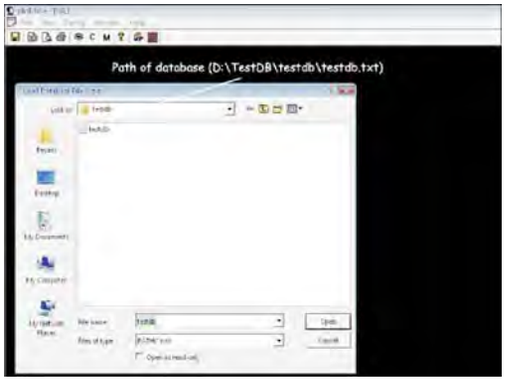


Screenshot of PBS Make

25.6 User Manual

Starting the application:

- Open the application executable PBS Make from appropriate subdirectory.
- Press the Face Maker button in toolbar.
- Load database file dialog box opens up. Browse through the directory having database file. Select it and press open.



- This would open the Select Dialog Box. This is the main dialog box of the PBS Make and it is a collection of all the face reconstruction tools available in PBS Make.

- Database may also be opened by pressing Load DB **[Load DB] button.** This would open the Select Dialog Box.

The Select Dialog Box:

- This box contains all the face reconstruction tools.
- The buttons having face component icons (like face, eyes, nose, lips, chin, ear cheek) are used to select the corresponding component of face.
- To toggle between the Front-Face and Side-Face view, press the Front / Side button.



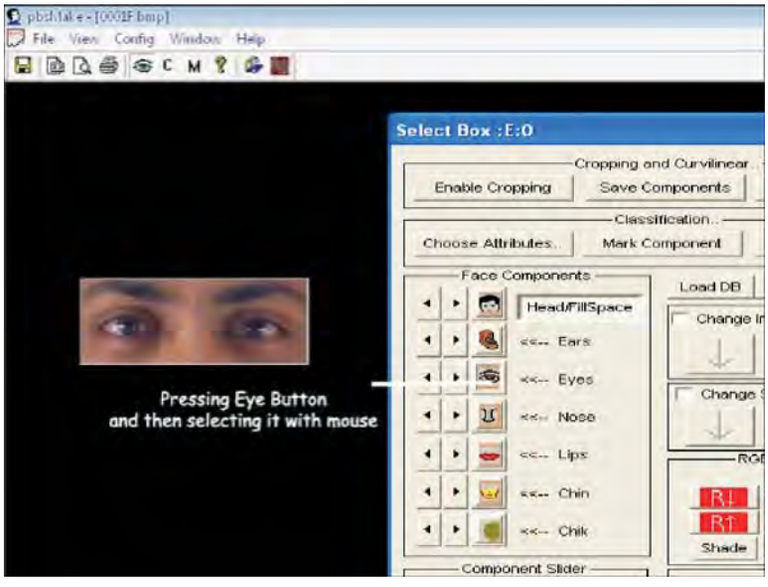




- Front / Side [Front/Side] button
- On pressing More [More] button an add-on dialog box appears. It is used to accessorize the face with hat, spectacles, beard, mustache and age.

Selecting a component

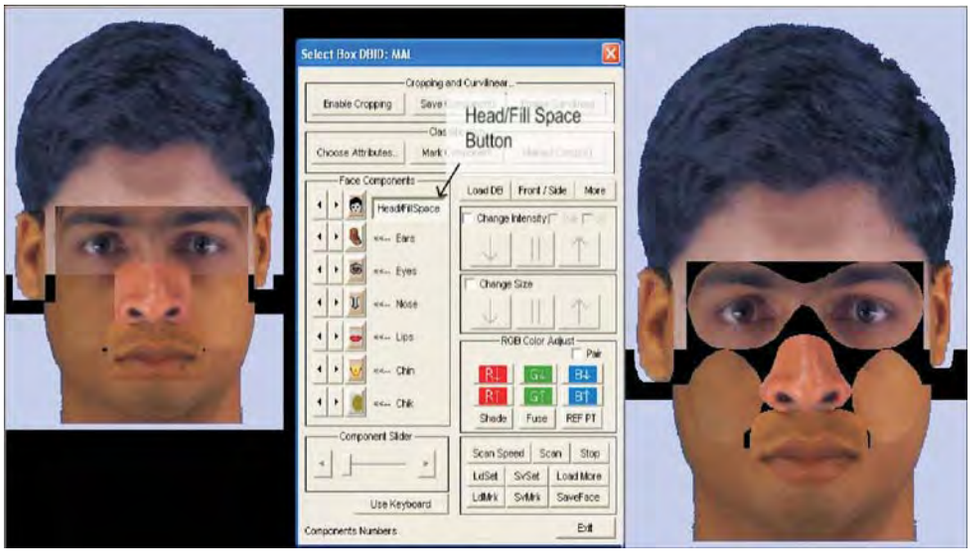
- Press the component button of your choice to select it.
- When multiple components are open, select a particular component by clicking on the image of that component.
- If a component is blocking the selection of other component, like spectacles blocks that of the eyes, then either select the component by pressing its icon button twice (not double click) or move the blocking component away and then select the component desired by clicking on the image of that component.
- On pressing the arrow button of any component twice (not double click), that component would automatically get selected provided that the component button has already been pressed.
- The selected component's initials come on the Title Bar of the Select Dialog Box. Also the sequence number of the component in database appears with it.



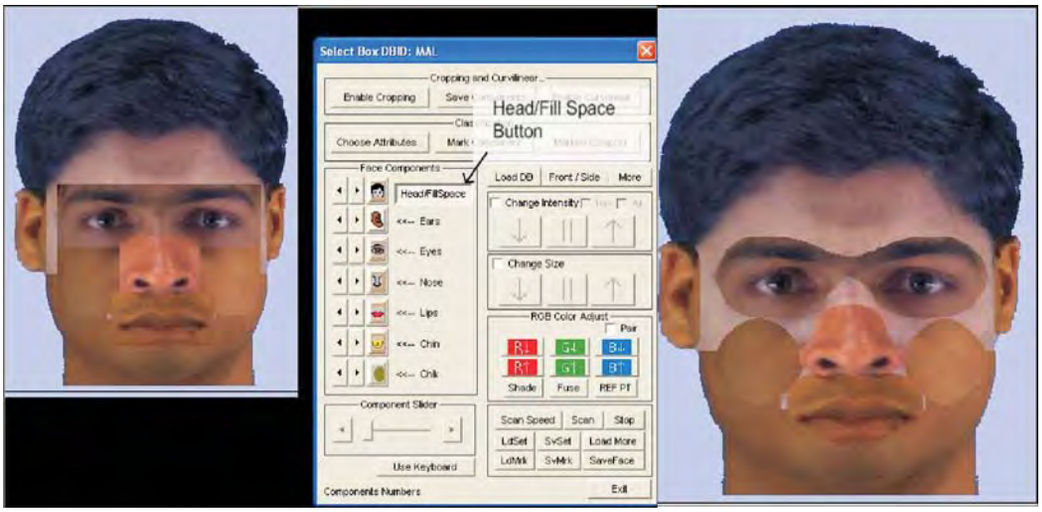
After selecting the components it allows to drag components as well as size can be changed.

Face/Head (Head/Fill Space Button)

This button is used to fill the blank space (black space between components) between the different components after you have generated the composite components. Below is shown the use of **Head/Fill Space** button. Image before **Head/Fill Space** pressed is shown below (Rectangular on left side and Curvilinear on right side).



After pressing **Head/Fill Space** button image will be as shown in the below figure.



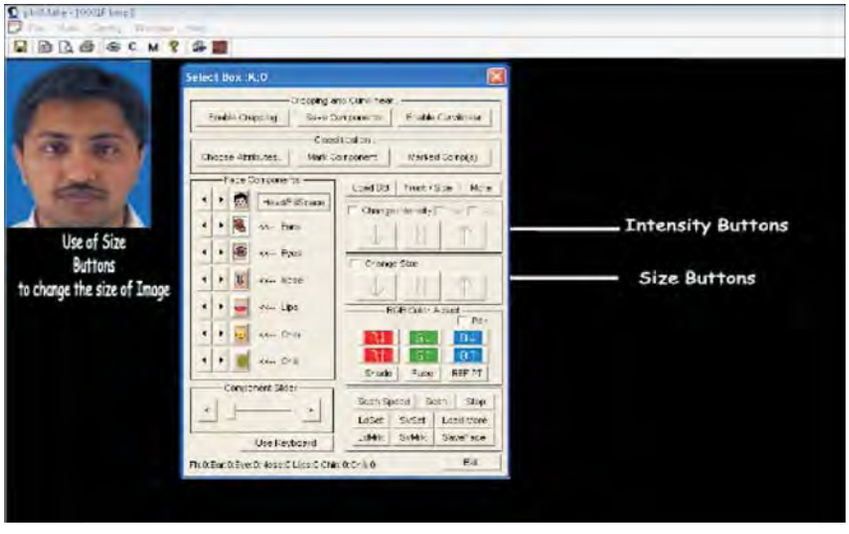
Initials are as follows:

Face	F	Hat	H
Eye	E	Specs	S
Nose	N	Mustache	M
Lips	L	Beard	B
Chin	C	Others	O
Ear	e	Chick	Ch

(iii) Sizing and moving the components:

- The complete frame can be zoomed in or out using [<All>] and [>All<] buttons respectively.
- To manually adjust the size of component, select the image of that component by left clicking on it once. This would highlight its frame border. Now point the mouse pointer to the edges or the corners of the frame border, hold left button pressed and drag the mouse while holding the left button. Edge would shift from only one edge while a corner would shift from both edges.
- To move the component without resizing, point the mouse pointer to the middle of the component, left click and drag the mouse while holding the left button, the component will move with the mouse pointer.
- The [|All|] button would undo all the resizing. This will move and restore original position and sizes of all the components.

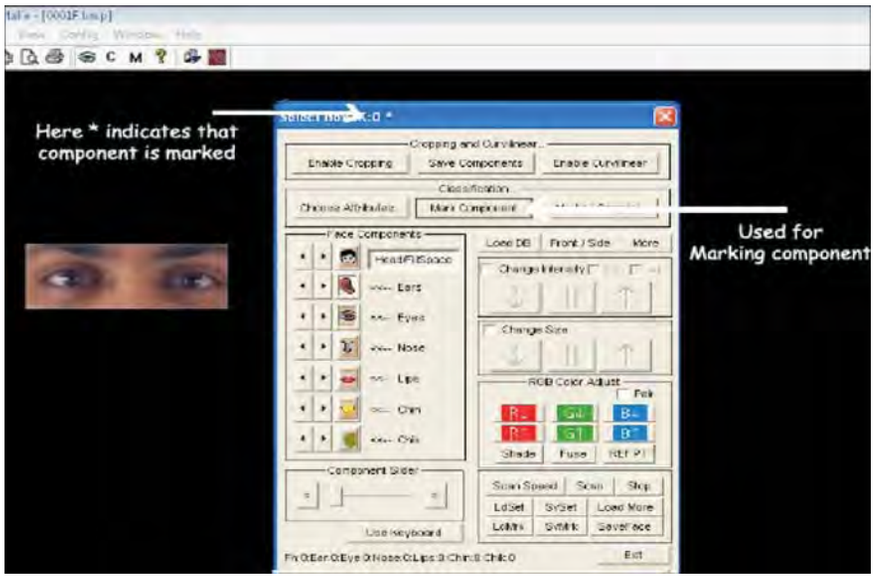
(iv) Surfing through the database:



- Using the arrow buttons ( ) to the left of each of the selected component's icon button, you can surf through the entire database of the selected component one by one. It is important to note that the button of that component should remain pressed.
- You can start a slide show of the selected component using the scan button. Use the stop button to stop the slide show. To set the interval for slide show, double click on stop button. Auto Scan Speed Dialog Box opens up. Enter the interval in milliseconds and press the apply button.
- To scan the database in the direction of your choice, click on the slider's arrow button of direction ( )of your choice beside the slider and then press the scan button.
- You can also move through the database using keyboard arrow keys. Press the key button. Now, on pressing the right/down or left/up arrow key the next or previous selected component is respectively shown.
- You can also move through the database of selected component by moving the slider at the bottom of Select Dialog Box by mouse.

(v) Marking the database:

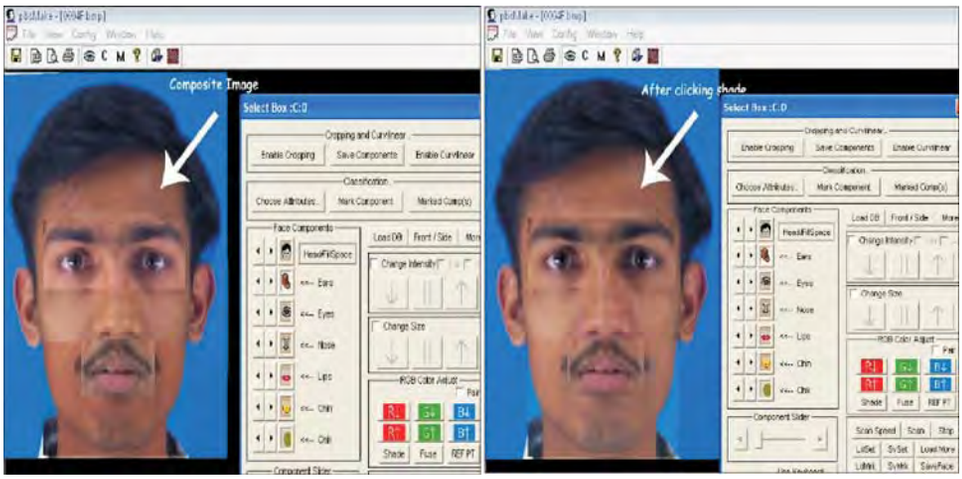
- To help an eyewitness in identifying and remembering the components of his choice the facility to mark the desired components has been provided.
- While surfing through the database the eyewitness can mark components resembling the criminal using the mark button.
- On doing so, that component number comes with a star (*) from then onwards.
- When the user presses the Marked button he will only be able to surf through only the marked components thus helping an eyewitness in making quicker choices.
- The marked components can be saved using SvMrk button. These saved marks can be loaded again using LdMrk button.



Reconstructing the face:

Using the techniques to select a component and surfing through the database make an approximate desired face as per eyewitness account.

This face's components may not be matching with the colour of the desired face.



To make automatic shade-normalization press the Shade button. This would make all the components of approximately same shades.

(vii) Manual Colour Matching:

- If a component's shade appears darker than others, then press [<W>] button to lighten it.
- If a component's shade appears lighter than others, then press [>W<] button to darken it.
- On pressing [|W|] button, the original shade of the selected component would appear.
- You can also adjust the Redness, Greenness and Blueness of the selected component using [<R>], [<G>] and [<B>] to increase respective intensities and [>R<], [>G<] and [>B<] to decrease respective intensities.
- To know the colour difference between a component and the face, use Colour Difference utility.

The Colour Difference utility:

- It helps to find colour difference of two points of source and destination image.

Colour Difference Tool: This tool is used to compare two different components (of different images) and to set their colour same by choosing the source component (according to which colour of destination part will be set) and destination component whose colour will be changed according to source component. Follow the steps as shown below:

- Double right click on the face. The Colour Difference dialog box will open up.
- Press the SRC button. Now right click on the source pixel whose RGB values are desired. (Here ForeHead)
- Press the DST button. Now right click on the destination pixel whose RGB values are desired. (Here Eyes)
- Then click the DIFF button, The DIFF box shows the colour difference components R, G and B. To match the source and destination colour use [<R>], [<G>] and [<B>] to increase respective intensities and [>R<], [>G<] and [>B<] to decrease respective intensities.

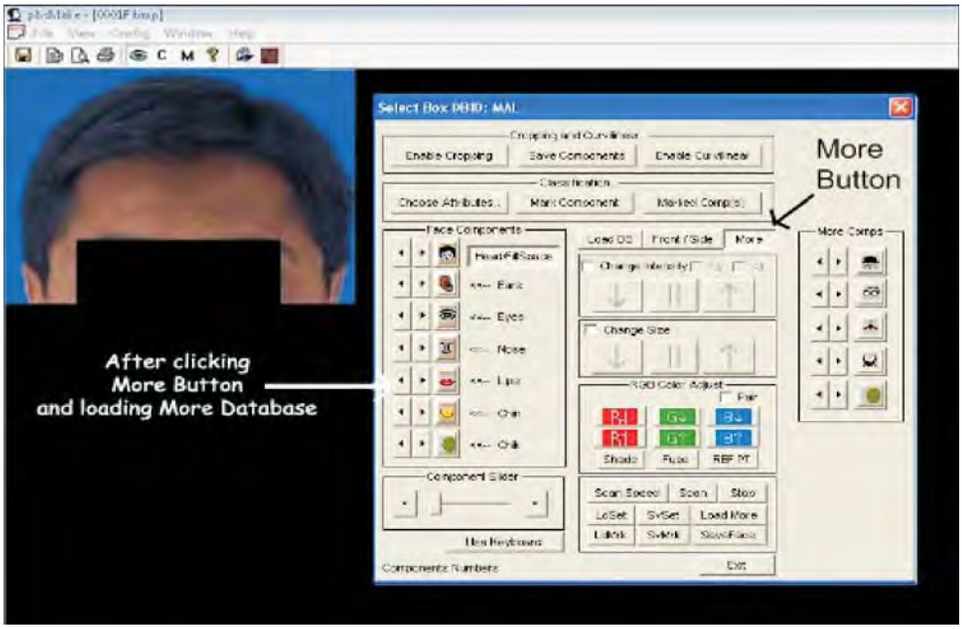


After clicking the DIFF button image will be as shown as in below figure. The colour of the eyes is set according to the colour of the forehead.

Saving and loading a composite face:

- The composite face thus made can be saved using SvSet button and giving an appropriate name.
- A saved face can be loaded back using the LdSet button and selecting the desired face in the dialog box.

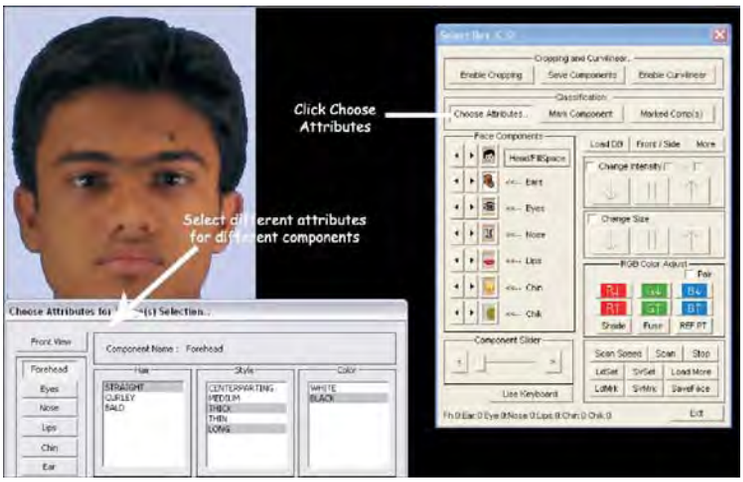
The MORE add-on dialog box:



- By pressing the More button toggles the MORE add-on dialog box.
- This dialog box can be used to accessorize (decorate) a reconstructed face by adding hat, spectacle, mustache, beard and age component to it.
- Load the database of the accessories by pressing the Load More button. Browse through to the directory having the database file. Select it and press open.
- Any of the hat, spectacles, moustache, beard, age, etc., can be selected using the corresponding icon button in the same way as was done in select dialog box.
- The database of each component can be surfed using the arrow buttons to the left of each of the component's icon button. Pressing the right arrow button gets the next component while the left arrow button gets the previous component in the database.
- These components can be sized and moved in the same way as was done with components in select dialog box.
- In the end, after all the accessories have been added complete face can be saved, by pressing the Save Face button and giving the desired name to its file.

Viewing database according to classification

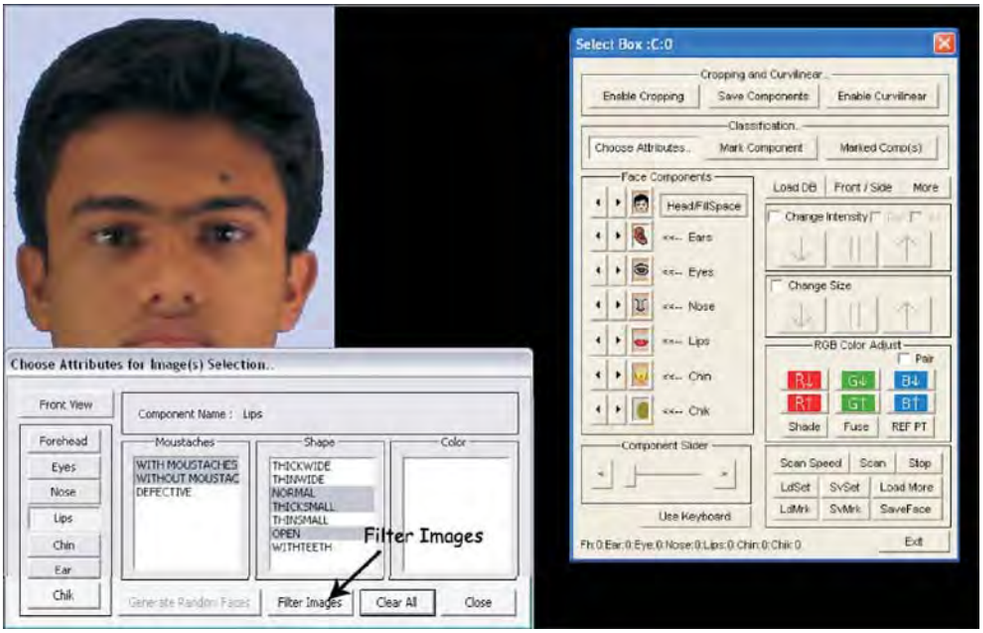
As shown in below figure select different attributes for different components according to which you wish to see the images, for example if you wish to see the images having forehead which has straight and black coloured hair and which is thick and long then select it as shown in figure. Similarly select different attributes for all components.



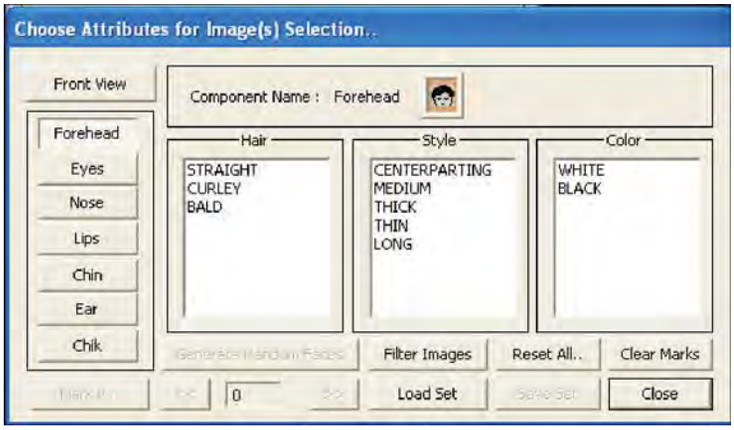
Then as shown in below figure click on filter images button. So all the images which have the attributes as you have selected will be marked and only that will be visible.

Now if you try to navigate through the database then only the components which are according to selected attributes will be visible, (this whole database needs to be classified).

It also has other buttons like Generate **Random Faces**, **Mark It, Filter Images**



(explained above), Reset all, Clear Marks, Load Set, Save Set, Close, Undo, Redo.



Generate Random Faces: This button is placed in Choose Attributes Dialog box which generates the random faces according to the attributes chosen. After this you can navigate through the generated random faces by pressing left and right buttons.

Mark It: This button will mark the particular generated random face.

Application: If while generating the random face you feel that this face resembles the criminal face to some extent then you mark on it and generate more faces. In this way you can mark many faces (Random Faces) and after that save them and edit them.

Save Set: This button will save the marked faces as well as the classification set and for this it will ask the location where you need to save this set. After this you can load the same set whenever needed. It is different from **the SvSet** button of the Select Box.

Load Set: This is used to load classification set (*.cls file) which is already saved. It is different from **LdSet** in Select Box. That load set will load only the face (.set file) saved at that time using save set.

Clear Marks: It will clear the current marked random generated faces.

Reset All: It will clear the current selected attributes for all components.

Component selection keys:

SPNFOREHEAD: Scan Face	CHKFOREHEAD: Select Face
SPNEYE: Scan Eye	CHKEYE: Select Eye
SPNNOSE: Scan Nose	CHKNOSE: Select Nose
SPNLIPS: Scan Lips	CHKLIPS: Select Lips
SPNCHIN: Scan Chin	CHKCHIN: Select Chin
SPNEAR: Scan Ear	CHKEAR: Select Ear
SPNCHIK:Scan Cheek	CHKCHIN:Select Cheek
SPNHAT: Scan Hat	CHKHAT: Select Hat
SPNSPECS: Scan Specs	CHKSPECS: Select Specs
	CHKMUSTACHES: Select
SPNMUSTACHES: Scan Mustaches	Mustaches
SPNBEARD: Scan Beard	CHKBEARD: Select Beard
SPNOTHERS: Scan Age	CHKOTHERS: Select Age

Closing Select Dialog Box:

By pressing the **Close** button closes the Select Dialog Box. However, the parameters set using different commands remains intact when Select Dialog Box is opened next time.

Short Description of Command Buttons:

Enable Cropping: This button enables and disable a cropping facility for components.

Save Components: This button saves the current components location in database if modified.

Enable Curvilinear: It enables the curvilinear components if currently its rectangular components and disable it if currently its curvilinear components.

Choose Attributes: It will open up the dialog to choose attributes of different components and then according to selected attributes you can view the database by clicking on Filter Images Button in that dialog which will mark the components that are having selected attributes. 'Clear All Button' will clear the currently selected attributes of selected component and will allow you to choose different attributes again.

Load DB 

: Load database.

Scan 

: Auto scan component forward.

Stop 

: Stop auto scan.

More 

: Dialog box for hat, spectacles, beard, etc.

Front/Side 

: Select front or side face.

SELALLLESS 
: Decrease all size by 10 per cent

SELNORM 
: Back to original size

SELALLMORE 
: Increase all size by 10 per cent.

Decrease Intensity 
: Decreases the whiteness of the selected component by 2.5 per cent. It is selected by left clicking mouse pointer inside the component boundary.

Back to Normal Intensity 
: Original value of the whiteness of the selected component is restored. The component is selected by left clicking mouse pointer inside the component boundary.

Increase Intensity 
: Increases the whiteness of the selected component by 2.5 per cent. It is selected by left clicking mouse pointer inside the component boundary.

Decrease Red Colour 
: Decreases the redness of the component by 2.5 per cent.

Decrease Green Colour 
: Decreases the greenness of component by 2.5 per cent.

Decrease Blue Colour 
: Decreases the blueness of the component by 2.5 per cent.

Increase Red Colour 
: Increases the redness of the component by 2.5 per cent .

Increase Green Colour 
: Increases the greenness of the component by 2.5 per cent.

Increase Blue Colour 
: Increases the blueness of the component by 2.5 per cent.

Use Keyboard 

: Select keyboard for scan.

Load Parts Set File 

: The load command loads a set of components assembled and saved earlier along with their relative position. This command opens a 'Load Parts Set File' dialog box to locate the desired (*.set) file. User can load a face image that he has saved with save button with (*.set) extension.

Save Parts Set File 

The 'save' command saves the serial number and the coordinates of a set of components assembled as face. The default extension of these files are *.set. These files are very small (400 bytes) and represents high resolution face image. These files could be quickly sent and received through e-mail between the police stations. User can save a face image with particular combination of face components. User can make face image by combining different face components and can save it with .set extension as a .PBS file.

Shade 

Auto adjusts shade of all components.

Fuse 

Produces the blurred image after shading it. It will eliminate all the boundaries, if visible.

Closes Select Dialog Box 

: The 'close' command closes the Select Dialog Box. However, the parameters set using different commands remains intact when Select Dialog Box is opened next time.

Load More 

: Loads extra database.

Save Face 

: Saves composite face.

SV Mark 

: Saves mark.

LD Mark 

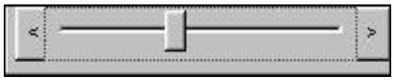
: Loads mark.

Mark 

: Marks selected components of image.

CHK Marked 

: Scans marked only.

Slidroll 

: Component slider.

SLDRP 

: Increment component.

SLDRN 

: Decrement component.



-Toggle ToolBar ID_VIEW_TOOLBAR "Show or hide the toolbar".

-Toggle StatusBar ID_VIEW_STATUS_BAR "Show or hide the status bar".

-FaceMaker IDC_FACEMAKE "Assemble face components".

-Enable Tooltip ID_VIEW_TOOLTIP "Enable ToolTip in Dialog Box".

-Print Size ID_PRINTOPTION_SCALE "Adjust the Image Width and Height for Printing".

-Load Last Work ID_VIEW_LASTWORK “Load last work at the start of PBS Make”

-Colour Diff ID_COLDIF “Get colour difference of two points”

-Open DB ID_OPENDB “Open Database”

-Open More DB ID_OPENMOREDB “Open More Database”

-Save Composit Face IDC_SAVEFACE “Save composite face as bmp image”

-ID_OPENDB “Open Database\nOpenDB”

-ID_OPENMOREDB “Open More Database\nOpenMoreDB”

-ID_PRINTOPTION_SCALE “Adjust the Image Width and Height for Printing\nPrintSize”

-ID_FILE_PAGE_SETUP “Change the printing options\nPage Setup”

-ID_FILE_PRINT_SETUP “Change the printer and printing options\nPrint Setup”

-ID_FILE_PRINT “Print the active document\nPrint”

-ID_FILE_PRINT_PREVIEW “Display full pages\nPrint Preview”

-ID_APP_ABOUT “Display program information, version number and copyright\nAbout”

-ID_APP_EXIT “Quit the application; prompts to save documents\nExit”

-IDC_FACEMAKE “Assemble face components\nFaceMaker”

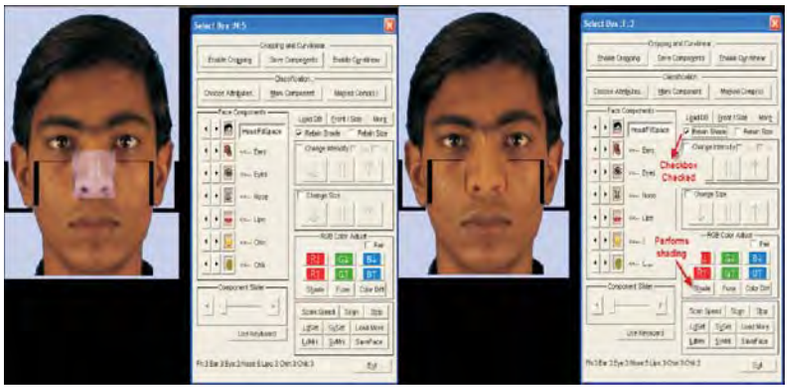
-ID_VIEW_TOOLTIP “Enable Tooltip in Dialog Box\n Enable Tooltip”

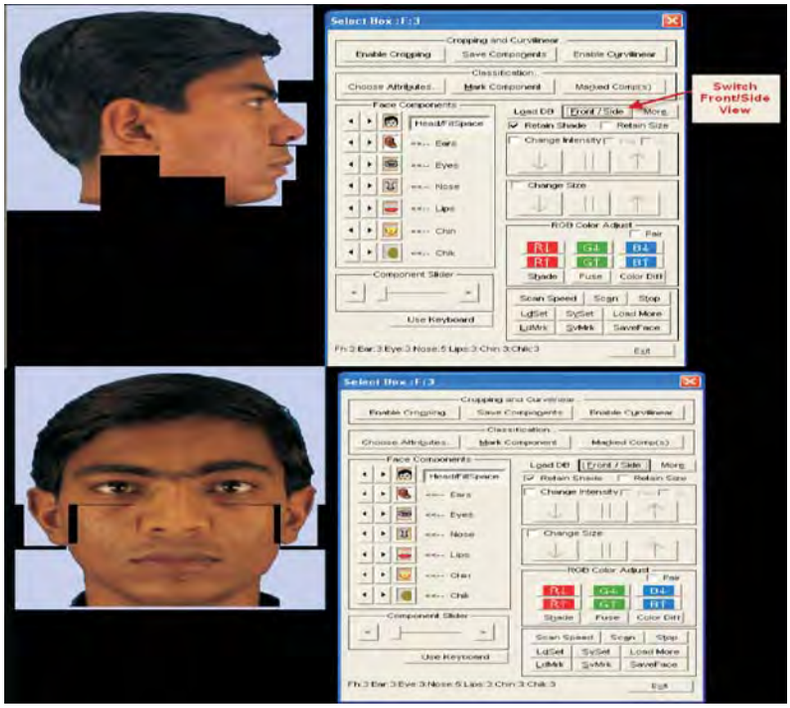
-ID_VIEW_LASTWORK “Load last work at the start of PBSMake\n LoadLastWork”

-ID_COLDIF “Get colour difference of two points\nColour Diff”

Retain shaded checkbox

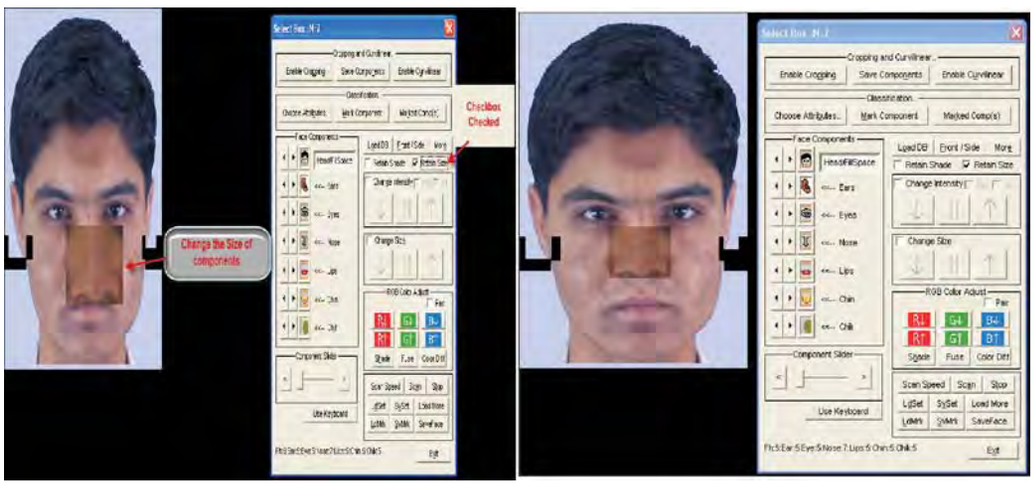
Enabling retain shade checkbox will maintain the shade of component while switching from front to side view.

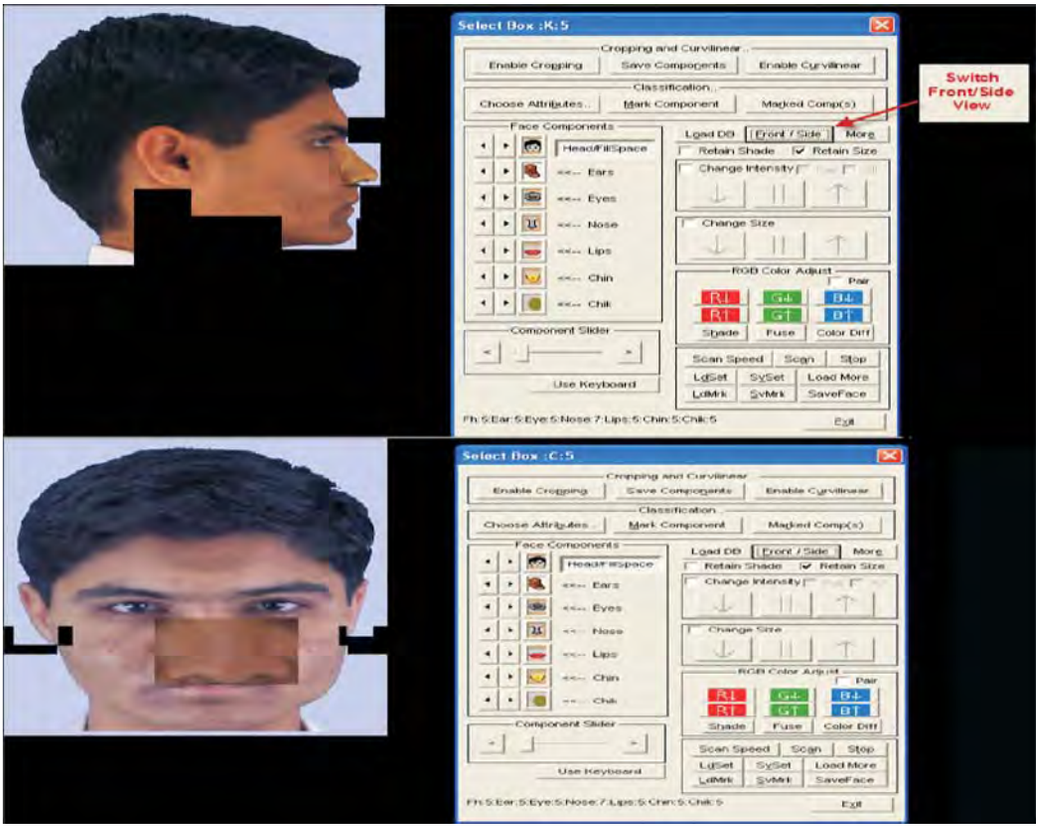




Retain Size Checkbox:

Enabling retain size checkbox will maintain the size of component while switching from front to side view.





25. 7 Operation Manual of PBS Edit

Highlights of PBS Edit: PBS Edit mainly concentrates on editing the face.

(i) It uses the face created by PBS Make DB for reconstruction of desired face.

(ii) Different ageing effects can be given to the face.

(iii) You can perform actions like redo, undo, copy, paste on the edited face.

(iv) It has a facility to pick the colour from the colour palette and also from the face image itself through 'colour picker'.

(v) It has a drawing tool like pencil and brush to draw single solid line and number of parallel curvilinear lines respectively.

(vi) It has the most powerful editing tool called 'fog' used to integrate the face components to a smooth portrait.

(vii) It has 'crop resize paste' tool that can copy a rectangular area from an image and paste it in different locations in four different ways and with desired scale factor.

(viii) It has tools like line, rectangle, and ellipse than can use to draw line, rectangle, and ellipses respectively.

(ix) It has tools like change shape 1 and 2, which are used to change the shape of a face (expression).

(x) It also provides the facility to add header and footer to the image using the caption 'text tool'.

(xi) There is a facility to zoom in and zoom out the image to have a closer look at the image.

(xii) There is facility of updating the image, saving the image, print, print preview and many more.

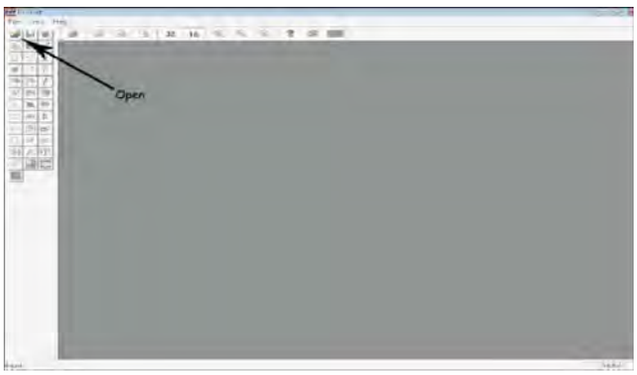
(xiii) Palette can be viewed as 16 bit (palette size) as well as 32 bit (palette size) using 'TogglePallete32' and 'TogglePallete16' buttons in the toolbar.

(xiv) One can access this package with a password for security purpose.

Starting the Application:

Open the application executable PBS Edit from appropriate sub-directory.

- It will automatically open the last edited image or you have to select 'open' from the file menu. If it does not open the last edited image automatically then the screen will appear as show in Figure below.



- This will open the mage. If the editing toolbar (palette) is not open then click on 32 or a 16 toggle button or palette 16 or 32 from the view menu.

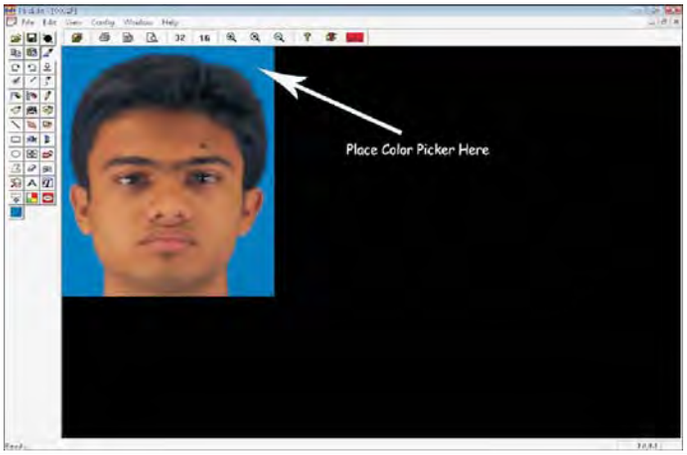
The 'Palette Toolbar' for Editing Purpose:

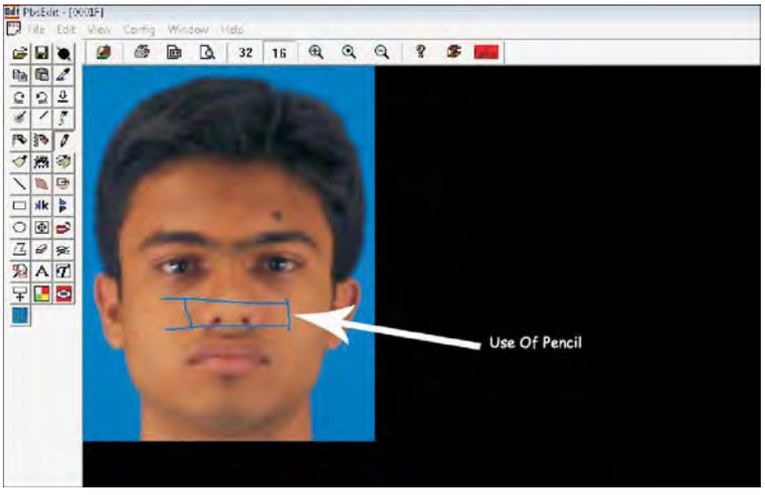
Colour Picker  **:**

This command allows to select the drawing colour from anywhere in the screen. Before every image colour selection the 'colour picker' button should be pressed. If you place 'colour picker' tool after selecting it and then if you left click then it will select background colour (blue) as current selected colour.

Pencil : Select Pencil Tool

This command is the most common tool selector. A pencil icon appears as a cursor. You have to keep the left mouse button pressed to draw. This tool draws a solid line. The size and the colour of the line is selected using 'colour picker' operation. Any of the draw tool command may be terminated using right mouse button click. Double clicking on pencil button opens property dialog box. The below figure shows use of Pencil with the colour selected as above with 'colour picker tool'. The size of the pencil can be changed with the help of 'tool size box' on the right side of the 'save' button in the Palette bar.

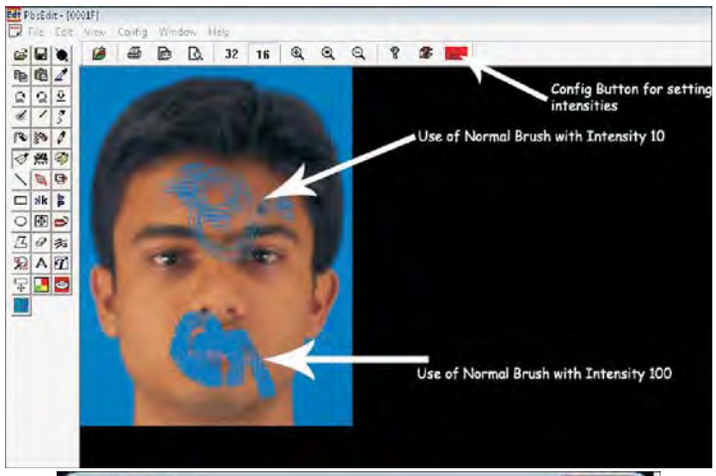




Brush : Select Normal Brush

The 'brush' command is similar to the 'pencil' command but draws a number of parallel curvilinear lines instead of solid line. This 'brush' is specially useful for drawing the hair. To view the hairy effect the size of the tool must be large. To have mixed colours (black and white) select colour from 'select colour bar' and try repeatedly. Following figure shows the use of normal brush with different intensities. You can set

intensities by clicking the 'config' button in the toolbar. By clicking on 'config' 'dialog configuration' as shown in below figure where you can set intensities for different brushes and spray tools will pop up.





Copy Brush  **:**

(i) At source, drag to desired direction.

(ii) Copy using brush.

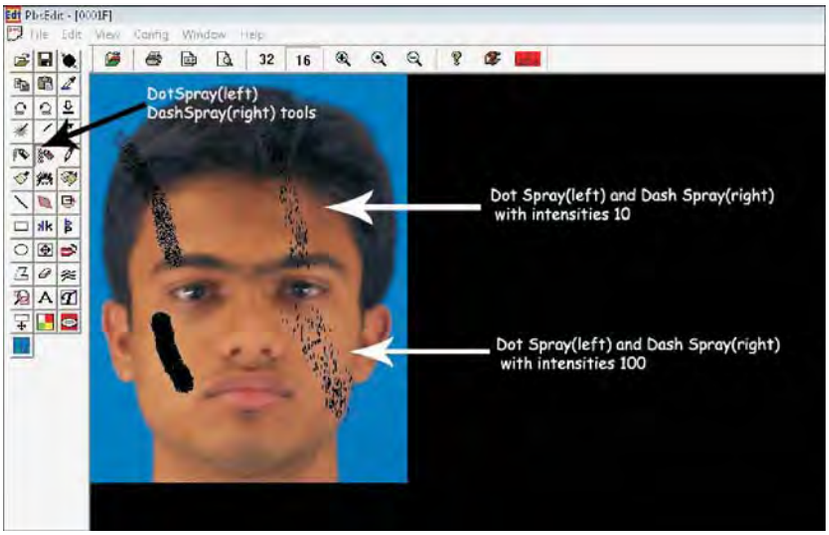
The 'copy brush' command opens a copy cursor. The copy cursor is to be placed over the image area to be copied to the other portion of the screen. Now while keeping the left mouse button (LMB) pressed, mouse is dragged few centimetres towards one of the three directions and mouse key is released. The four modes of copying are:

- Horizontal inverse
- Vertical inverse
- Horizontal and vertical both inverse
- No inverse



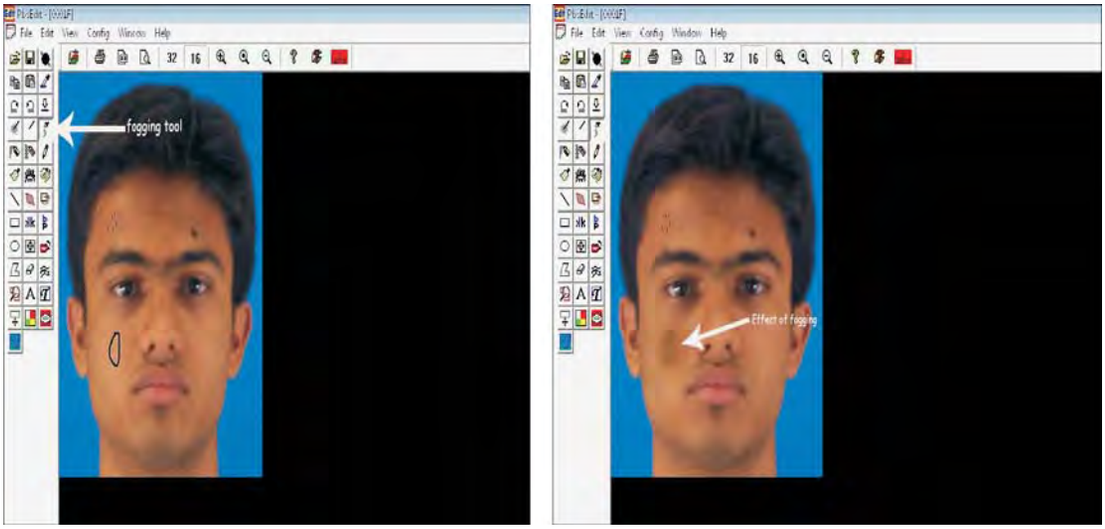
Dot and Dash Spray : Select Spray Gun

The 'spray' command is the most common tool of image editors. In this 'spray implementation' a new property is added. In most spray gun continues spray produces monotonous colour. To simulate the natural skin colour, a small amount of uncertainty is added to the colour. You can select this property in spray property box of 'spray' button by double clicking the mouse LMB on it. Below figure shows use of 'dot spray' and 'dash spray' using different intensities.



Fog : Select Fogging (Blurring) Tool

This is the most powerful editing tool used to integrate the face components to a smooth portrait. Fog tool dynamically replaces the colour of a picture element by the average colour value of adjacent picture elements. This produces blurring effect and smoothens sharp colour boundary. The result of an editing example of 'fog tool' is shown in the section on 'Editing BMP Files'. The tool size can be changed using 'fog property' dialog box or 'select colour bar'.



Before fogging **After fogging**

Crop Resize Paste  **: Select (crop)- Mirror- Resize and Paste**

Using this command you can copy a rectangular area from an image and paste it in different locations in four different ways and with desired scale factor. Although it performs complex modes but the operation is fairly simple:

- Mark the source rectangular area by pressing LMB and dragging the mouse.
- Mark the destination rectangular area in the same way. You can drag the mouse in four difference directions, namely

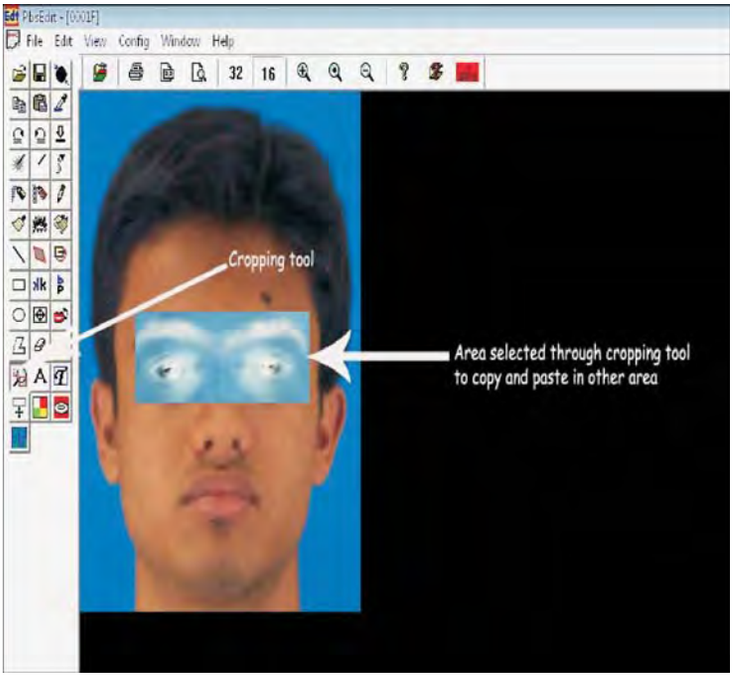
  (i) North-East

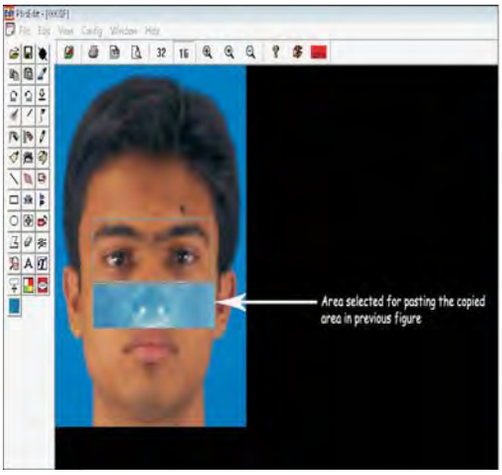
  (ii) South-East

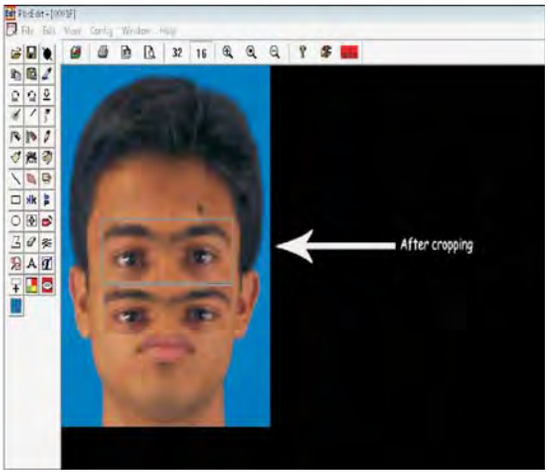
  (iii) South-West

  (iv) North-West

Depending on the direction the image mirroring will take place and the amount of drag will decide the magnification. The result of an editing example of 'crop resize paste' tool is shown in the section on 'Editing BMP Files'.







Line : Select Line Drawing Tool

It is a simple to use geometric drawing command. To draw a straight line, take the mouse cursor to the starting point of the line, press the LMB and drag the mouse to the end point and release the LMB. This will draw a straight line between the start and end the points. You can change the thickness and colour of the line using the 'select colour' command or the line property box.

Rectangle : Select Rectangle Draw Tool

Rectangle command is exactly similar to the line command. It draws a rectangle between the start and the end point as the opposite diagonal points of the rectangle. Use 'rectangle property box' by double clicking on the 'rectangle select button' to choose filled or blank ticking for desire mode of drawing.

Ellipse : Select Ellipse Tool

Ellipse command is exactly similar to the line command. It draws an ellipse touching the imaginary rectangle between the start and the end point as the opposite diagonal points of the rectangle. Use the 'ellipse property box' by double clicking on the 'ellipse select button' to choose filled or blank ticking for desire mode of drawing.

Polygon : Select Polygon Tool

To draw a polygon, follow the same instructions as line command. The polygon command does not terminate at end point. The end point of any line is considered as the starting point of the next line. Every time you press the LMB a new connected line is drawn. To terminate the command, double click on the last point. This will complete the polygon by joining the first point to the last point.

Eraser :

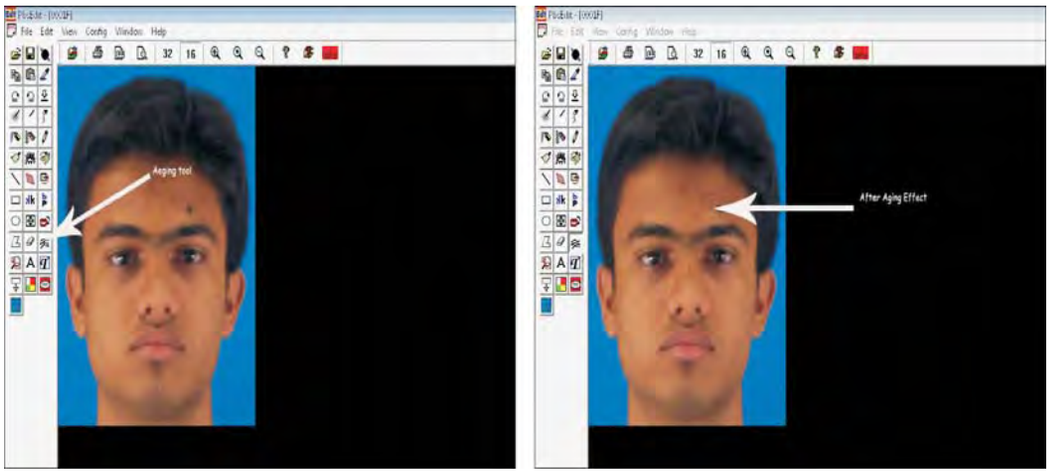
It will allow you to erase the edited area and get the original area where ever you move the eraser.

Tilt Image :

Select a rectangular boundary around the portion of the image to be tilted. Now anchor to one of the eight positions and drag. The eight positions are four corners and four sides. Following are the possible options- increase/decrease the width, increase/decrease the height, convert to parallelogram, drag corner.

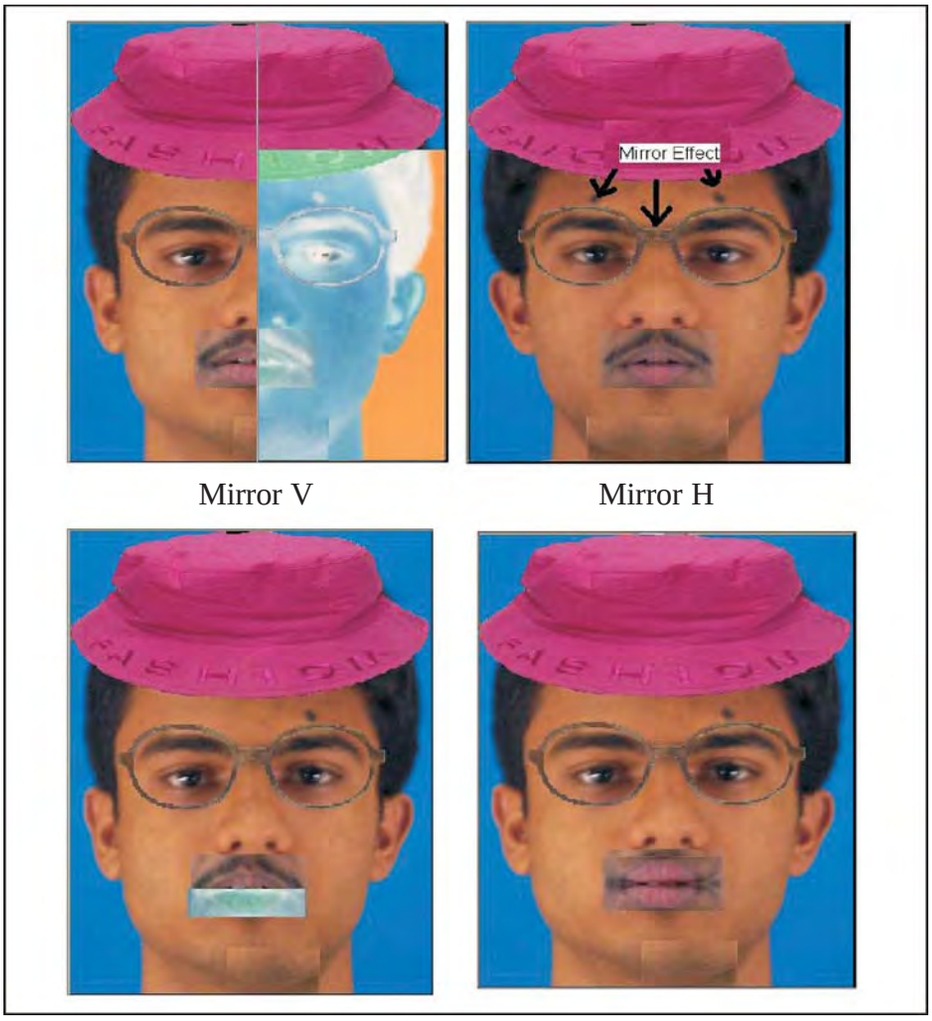
Ageing :

It will help you to make the image more aged by creating emboss lines on the human face. For this click on the ageing tool and then draw the mouse cursor onto the image where you want the age marks (normally on forehead and cheeks) as shown in Figure.



Mirror H and Mirror V:

Click LMB to a point (e.g. tip of the nose). A vertical reference will appear. Select a rectangular boundary around the portion of the image starting from the reference line, to be horizontally mirrored. The starting edge of the rectangle should be towards the side you want to mirror. With the release of LM B the mirroring will start. Figure is an example showing horizontal mirroring of right half of the face to the left half. The rectangle start corner is northwest on the middle top of the head in this example.



Select Area:

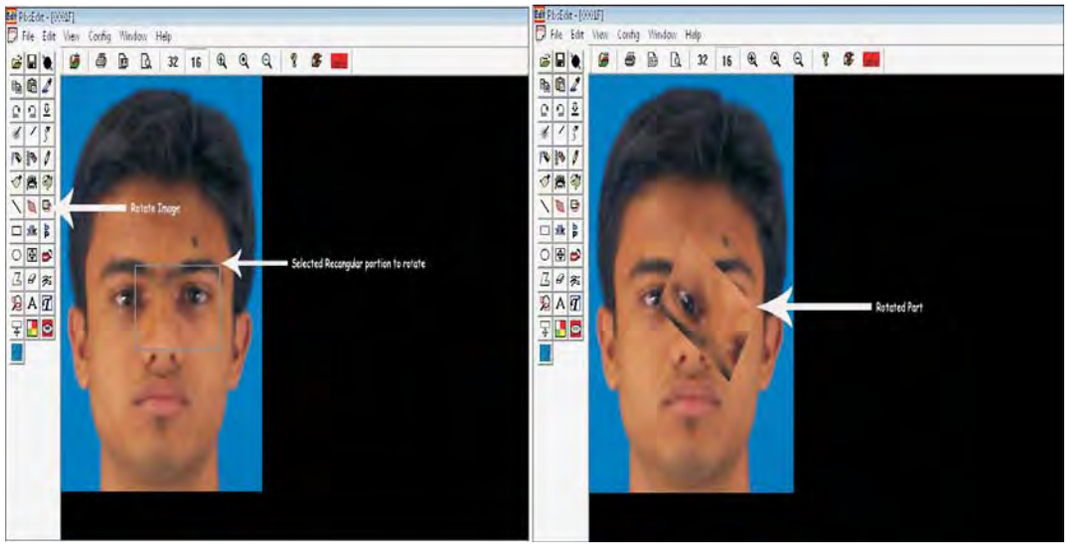
It will help to copy any part of the image and paste it anywhere on the window opened. In order to do this click on the LMB on the tool select area and then select the portion of the image. After that drag the mouse pointer to copy the image.

Colour Dialog Box  **:**

It is used to make the colour palette from the image itself. You can save it in the colour palette. For this right click on one of these colour palette square and left click on the image portion which you want to add in the colour palette. If you want to use the palette select it and drag on the image to have the effect. You can load the existing palette or standard palette also.

Rotate Image  **:**

You can use this tool to rotate image or any portion of the image in any desired direction. For this click on the tool then select the image portion which you want to rotate and drag the mouse in the desired direction as shown in Figure.



Tool Size Box  **:**

It is used to increase/decrease the size of each tool effects (copy brush, light brush, dark brush, etc.).

Hair Brush  **:**

With the help of this tool you can draw hair on the image. For this click on the 'hair brush' tool and drag the mouse on the image to create hair. (This will create lines which looklike hair).

Undo  :

It is useful for removing the changes you have currently made to the image.

Redo :

This tool is useful for redoing the changes for which you have used undo.

Update Image :

With the use of this tool current modifications/updates are saved which you have made to the images.

Save :

It is used to save the current image with the modifications done in the original image.

Copy :

This button is used to copy a rectangular portion of the image from the original image.

Paste :

It is used to paste the copied part of the image.

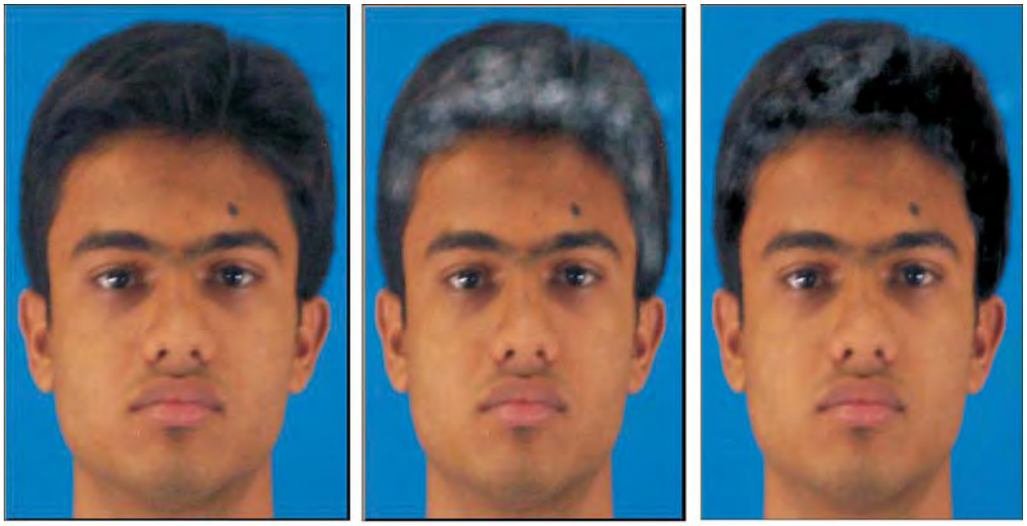
Dark Brush:

To apply dark brushing effect on image. You can change the size and intensity of brush through 'tool size box' and 'configuration' button respectively.

Light Brush:

To apply light brushing effect on the image. You can change the size and intensity of brush through 'tool size box' and 'configuration' button respectively.

Normal Picture **Light Brush** **Dark Brush**



Change Shape 2  **:**

This tool is used to change the shape of a particular selected rectangular portion of the image. First select the part of the image you wish to change the shape and then drag a line from any particular point. *The dragging line should be small enough to have an effect.*

Change Shape1  :

This tool is used to change the shape of a particular selected rectangular portion of the image. First select the part of the image you wish to change the shape and then drag a line from any particular point. *The dragging line should be small enough to have an effect.*

Selection of Area Shape 2	Effect of Change Shape1	Effect of Change
		

Header-Footer  :

It is used to provide a header and footer to the image. Different fonts of different sizes and colours can be selected by clicking on the font button after clicking on the header and footer button. Then place the header and footer at required position on the image.

Text  :

It is used to write a text on the image. For this first click on the text button and then select appropriate font with font style and colour. After that click on OK. Now draw the rectangular text box and then you can write inside the text box.

Move Image  :

It is used to move the last pasted image. For this click on the 'move image' button that will paste the image.

 :Open Paste Image

 :Print

 :Print Size

 :Print Preview

 :View/Hide 32 bit Palette bar

 :View/Hide 16 bit Palette bar

 :Zoom In

 :Original Size

 :Zoom Out

 :Clicking on this button will open the about PBS Edit Dialog

 :Clicking on this button will open the help document

Reference

1. National Crime Records Bureau, Ministry of Home Affairs, Government of India, New Delhi.

26 POLYGRAPH TEST

Forensic psychologists interpret and evaluate the internal and external behavioral patterns of suspects/accused/witnesses/victims with the help of different equipments and aid in the process of scientific investigation of criminal cases. They help the investigating agencies to establish the knowledge, involvement and connivance of an individual in a particular case under investigation.

Forensic psychology includes:

(i) Polygraph or Lie-Detection Test

(ii) Brain Mapping or Brain Finger Printing or Brain Electrical Oscillation Signature Profiling Test

(iii) Narco Analysis Test

(iv) Psychological and Geographical Profiling

Lie Detection is a psycho-biological test to check the veracity of statements on computerized equipment known as a lie-detector or polygraph. The lie detector measures the following autonomic nervous system activities in the form of graphs:

(i) Abdominal respiration

(ii) Thoracic respiration

(iii) Galvanic skin resistance (GSR)

(iv) Blood pressure/pulse rate

(v) Muscular pressure

(vi) Finger pulse

(vii) Skin temperature

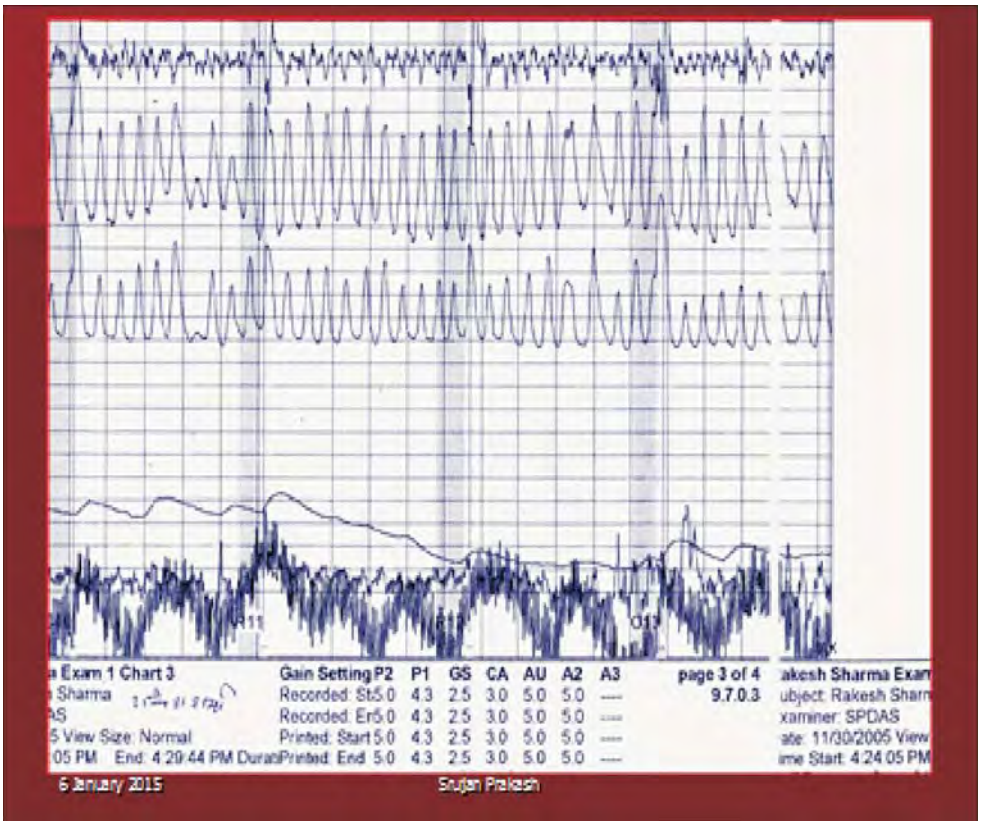


Figure 26.1: A normal polygraph chart

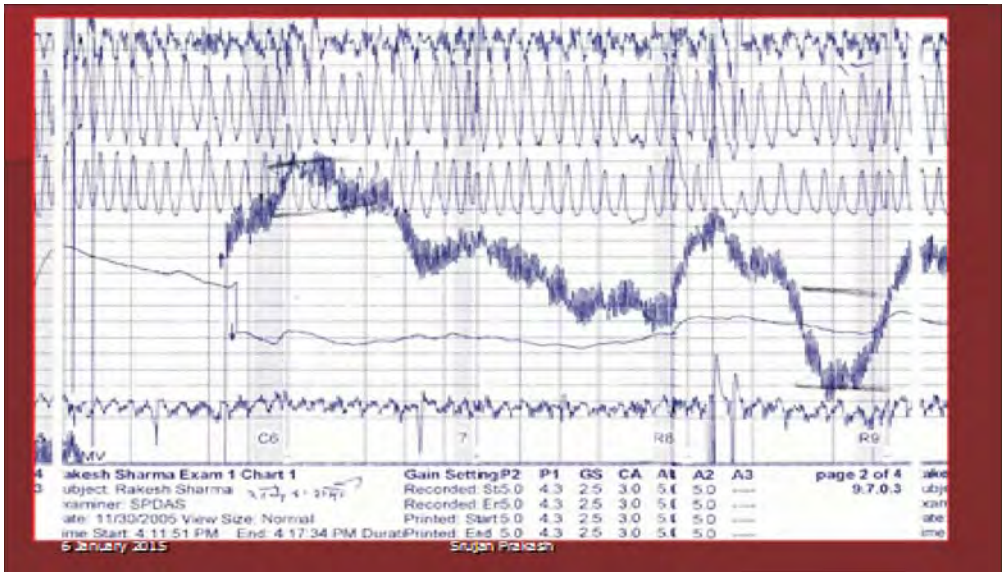


Figure 26.2: Polygraph chart showing deception

26.1 Legal Requirement

A full bench of the Hon'ble Supreme Court of India in Smt. Selvi and others versus State of Karnataka (Criminal Appeal No 1267 of 2004) I order dated 5 May 2010 has held that

'*xxx We hold that no individual should be forcibly subjected to any of the techniques in question, whether in context of investigation in criminal cases or otherwise. Doing so would amount to an unwarranted intrusion into personal liberty. However,* we do leave room for the voluntary administration *of the impugned techniques in the context of criminal justice, provided that certain safeguards are in place. Even when the subject has given consent to undergo any of these tests, the results by themselves cannot be admitted as evidence because the subject does not exercise conscious control over the responses during the administration of the test. However, any information or material that is subsequently discovered with the help of voluntary administered tests results can be admitted in accordance with Section 27 of the Indian Evidence Act, 1872. The National Human Rights Commission had published Guidelines for administration of Polygraph tests (Lie Detector Tests) on an Accused in 2000. These Guidelines should be strictly adopted for conducting the 'Narco Analysis technique' and the 'Brain Electrical Activation Profile Tests'.xxx*

Source: *All India Reporter*, July 2010, pp. 2060–1

The National Human Rights Commission vide letter no. 117/8/97–8 dated 11/01/2000 has issued guidelines regarding administration of Polygraph Test to accused persons**.** The investigating officers are advised to follow the guidelines scrupulously. The Commission, after bestowing it's careful consideration on this matter of great importance has laid down the following guidelines relating to the administration of Lie Detector Tests:

(i) No Lie Detector Test should be administered except on the basis of consent of accused. An option should be given to the accused whether he wishes to avail such test.

(ii) If the accused volunteers for a Lie Detector Test, he should be given access to a lawyer and the physical, emotional and legal implications of such a test should be explained to him by the police and his lawyer.

(iii) The consent should be recorded before a Judicial Magistrate.

(iv) During the hearing before the Magistrate, the person alleged to have agreed should be duly represented by a lawyer.

(v) At the hearing, the person in question should also be told in clear terms that the statement that is made shall not be a 'confessional' statement to the Magistrate but will have the status of a statement made to the police.

(vi) The Magistrate shall consider all factors relating to the detention including the length of detention and the nature of interrogation.

(vii) The actual recording of a Lie Detector Test shall be done in an independent agency (such as a hospital) and conducted in the presence of a lawyer.

(viii) A full medical and factual narration of manner of the information received must be taken on record.

26.2 General Requirements

(i) The investigating officer is advised to send a requisition addressed to the Director, State FSL, requesting for a date of polygraph examination. The requisition has to be forwarded either by Superintendent of Police or Sub Divisional Police Officer. While sending requisition, the investigating officer should attach photocopies of all relevant documents such as FIR, statements of subject(s) recorded under Section 161 CrPC, PM Report, Spot visit report, sketch of the spot, a brief case history and photographs, if any. This will enable the experts to understand the nature of the crime, role of the subject(s), and most importantly how, when and where the crime was committed, who were the other accomplices and the motive behind the crime and other selected issues such as disposal of dead body, weapon of offence, vehicle used if any etc.

(ii) The investigating officer is advised to requisition the services of a Polygraph Division only after making a thorough investigation and after collecting relevant documents including physical evidence, mobile call details, PM report, inquest report, injury report, age certificates, etc. In the absence of such details referred to above, it is extremely difficult for the examiner to formulate proper questions and unreveal inconsistencies in the statements of the subject.

(iii) The laboratory will communicate date for consultation with the investigating officer. The expert after going through the facts of the case will prepare questionnaire and communicate date(s) for the polygraph test.

(iv) The investigating officer is required to meet the concerned expert at State FSL, personally for discussion and subsequent examination. Under no circumstances, any officer other than the IO will be entertained.

(v) Before sending requisition, the concerned IO should attach a declaration that he has obtained consent of the subject(s) to undergo the Test as per Article 20(3) of the Indian Constitution and orders passed by the Honorable Supreme Court of India referred to above. Often, it has been observed that the subjects are not informed by the investigating officer, as a result of which the expert has to face problems to obtain consent from the subjects at the time of examination. Invariably this has resulted in inconvenience and wastage of time both of the expert and the IO.

(vi) Only nominated subjects will be examined on date and time fixed by the expert. Fresh dates are to be obtained if additional persons related to the crime are required to be examined.

(vii) As a Polygraph Test is a psycho-physiological test, long journey should be avoided on the date of examination and the subjects may be given sufficient rest and food prior to polygraph examination to ensure qualitative results.

(viii) In case of lady subjects, a lady home guard/constable is required to accompany the subject who will remain present during examination also.

(ix) All minor subjects should be accompanied by their parents/guardians compulsorily who will also countersign the consent form.

(x) In case further session is required, the IO should make his/her arrangements to stay. The IO will also make necessary arrangements for security of the subjects.

(xi) While asking the questions on the equipment, each question is asked after a gap of 25 seconds. This gap is allowed in order to activate and normalize the sympathetic and para sympathetic components of the autonomic nervous system. Marking should be made on the chart at the time of starting of question and end of the question and also indicate the response of the subject on chart (Required in manual polygraph equipment).

Limitations: Polygraph tests cannot be conducted on subjects hard of hearing, lunatics or persons suffering from acute high blood pressure, asthma or expecting mothers.

26.3 Sample Format for Intimation to I.O.S Regarding Fixation of dates of Polygraph Test

SCIENCE IN PURSUIT OF TRUTH

STATE FORENSIC SCIENCE LABORATORY, RASULGARH,

BHUBANESWAR-751010, ODISHA

TEL- 0674~2586187/ 417, FAX- 2586187

No._____SFSL-LD Date / /2015

To

The Superintendent of‘ Police,

Dist-

Ref: Letter no. dtd ——— regarding date of Polygraph test

****

Case Ref: —— PS: _____ Case No- dated U/s ———— IPC (GR NO.———)

No. of subjects for polygraph test: 1 (one)

Date of polygraph examination: DD/MM/YYYY (Day) Time: _____ sharp

Place of examination: Lie Detection Division, State FSL, ————————-

Name, designation and contact number of expert: ————————————

Additional documents required: A requisition addressed to the Director, State FSL BBSR for production of subject and copy of PM Report.

With reference to the letter and subject mentioned above, the IO may be directed to follow the instructions given below carefully.

Instructions for the Investigating Officer

(i) Polygraph test is a voluntary test. The subjects should be informed about the test as per article 20(3) of the Indian Constitution. The concerned IO will submit written consent(s) of each subject to the expert on the date of examination.

(ii) For the subjects in custody, guidelines of the National Human Rights Commission issued vide letter no. 117/8/97– 8 dated 11January, 2000 may be scrupulously followed.

(iii) The number of subjects should not exceed three (3) per day as per prevailing norms laid down for the polygraph test.

(iv) Recent medical history of the subject is advisable pre-requisite for the test.

(v) As a polygraph test is essentially a psychological test, any type of fatigue or exhaustion ought to be avoided such physical condition would affect the test adversely.

(vi) Lady suspects should be compulsorily accompanied by lady personnel without which test will not be conducted.

(vii) Parents/guardians of minor suspects must accompany him/her to countersign the consent form for polygraph test.

(viii) Only named subjects will be examined on the specified date and time, fixed by the expert.

(ix) Polygraph test may take longer time. The Investigating Officer should come adequately prepared to stay in Bhubaneswar.

Director
State FSL, Bhubaneswar

SAMPLE FORMAT OF POLYGRAPH TEST REPORT

BY REGD. POST

SCIENCE IN PURSUIT OF TRUTH

STATE FORENSIC SCIENCE LABORATORY

RASULGARH, BHUBANESWAR, ODISHA

No._____ SFSL-LD Date / /2015

POLYGRAPH (LIE DETECTOR) TEST REPORT

From:

The Director and Chemical Examiner to the Govt. of Odisha,

State Forensic Science Laboratory,

Rasulgarh, Bhubaneswar- 751010 (Odisha)

To

The Superintendent of Police,

Dist. _____

Ref.: Letter no. _____ dated _____ regarding Polygraph (Lie Detector) Test in _____ Police Station Case No._____ dated DD/MM/YYYY U/s _____ IPC

With reference to the above, Lie Detection Test Report No. : - _____ is sent herewith.

Test: Lie Detection test is a psycho-biological examination to check the veracity of statements of subjects with the help of computerized equipment known as a Lie Detector or Polygraph. This equipment measures 6 different types of autonomic physiological changes in the form of graphs. They are

(i) Thoracic respiration
(ii) Abdominal respiration
(iii) Galvanic skin resistance
(iv) Blood pressure
(v) Movement or muscular pressure
(vi) Finger pulse

Questionnaires are prepared by the polygraph expert on the basis of documents submitted by the IO and discussion held with individual subjects. The Lie detector equipment records changes in the autonomic nervous system in the body of the subject during the examinations which form the basis for detection of deception in the report.

Table 26.1: Details of Persons Subjected to the Examination

Sl. No	*Name*	*Age*	*Sex*	*Category*	*Place of Examination*	*Date of examination*
1.	**XXXXXX**	**45**	**Male**	**Suspect**	**State F.S.L, ––– –**	**––––**

1. The Lie Detector (polygraph) test was conducted on the written voluntary consent of the subjects as per Article 20 (3) of the Indian Constitution.
2. The subjects were found to be psycho-biologically sound and responsive to the test.
3. The Lie Detector (Polygraph) equipment was working satisfactorily as on _____(date).
4. The subject was produced and identified by the IO.

In this case, 1 questionnaire consisting of 16 questions was asked to the subject in ——— language out of which 9 were relevant questions, 5 irrelevant questions and 2 general control questions.

Relevant questions are related to the crime under investigation. Irrelevant questions are neutral questions that are not related to the crime. General control questions are used to exclude or include the possible involvement of the subject in any other crime prior to or after the occurrence of the crime at hand.

XXXXXX, suspect admitted voluntarily in writing before polygraph expert during pre-test discussion **(Copy enclosed)** that Ram Singh had in fact carried his mobile telephone with him on 18/12/14 when they both had been to ——— He further admitted that Ram Singh had handed over the mobile to him at — on 18/12/14 night, before he left for —— at around 8.00 PM. The questionnaire in respect XXXXXX has been framed accordingly.

The questionnaire along with answers of the subject to each question was as follows:

Sl. No.	*Type of questions*	*Questions*	*Answers of the subject*
1.	Irrelevant	Is your name XXXXX?	Yes
2.	Irrelevant	Have you taken your lunch today?	Yes
3.	**Relevant**	Is it a fact that Ram asked you to accompany him to visit ------ on 18/12/14?	Yes
4.	Irrelevant	Do you live in ----------?	Yes
5.	**Relevant**	Did Ram Singh carry his mobile telephone with him on 18/12/14 when you both visited-------i ?	Yes
6.	Control	Before this year, did you ever try to kill anybody?	No
7.	Irrelevant	Are you a farmer by profession?	Yes
8.	**Relevant**	Did you and Ram Singh return to ------ on 18/12/14 at around 6.30 PM?	Yes
9.	**Relevant**	Is it a fact that Ram Singh took liquor at on 18/12/14 evening despite your protest ?	Yes
10.	Control	Prior to 2014, did you ever tell lies before the police?	No
11.	**Relevant**	Did you kill Ram Singh by pushing him to the road side on 18/12/14 night?	No
12.	**Relevant**	Is it a fact that you proceeded to -------- for marketing at around 8.00 PM leaving Ram Singh on the road side (where he fell asleep)?	Yes
13.	Irrelevant	Did you answer all my questions truthfully?	No
14.	**Relevant**	Did you get to know about the death of Ram Singh for the first time from family members of Ram Singh on 19/12/2014 forenoon?	Yes
15.	**Relevant**	Was there any untoward incident at ----- on 18/12/14 night?	No
16.	**Relevant**	Are you aware of the present whereabouts of Rs. 20,000.00 of Ram Singh?	No

Expert Opinion

The analysis and evaluation of polygraph charts of XXXX reveal deceptive responses. According to the test and analysis, the statements of above named subject are found to be not true.

Director and Chemical Examiner

Assistant Director and Assistant Chemical Examiner

Memo No. _____SFSL-LD date / /2015

Copy forwarded to Inspector in charge, ——— Police Station, Dist- ———— for information and necessary action.

Director

27 WILDLIFE

27.1 Introduction

The Parliament of India passed the Wildlife Protection Act, 1972 (53 of 1972) on 9th September 1972. It is the first comprehensive Act on Wildlife Protection in India and is among the most stringent of such Acts in the world. It is applicable to the whole of India except the state of Jammu & Kashmir. Since its promulgation in the year 1972 the Act has been amended seven times in the year 1976, 1982, 1986,1991,1993,2002 & 2006. The Act has twelve chapters, six schedules and sixty-six sections.

In the Act the "Wildlife" has been defined as any animal, aquatic or land vegetation which forms part of any habitat. The word "Wild Animal" has been defined as any animal specified in schedule- I to schedule- IV of the Act and found wild in nature. As per the Act the word "Animal" includes mammals, birds, reptiles, amphibians, fish, other chordates and invertebrates and also includes their young ones and eggs. The concept of hunting as given in the Act is very wide and includes killing, poisoning, capturing, coursing, snaring, trapping, driving or baiting any wild or captive animal and every attempt to do so and hunting also includes injuring, destroying or taking any part of the body of any wild animal or captive animal and in the case of wild birds and reptiles damaging or disturbing the eggs or nests of such birds or reptiles. As per the Act the words "Captive Animal" means any animal specified in schedule-I to schedule-IV which is captured or kept or bred in captivity. As per the Act if any person under takes even a single transaction in relation to the business of buying or selling any captive animal, animal article, trophy or specified plan, he will come within the definition of "Dealer".

The Act has many unique provisions for protection of wildlife resources in the country. Section 36 of the Act provides that the State Government in consultation with the local community declare any area owned by the Government particularly the area which links one

protected area with the another, as a conservation reserve. This section further provides that if any community or individual desires to protect wildlife on their private or community land then such lands can be declared as community reserved. The right or privileges of the local community are not affected by declaration of such conservation reserve or community reserve. Section 38 of the Act provides for declaration of an area as Tiger Reserve. The chapter VI (A) of the Act which was inserted by amending the Act in 2002, provide for forfeiture of illegally acquired property. Section 38 (L) and Section 38 (Y) of the Act provides for the constitution of the National Tiger Conservation Authority and Wildlife Crime Control Bureau respectively. The hunting of any wild animal specified in schedule-I to schedule-IV of the Act has been totally prohibited except as provided in section-11 or section 12 of the Act under which the Chief Wildlife Warden can permit hunting in certain cases or can issue permit for hunting for some special purposes like education, scientific research and scientific management. Among the wild animals specified in the schedules of the Act, the wild animal specified in schedule–I and part-II of schedule–II has been given a higher status of protection and they have been classified as "Scheduled Animals". The trade or commerce in such scheduled animals have been totally prohibited under chapter V–A of the Act. Under section 44 of the Act the licenses can be granted to any person for carrying out business as manufacturer or dealer in any animal article or trophy or captive animals or in meat subject to the provisions of chapter V-A regarding scheduled animals.

The penalties under the Wildlife Protection Act 1972 are given under section 51 of the Act. The different punishments prescribed for various offences under the Act is as follows:

Offence	Penalty
Contravention of the provision of the Act except chapter IV-A, chapter IV-B, chapter V-A, section 53 and section 58 (Y).	Punishable with imprisonment for a term which may extend to three years or with fine which may extent to twenty five thousand rupees or with both.
Contravention of the provision of the Act except chapter IV-A, chapter IV-B, chapter V-A, section 53 and section 58 (Y), if the offence is related to any scheduled animals.	Punishable with imprisonment for a term which shall not be less than three years but may extend to seven years also with fine which shall not be less than ten thousand rupees.

Offence	Penalty
Hunting in a sanctuary or a National Park or altering the boundary of a sanctuary or National Park.	Punishable with imprisonment for a term which shall not be less than three years but may extend to seven years and also with fine which shall not be less than ten thousand rupees.
Contravention of the provision of section 38 (J).	Punishable with imprisonment for a term which may extend to six months or with fine which may extend to two thousand rupees, or with both.
Offences in relation to the core area of a Tiger Reserve, hunting in a Tiger Reserve or altering the boundaries of the Tiger Reserve.	Punishable with imprisonment for a term which shall not be less than three years but may extend to seven years, and also with fine which shall not be less than fifty thousand rupees but may extend to two lakh rupees.
Contravention of the provision of chapter V-A regarding Trade or Commerce in trophies or animal articles.	Punishable with imprisonment for a term which shall not be less than three years but which may extend to seven years, and also with fine which shall not be less than ten thousand rupees.
Contravention of provision of section 53 of the Act.	Punishable with imprisonment for a term which may extend to six months, or with fine which may extend to five hundred rupees, or with both on conviction for such offence.
Contravention of section 58 (Y) of the Act.	Punishable with imprisonment for a term which may extend to five years or with fine which may extend to fifty thousand rupees.

27.2 List of Indian wildlife species that are commonly found in illegal trade

A. Mammals:

S.No.	Common Name	Scientific name	Status in WLP Act	Body Parts found in trade
1.	Black Buck (Krishna Mrig)	Antelope cervocapra	Sch. I, Pt.I	Horns & Meat
2.	Himalayan Brown Bear	Ursus arctos	do	Bile, Gall Bladder &skin
3.	Chinese Pangolin	Mainis pentadactyla	do	Scales, flesh& skin
4.	Indian elephant	Elephaus maximus	do	Ivory/tusk
5.	Indian lion	Panthera leo persica	do	Skin, nails
6.	a. Leopard or Panther b. Snow leopard	a. Panthera pardus b. Panthera uncia	do	Skin,nails, teeth
7.	Civet	Vivera megaspila	Sch.II, Part II	Skin(pelt)
8.	Musk deer	Moschus mochiferus	Sch. I, Pt.I	Musks
9.	Pangolin	Manis crassicaudata	do	Scales & flesh & skin
10.	Rhinoceros	Rhinoceros unicornis	do	Horn, nails & flesh
11.	Otter	Aonyx cinerea & Luthra perspillata	Sch. II, Part II	Skin
12.	Sloth Bear	Melursus ursinus	Sch. I, Pt.I	Bile
13.	Loris-Slender Loris	Nyeticebus coucang	do	Ornamental & aesthetic
14.	Tiger	Panthera tigris	do	Pelt Skin, nails, teeth, moustache hairs, flesh, bones etc.
15.	Tibetan antelope (Chiru)	Panthelops hodgsoni	do	Body hair for shawl/stoll

B. Amphibians & Reptiles (Sch I Part II & Sch II)):

S.No.	Common Name	Scientific name	Status In WLP Act	Body parts found in trade
16.	Monitor lizard	Varanus griscus(daudin) & Varanus flavaescens	Sch.I, Part II	Skin & fat
18.	Terrapins & Eastern Hill Terrapin	Batagur basaka & Melanochelys tricarinata	Sch.I, Part II	Meat & aesthetic
19.	Pythons, King Cobra and other snakes	Genus python Genus naja	Sch.I, Part II Sch.II,Part II	Skin (Poison)
20.	Spiny tailed Lizard/Sanda	Uromastix hardwickki	Sch.II, part I	Skin & fat

C. Mammals, Reptiles & plants (Sch.II Part II, SchIII, Sch IV & SchVI):

S.No.	Common Name	Scientific name	Status in WLP act	Body parts found in trade
21.	Mongoose	Herpastice	SchII, Part II	Hairs
23.	Sambhar	Cervus Unicolor	SchIII	Flesh & antlers
24.	Chital	Axis axis	SchIII	Flesh & Antlers
25.	Wild pig	Sus scrofa	SchIII	Flesh & Ivory
26.	Sand boa	Boldae	SchIII	Sorcery
27.	Kuth	Saussera costus	Sch VI	Medicinal(powder or coctation form)
28.	Tokey Gecko	Geecko geecko	Sch IV	Ornamental & aesthetic
29.	Tortoise	Testeudinidae, Tryonychidae	Sch IV	Meat, Pet

D. Birds:

S.No.	Common Name	Scientific name	Status in WLP Act	Body parts foond in trade
30.	Swiftlets	Collocalin unicolor & C.fusiphaga	Sch. I, Part III	Nests
31.	Hill Myna	Gracula spp.	Do	Live
32.	Khalij pheasant	Loprus leucomelana	Do	Ornamental
33.	Avadavat & Munia	Estrildine	Sch. IV	Ornamental
34.	Parakeet	Psittacidae	Sch. IV	Ornamental
35.	Owls	Strigidae	Sch.IV	Sorcery
36.	Grey Jungle fowl	Gallus sonertti	Sch.II, Part II	Neck feathers for angling

E. Shells (mollusca):

S.No	Common name	Scientific name	Status in WLP Act1972	Parts found in trade
37.	Cassia Cornuta	Same	Sch.I, Part IVB	Whole& in parts
38.	Charonia tritonis	same	do	do
39.	Conus milneedwardsi	same	do	do
40.	Cypraecasis rufa	same	do	do
41.	Hippopus hippopus	same	do	do
42.	Nautilus pompillcis	same	do	do
43.	Tridacana squamosa & T. maxima	same	do	do
44.	Tudicilla spirillus	same	do	do

F. Corals (Coelenterates):

S.No.	Common name	Scientific name	Status in WLP act	Parts used in trade
45.	Reef Building Corals	All scaleractinians	Sch I, Part IVA	whole
46.	Black Coral	All antipatharians	do	do
47.	Organ pipe coral	Tubipora musica	do	do
48.	Fire coral	All millipora spp.	do	do
49	Sea fan	All gorgonians	do	do

G. Echinodermata:

S.No.	Common name	Scientific name	Status in WLP act	Parts used in trade
50.	Sea cucumber	All holothurians	Sch I, Part IVC	Whole & in parts

H. Fishes

S.No.	Common name	Scientific name	Status in WLP act	Parts used in trade
51.	Sea horses	All Sygnathidians	Sch I, Part IIA	Whole & in parts

I. Red Sander

S.No.	Common name	Scientific name	Status in WLP act	Parts used in trade
52.	Red Sander	Pterocarpus santalinus	Not listed under WL(P) Act. CITES Appendix II	Timber, Chips, Powder

J. Primates

S.No.	Common name	Scientific name	Status in WLP act	Parts used in trade
53.	Slow Loris			Animal in pet trade
54.	Slender Loris			

27.3 Features for identification of the species:

27.3.1 Blackbuck

[Antelope cervicapra, Sch.I, Pt.I, (2)]:

It is a member of the Bovidae family which is distributed in peninsular India. The general height of the species at shoulder level is 72-84 cm. and weighs 32-42 kg.



Hair-Signature-Pattern:

(a) Colour- Creamish white (b) Circular Scale Pattern-Imbricate (c) Medullary Pattern- Continuous and (d) Medullary Index - 0.634.

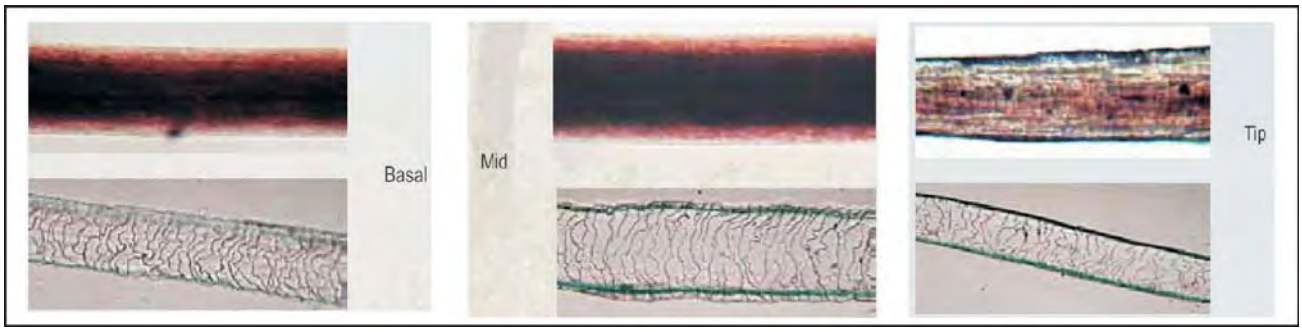
27.3.2 Bear:

(i). Sloth bear [Melursus ursinus, Sch.I, Pt.I, (31C)] : It is a member of Ursidae family which is found in North Eastern Region, Peninsular and South India. Its body length range from 140 - 171 cms and it weighs from 66 -144 Kg.



Hair Signature-Pattern:

(a) Colour- Grey with light & dark brown patches, (b) Circular Scale Pattern-Imbricate, (c) Medullary Pattern- Ladder Medulla, and (d) Medullary Index - 0.799.



(ii). Sun Bear: It is a member of Ursidae family which is mainly distributed in the States of Assam & Arunachal Pradesh. Its body length range from 105 -141 cms and it weighs about 28 - 66 Kg.



(iii). Himalayan/Asiatic Black Bear: It is distributed in NE & Himalayan Region of the country. Its body length ranges from 141 - 171 cms and it weighs from 91-116 Kgs.



Bear are generally poached for its bile that contains Ursodeoxycholic acid(USDA) which is believed to reduce fever, protect liver, improve eyesight, breakdown gallstone and acts as anti inflammatory. It is traded fresh, frozen or dried.

The colour of preserved gall bladders vary from dark brown to dark blackish and it is oval in shape. The fresh bladder contains juice of yellowish colour & its crystal is found in dried form or in old bladder. Pig gall bladders also often traded as bear gall bladder.

Chemical analysis for Bear bile: 10-20 mg of yellow bile + Conc. Sulphuric acid + 3.5% solution of Phosphomolybedic acid in Iso-propyl alcohol + heat, gives blue colour in the presence of salts. Thin layer Chromatography test also confirms the presence of BEAR-BILE.

Photograph of bear gall bladder:



27.3.3 Pangolins

Pangolins are being poached in large numbers as its scales are in high demand in international markets especially in China. Two species of Pangolin are found in the country.

(i). Chinese Pangolin [Manis pentadactyla, Sch.I, Pt.I, (5A)]:

It inhabits tropical Asian forests and hilly areas. In India it is found in the North Eastern Region. Its body is covered by15 -18 longitudinal rows of overlapping scales and underside is covered by coarse bristle like hairs and the tail tip is naked. It is smaller than the Indian Pangolin.

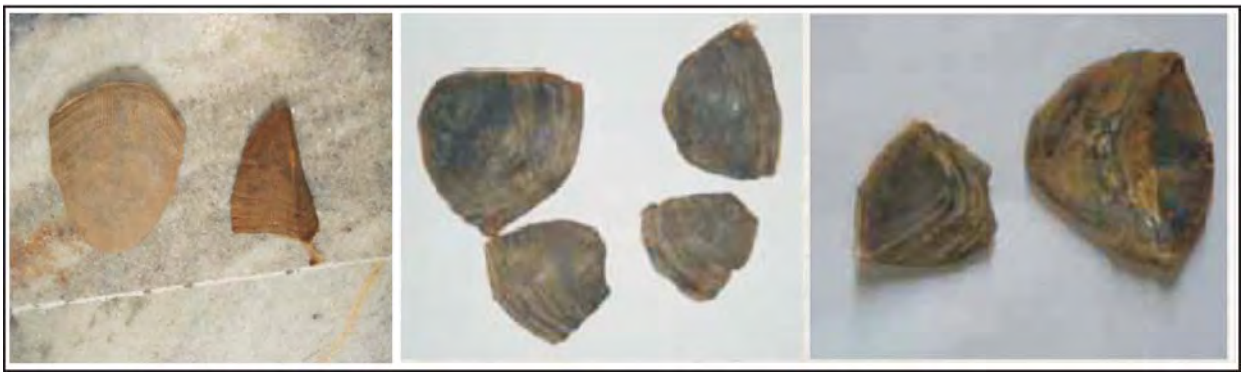


Pangolin [Manis crassicaudata, Sch.I, Pt.I, (28)]:

It is larger than Chinese pangolin whose body is covered by 11-13 longitudinal rows of overlapping scales. In India it is found all over the country except NE Region.



Pangolin Scales:



The scales are made up of keratin which is imbricately arranged on the body till the tail end. The pangolin scales have the function of anti adhesion & anti wear against the soil & rock.

27.3.4 Indian Elephant

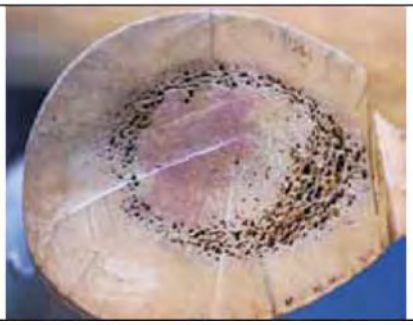
[Elephas maximus, Sch.I, Pt.I, (12B)]:

This species is a member of Elephantidae family which is distributed in NE India, WB, Odisha, Jharkhand & South India. It is mainly hunted for its teeth called Ivory. Male has tusks and some females have tushes (very small tusk).



Ivory is formed from dentine which is hard, dense and consists of 70% inorganic material and rest collagen. Unlike human teeth, it lacks enamel coating but it contains hard cementum layer. One third of the tusk is hollow. Layer upon layer of calcified tissue is deposited from inside in the tusk giving rise to concentric oval growth, called Lines of Owen which is visible in cross section. If the ivory is cut lengthwise, its appearance is that of triangle. Unlike bone, there is no blood vessel system in the ivory and therefore it is dense. Unique to elephant ivory is the lines of Retizius also known as Schreger lines that are visible in cross section.

Photographs of genuine ivory and fake ivory:

Genuine	Fake
	
	
	

Difference between bone & ivory:

To distinguish ivory from bone, one has to look for the two different patterns of lines present on the ivory. The first are somewhat parallel lines that are running along the length of the tooth/tusk from where the piece is carved. Perpendicular to these lines shall be X - section grain pattern. This X-section looks like V's or circular/parallel lines. If the lines form V's, the piece is from either elephant or mammoth. The angle formed on the Schreger lines will tell

that the ivory is from elephant (Obtuse angle) or mammoth (Acute angle). Bones have tiny Harvesian canal to carry nutrients and house nerves & other organic material. Some of the organic materials stick to the wall and turns dark as it decays. Decayed organic materials are very difficult to see but Harvesian canal are always present in bones.



Schreger Lines in Ivory | Haversian Canal in Bone

Ivory Artefacts



27.3.5 Indian Lion

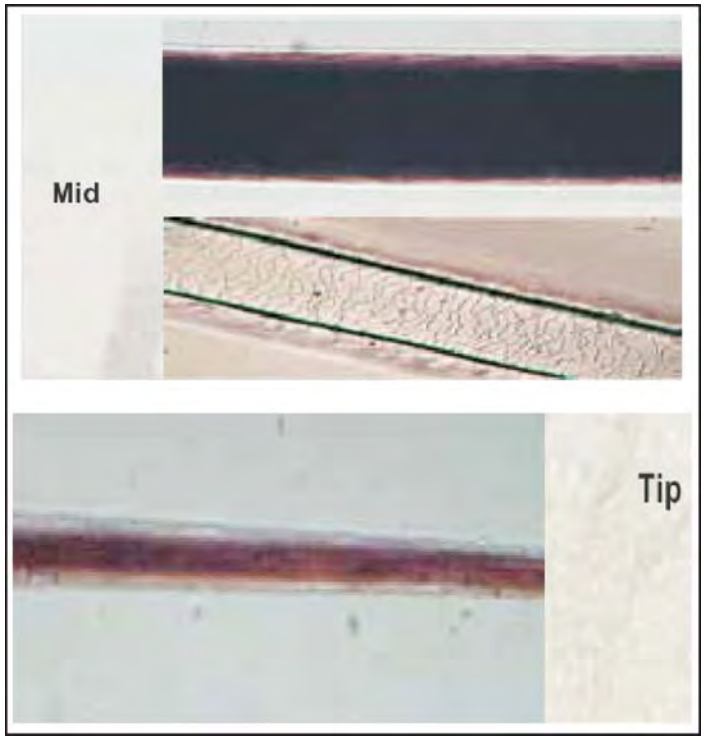
[Panthera leo persica, Sch.I, Pt.I, (13)]:

It is a member of felidae family and found in the State of Gujarat in India. The total body length is approximately 3-7 mtrs and weighs about 111-119kgs (approx.)



Hair-Signature - Pattern:

(a) Colour- Grey with light & dark brown patches (b) Circular Scale Pattern - imbricate (c) Medullary Pattern- Continuous Medulla and (d) Medullary Index-0.557.



27.3.6 Leopards:

(i). Leopard or Panther[Panthera pardus, Sch.I, Pt.I, (16B)]:

It is a member of felidae family which is found through out India except the snow clad region. The total body length is approximately 182- 216 cms & it weighs 40 - 67kgs (approx.). It inhabits fringe areas of human habitations and it is often target of man – animal conflict. Its skins and bones are found in illegal trade. Often leopard bones are traded as tiger bones in the illegal trade.



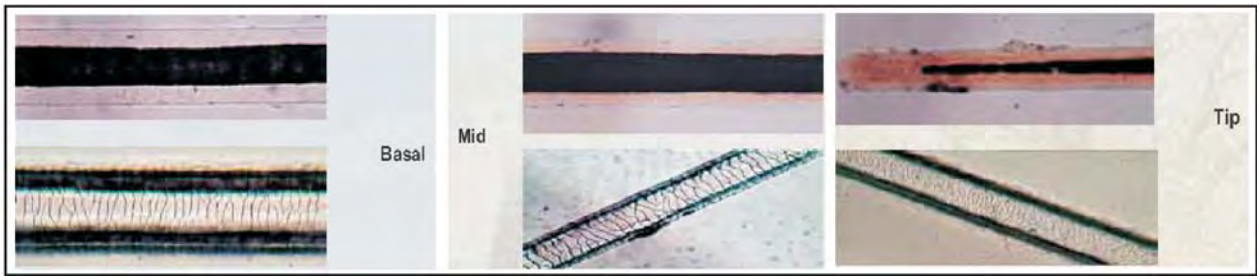
Leopard



Leopard Skin

Leopard hair - Signature-Pattern:

(a) Colour-Creamish brown, (b) Circular Scale Pattern-Imbricate, (c) Medullary Pattern-Continuous Medulla, and (d) Medullary Index-0.657.



(ii) Snow leopard [Panthera uncia, Sch.I, Pt.I, (33)]:

It is a member of felidae family which is found in snow clad regions in the States of J&K, Arunachal Pradesh & Uttarakhand. The total body length is approximately 99 - 131 cms & it weighs 36-56kgs (approx.)



27.3.7 Loris and Slow Loris

[Loris tardigradus {Sch.I, Pt. I(20)}] and [Nyeticebus coucang {Sch.I, Pt.I(32)}]

Loris is a nocturnal wild animal and member of Loridae family. Out of two species, slow loris is found in North-Eastern part of India mainly in Assam & Manipur. Its body length ranges from 29 - 41 cms and weighs about 1.2 -1.3 Kgs. Slender loris is generally found in southern states of Tamil Nadu, Kerala & Andhra Pradesh. Its body length ranges 21- 26 cms and it weighs about 1.1 – 1.2 Kg. The species is primarily trapped for keeping it as pet.





Loris tardigradus{Sch.I, Pt. I(20)} **Slow loris[Nyeticebus coucang{ Sch.I, Pt.I(32)}]**

Photographs of Loris (Sloth) seized by enforcement agencies









27.3.8 Civets

Civet is member of Viverridae family. Civets are traded for their skin fur & scent gland.

Malabar Civet [Viverra megaspila, Sch.I, Pt.I, (22)]:

Malabar Civet is member of Viverridae family and found in Kerala & Karnataka. Its body length is approximately 126 cm and weighs upto 9 Kgs.



Other members of this family:

Large Indian civet [Sch.I, Pt.II(1-A)]: – It is found in North east India.



Small Indian Civet [Sch.I, Pt.II(1-A)]: – It is found throughout India except J&K.



(c) Brown Palm Civet [**Sch.I, Pt.II(1-A)]:** - It is generally found in Kerala & Tamil Nadu.



(d) Common Palm Civet [**Sch.I, Pt.II(1-A)]:** – It is found all over India except Rajasthan, Gujarat & Himalayan region.



(e) Jerdon's Palm Civet [Sch.I, Pt.II(1-A)]: - It is found in Kerala, Karnataka & Tamil Nadu



(f) Small toothed Palm Civet –[Sch.I, Pt.II(1-A)]: It is commonly called 3-striped palm civet. It is generally found in NE India and WB.



(g) Himalayan masked palm civet [Sch.I, Pt.II(1-A)]: - It is found throughout Himalayan region from J&K to Arunachal Pradesh.



(h) Himalayan palm Civet [**Sch.I, Pt.II(1-A)]: -** It is found in Kashmir & parts of NE India.



27.3.9 Musk Deer

[Moschus moschiferus/*Moschus leucogaster* Sch.I, Pt.I, (25)]:

It is a member of Mochus family. It inhabits the high rugged terrain of Himalayas between 2200 - 4400 mtrs. The musk of this spp contains ketone muskone. Musk is illegally traded to be used in traditional Asian medicines and in perfumery.



Musk pod and hair signature:



27.3.10 Rhinoceros

[Rhinoceros unicornis, Sch.I, Pt.I, (30)]:

It is found in WB, Assam & UP. Rhinoceros are killed for its Horn. The colour of horn varies from brown to black and it is made of keratin, therefore, on burning it smells like the burning of hair.



Genuine and fake Rhinoceros horns:







27.3.11 Otter

Clawless otter[{Aonyx cinerea, Sch.I, Pt.I, (31B)} & Otters{ Luthra perspicillata, SchII, Pt.II (4)}]:

Otters are members of Mustelidae family. Clawless otter is generally found all along Ganga river basin & its tributaries. The other species i.e. the smooth Indian otter or smooth coated otter is found throughout India and most commonly seen in UP, Kerala & West Bengal. Otters are being hunted for their skin.

(a). Clawless Otter:



(b). Clawed Otter:



Otter Skins:



27.3.12 Tiger

[Pantera tigris, Sch. I, Pt.I(39)]:

It is a member of Felidae family. Almost all its body parts are traded. Fake tiger skins are also in trade. **Distinguishing features of tiger skin:**



Check for presence of white colour on the maxillary cheeks



Check for presence of white hair on the front inner surface of ear lobe



Check for presence of black colour with white eyespot on the rear outer surface of the ear lobe.



Check for white colour on the portion below the mandible, chest and inner portions of fore legs



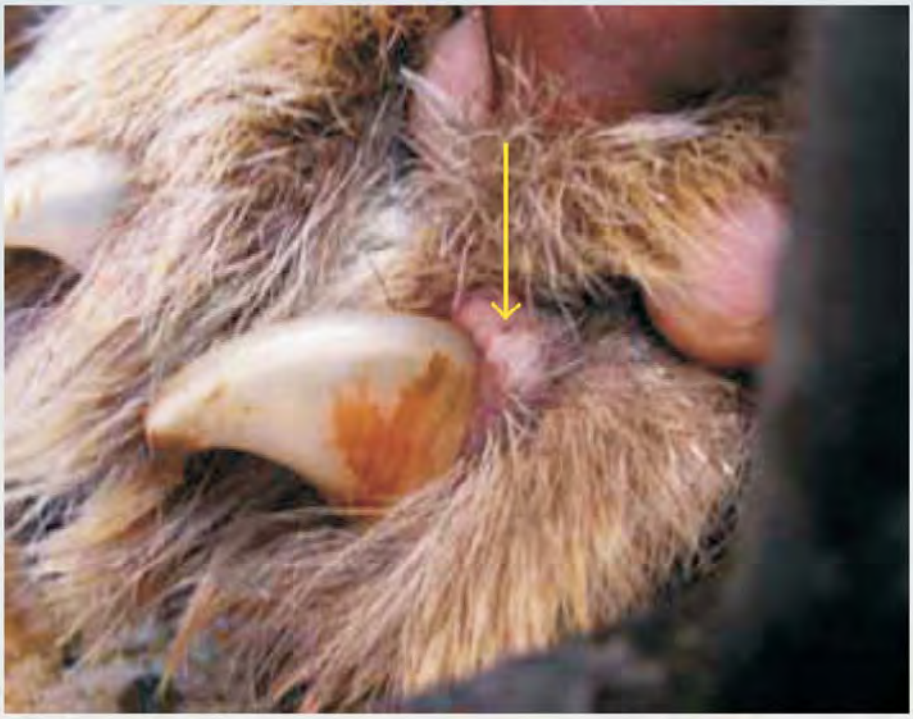
Check for neck stripes originating from the middle portion of the head and going out to front legs in an angular fashion



Check for Dentition in the order
2{I3.C1.P3.M1/ I3.C1.P2.M1} =30



Check for embedment of the claw in the pad muscle and not encapsulated in fur



Check for presence of claws, 5 main and 1 dew on the fore paws and 4 main with dew claw absent on the hind paws



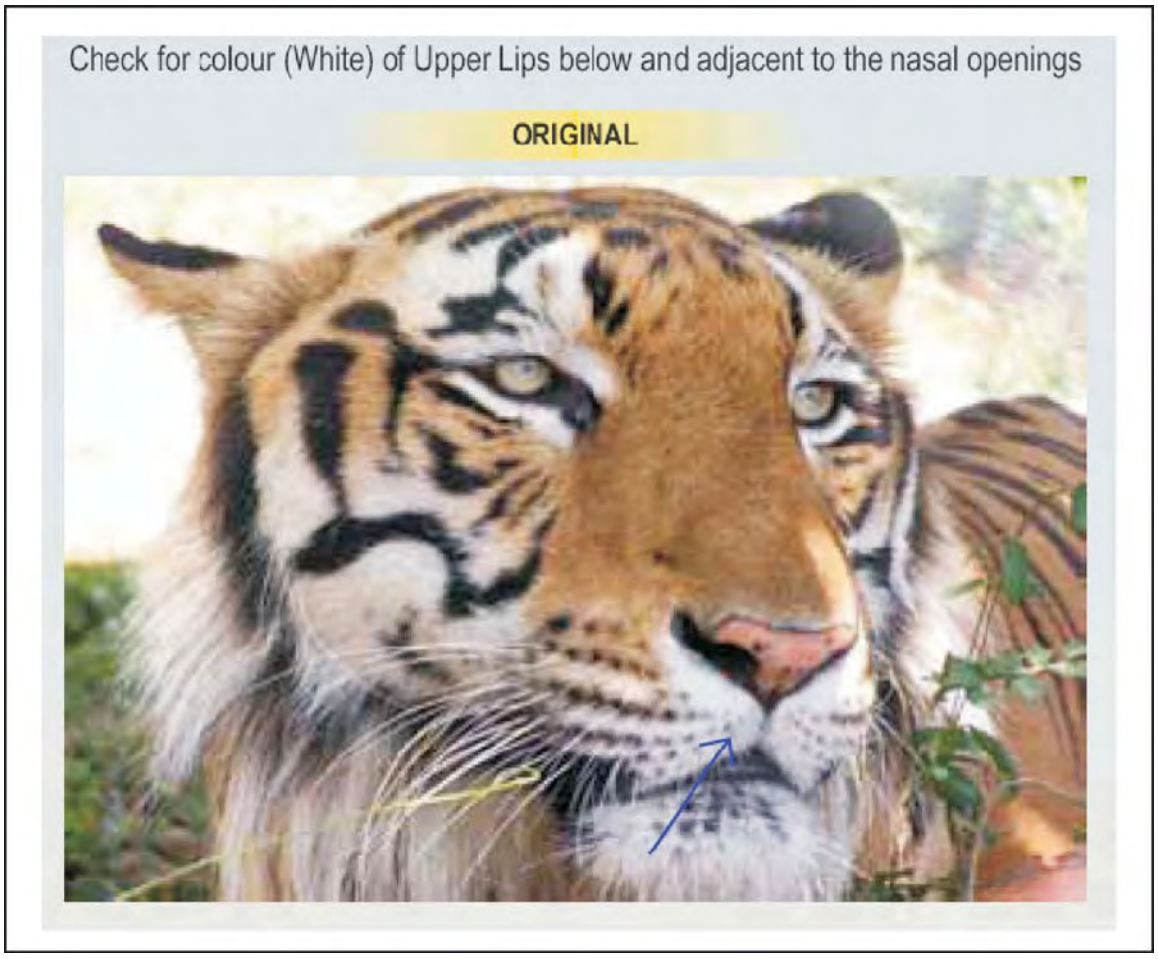
Check for black stripe overlapped by brown and not converse

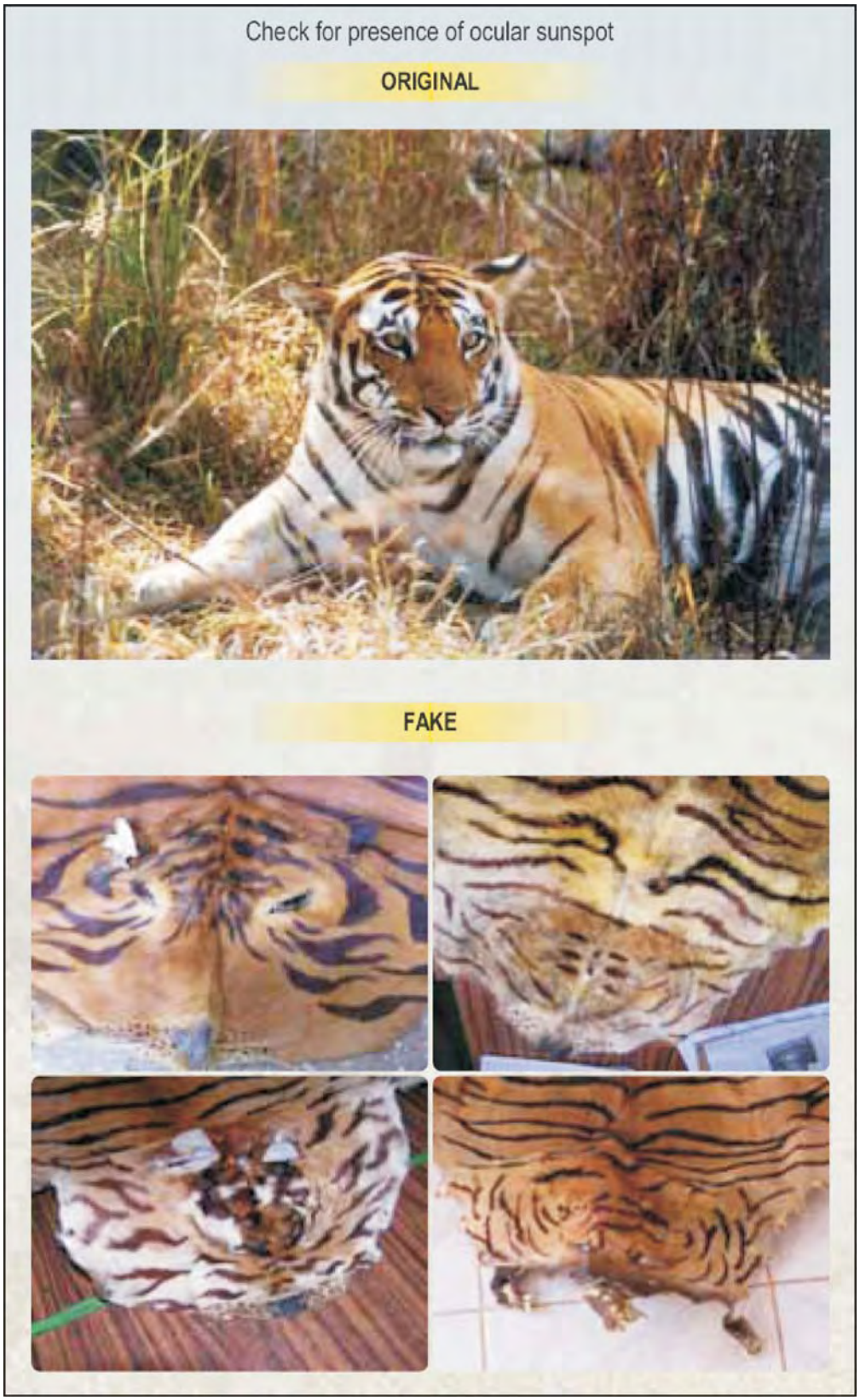


Recap of Identification of Salient Features



Comparison between genuine and fake tiger skin:




Check for presence of ocular sunspot
ORIGINAL
FAKE

Check for presence of white colour on maxillary cheek

ORIGINAL



FAKE



Check for the presence of white hair on the front inner surface of the ear lobe

ORIGINAL



FAKE



Check for neck stripe originating from the middle portion of the head and going out to front leg in an angular fashion

ORIGINAL



FAKE



Check for the white colour on the portion corresponding to the entire belly, inside of rear leg

ORIGINAL



FAKE









Check for the girth of the tail and tail ending in a solid black band

ORIGINAL



FAKE



Check for Dentition in the order
2{I3.C1.P3.M1/ I3.C1.P2.M1} =30

ORIGINAL



FAKE



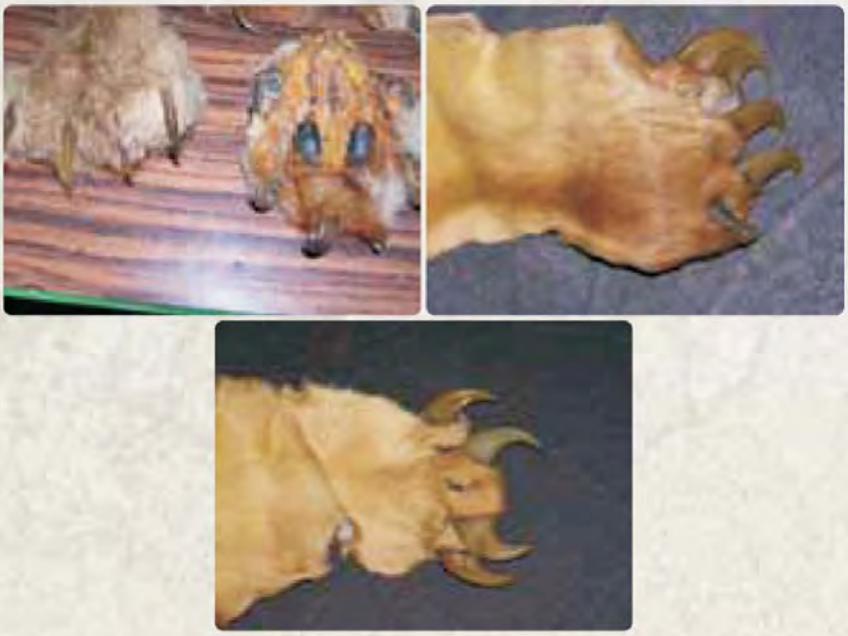


Check for presence of claws, 4 main and 1 dew on the fore paws and 4 main with dew claw absent on the hind paws

ORIGINAL



FAKE



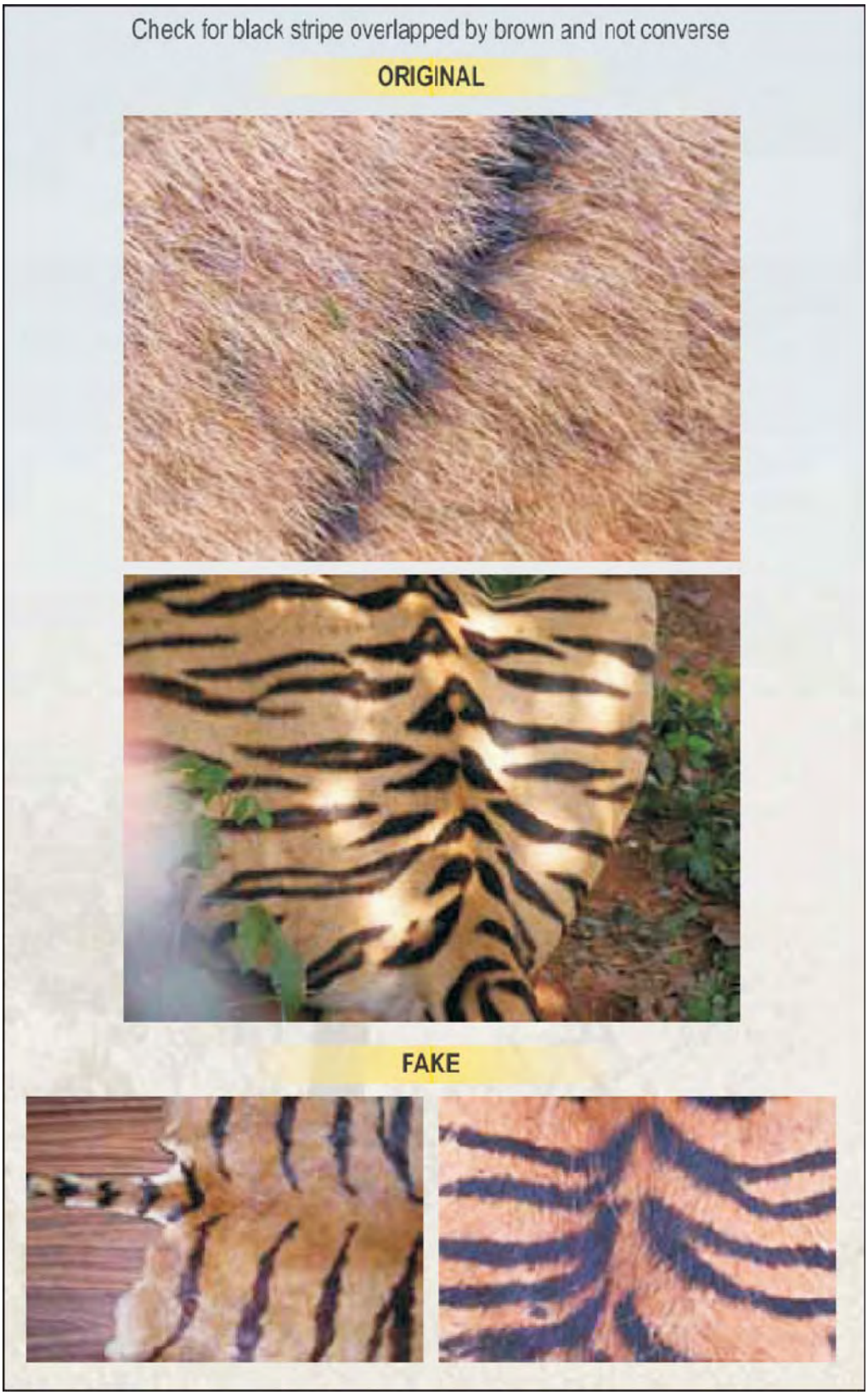
Check for embedment of the claw in the pad muscle and not encapsulated in fur

ORIGINAL



FAKE




Check for black stripe overlapped by brown and not converse
ORIGINAL
FAKE

Prepare whole mount of the dorsal guard hair and examine microscopically. Compare the medullary structure and measure the medullary ratio. Original will have simple unbroken amorphous medullary structure with an average medullary ratio of 0.551 (viewed at 200 x)

ORIGINAL

Basal



Mid



Tip



Fusi



FAKE

Basal



Mid



Tip

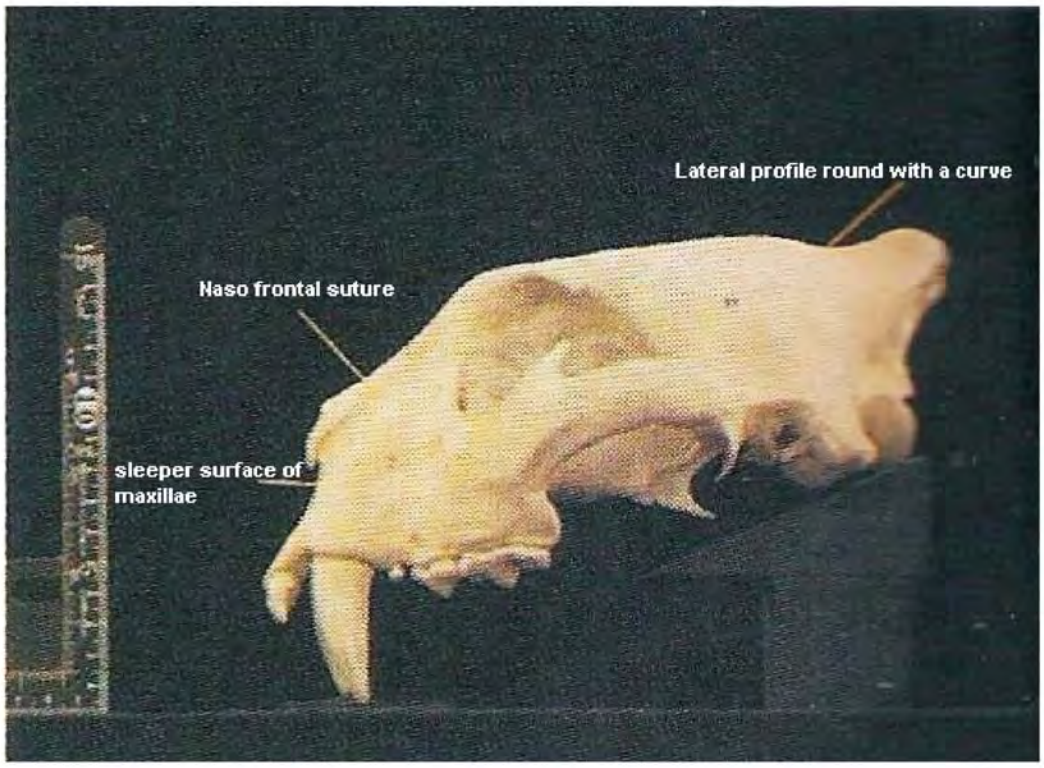


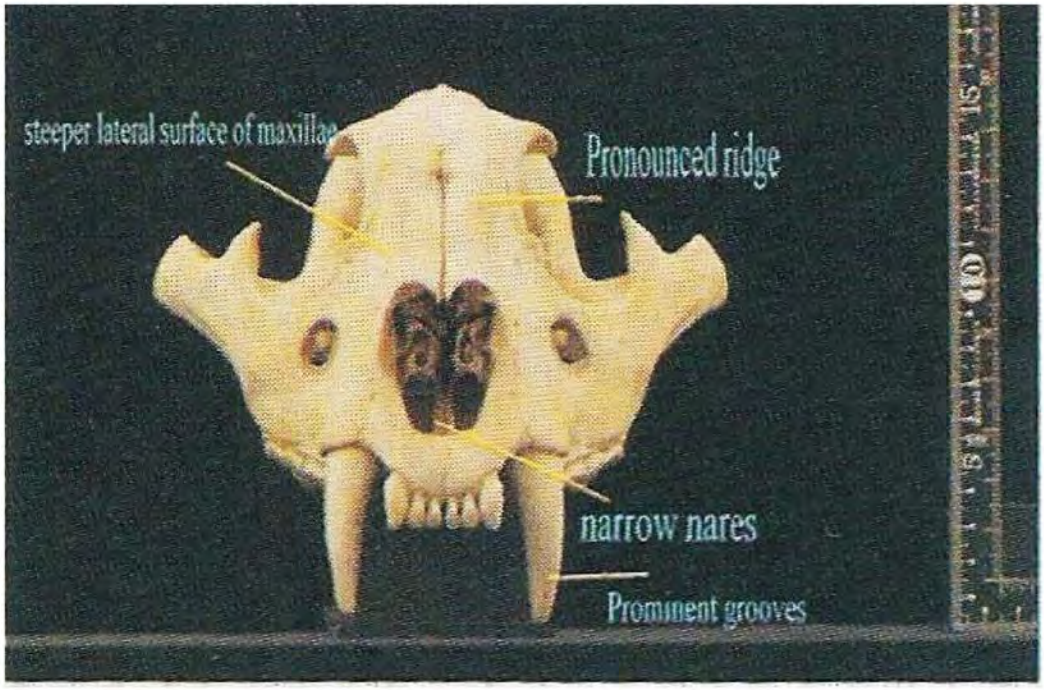
Fusi

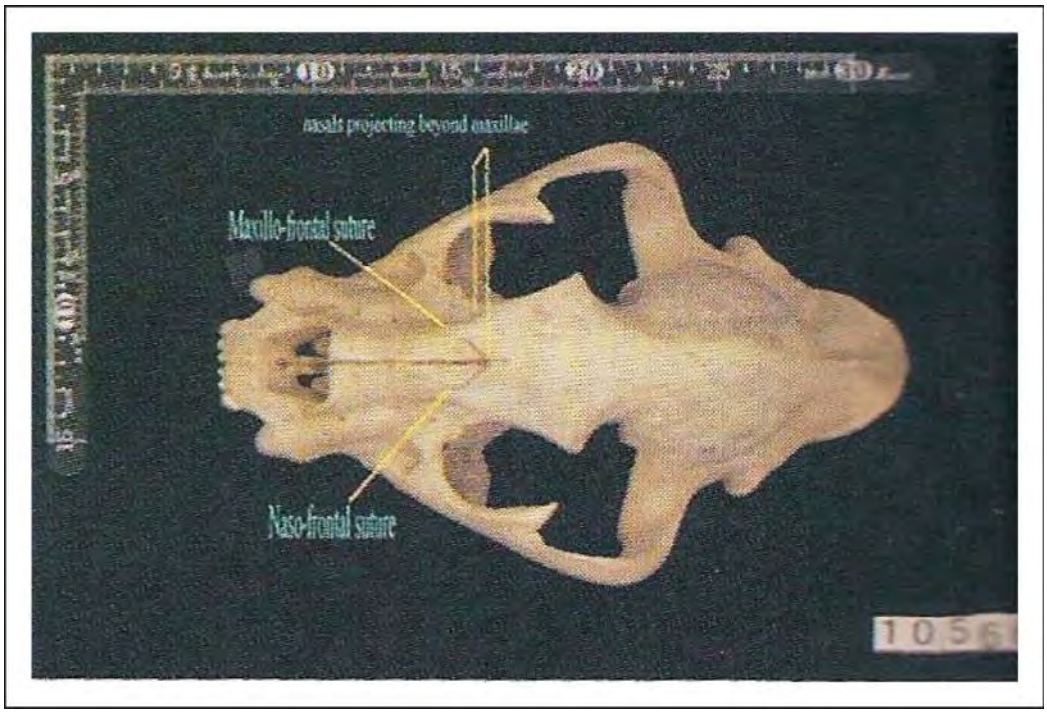



Prepare caste of cuticular scale and examine the pattern (viewed at 200x)
ORIGINAL
Basal
Mid
Tip
FAKE
Basal
Mid
Tip


Compare subjectively the size, shape and other general features of the whole skin
ORIGINAL
FAKE


Lateral profile round with a curve
Naso frontal suture
sleeper surface of maxillae


steeper lateral surface of maxillae
Pronounced ridge
narrow nares
Prominent grooves

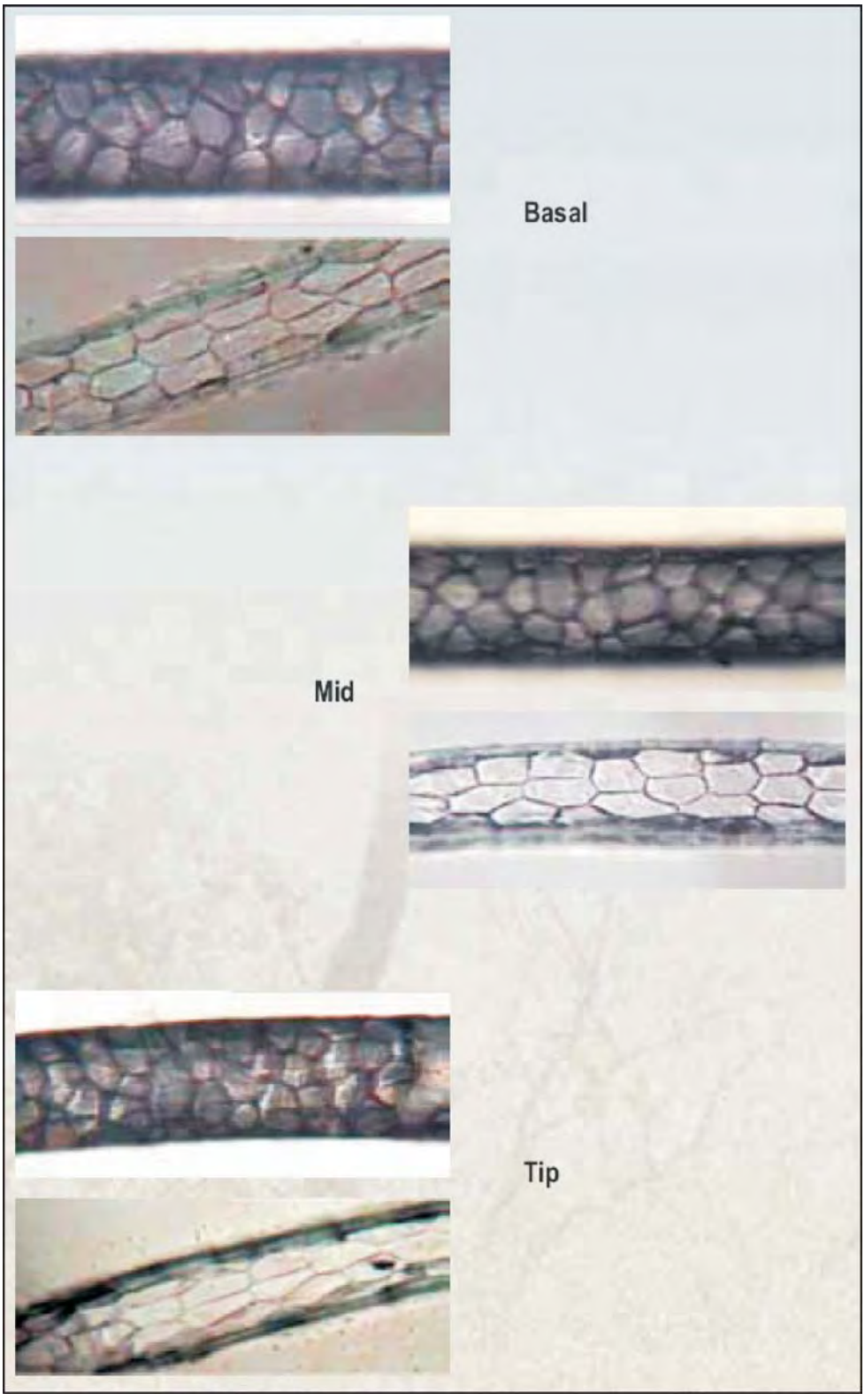


27.3.13 Tibetan Antelope

[Panthelops hodgsoni, Sch. I, Pt.I (36-A)]:

It is commonly called as 'Chiru'. The animal is killed for its body hair from which Shahtoosh thread are derived. Shahtoosh shawls are smuggled out of the country to various destinations especially in Europe, North America and Gulf.





Tibetan Antelope guard hair signature

27.3.14 Monitor lizard

Monitor lizards are being poached for its meat, skin and fat. The commonly hunted species of monitor lizard are as under:

(i) Agra monitor lizard [Varanus grisus (Daudin), Sch.I, Pt.II, (1)]:



(ii) Barred, oval or yellow monitor lizard [Varanus flavescens, Sch.I, Pt.II, (1-C)]:



27.3.15 Turtles and Terrapins

Almost all spp. of turtles & terrapins are traded. The demand is generally for consumption and as pet. The most commonly traded species of turtles and terrapins are as under:



Melanocchelys tricarinata[Sch.I, Pt.II, (1-F)]



Hoesemys silvatica[Sch.I, Pt.II, (9-A)]

	
Kachunga kachunga [Sch.I, Pt.II, (14-B)]	Trionyx gangeticus[Sch.I, Pt.II, (3)]
	
Batagur baska [Sch.I, Pt.II, (1-E)]	Lissemys punctate punctate [Sch.I, Pt.II, (8)]
	
Trionyx hurum [Sch.I, Pt.II, (14)]	Geoclemys hamiltonii [Sch.I, Pt.II, (14-C)]
	
Chelonia mydas [Sch.I, Pt.II, (4)]	Pelochelys bibroni [Sch. IV]



Eretmochelys imbricate [Sch. I, Pt.II, (5)]



Caretta caretta [Sch.I, Pt.II, (12)]



Lipidochelys olivacea [Sch.I, Pt.II, (13)]



Chitra indica [Sch. IV]



Geochelone elegans [Sch IV (15).]



Turtle eggs seized from poacher in Assam.



Kachunga tecta tecta



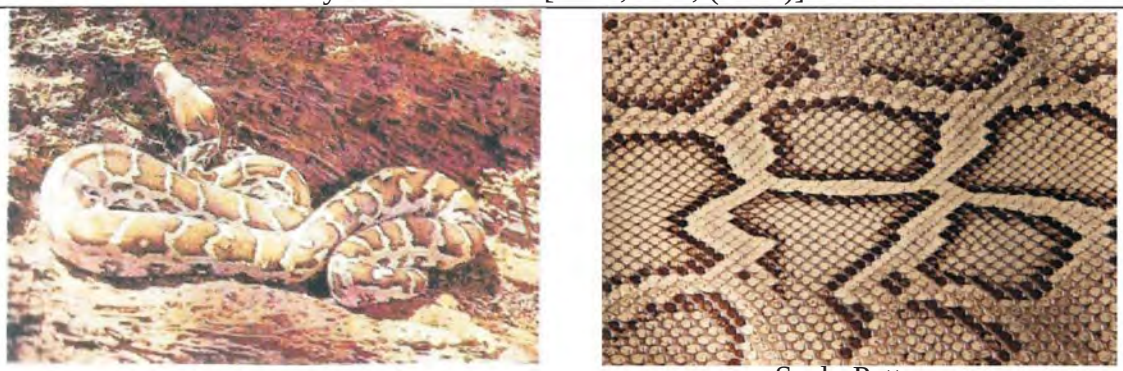
Dermochelys coriacea (Linnaeus) Sch. IV (15)

27.3.16 Pythons, King Cobra and other Snakes

Almost all species of snakes are killed either for their skin or venom but the most hunted species are python and cobra.



Python reticulatus [Sch.I, Pt.II, (14-A)]



Scale Pattern

Python molurus [Sch.I, Pt.II, (14-A)]





Scale Pattern

Xenochrophis piscator [Chekered keelback snake, SchII, Pt.II, (8)]

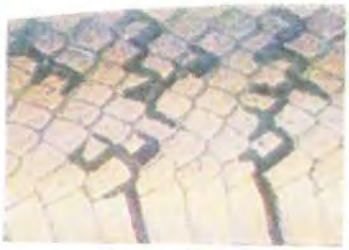


Atretium schistosum [Oleveceous keelback snake, SchII, Pt.II, (13)]



Elachistodon westermanni Reinhardt[Sch.IV]





SCALE PATTERN



Ptyas mucosus [Dhaman/rat snake, Sch.II, Pt.II, (9)]

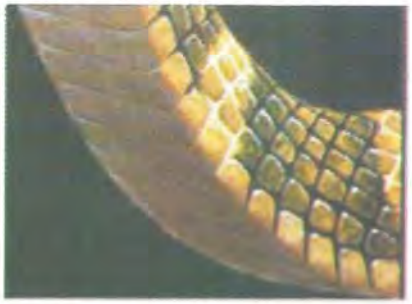


Scale Pattern

Viper russelli [Russel's viper Sch.II,Pt.II, (14)]



Naja naja naja *Naja naja kaouthia* *Naja naja oxiana*



SCALE PATTERN OF *Naja spp.*



CUNEATE SCALE OF *Naja sp.*



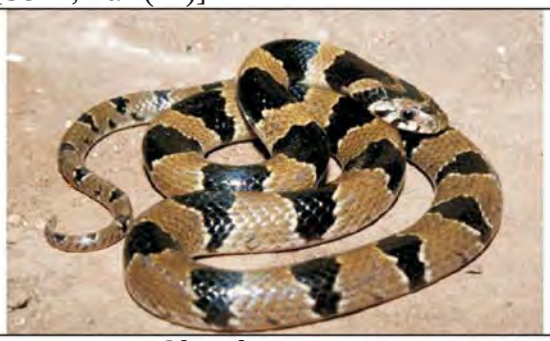


Scale Pattern

Ophiophagus hannah[SchII, Pt.II(12)]



Bangarus fasciatus



Oligodon arnensis



Trimeresurus monticola



Hydrophis cyanocinctus

27.3.17 Spiny tailed lizard

[(Sanda) Uromastix hardwickii Sch.II, Pt.II(25)]:

This species is poached for its oil/fat.



27.3.18 Mongoose

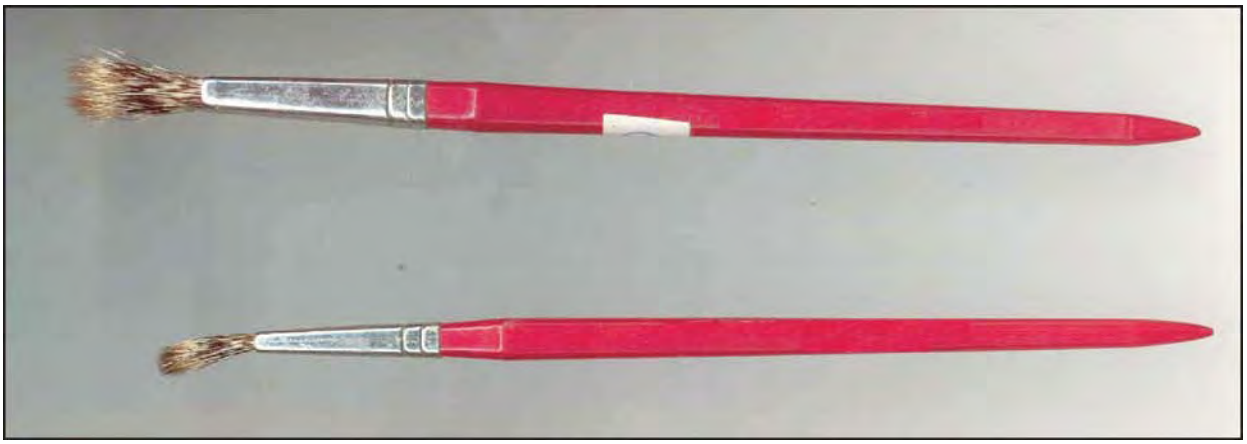
[Herpestes spp. Sch.II, Pt.II(16)]:

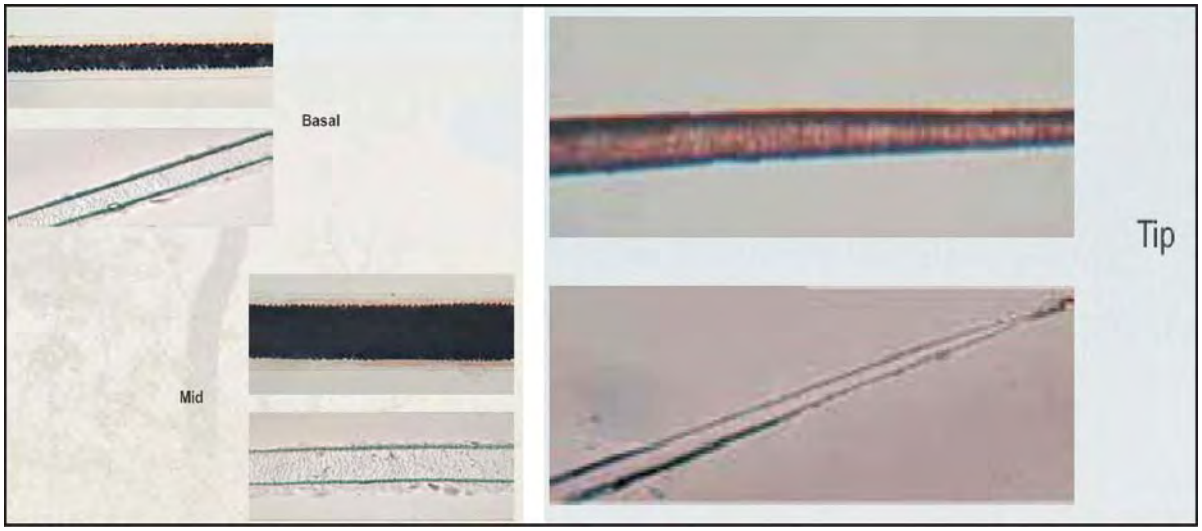
All species of Mongoose are killed for their hair, meat & claws. Mongoose hair brushes are considered most suited for professional painting.





Mongoose hair Brush and its hair signature:





27.3.19 Sambar

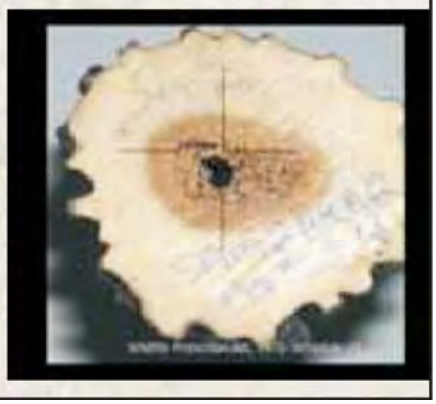
[Cervus unicolour, Sch.III (16)]:

It is poached for its meat, skin & antlers.

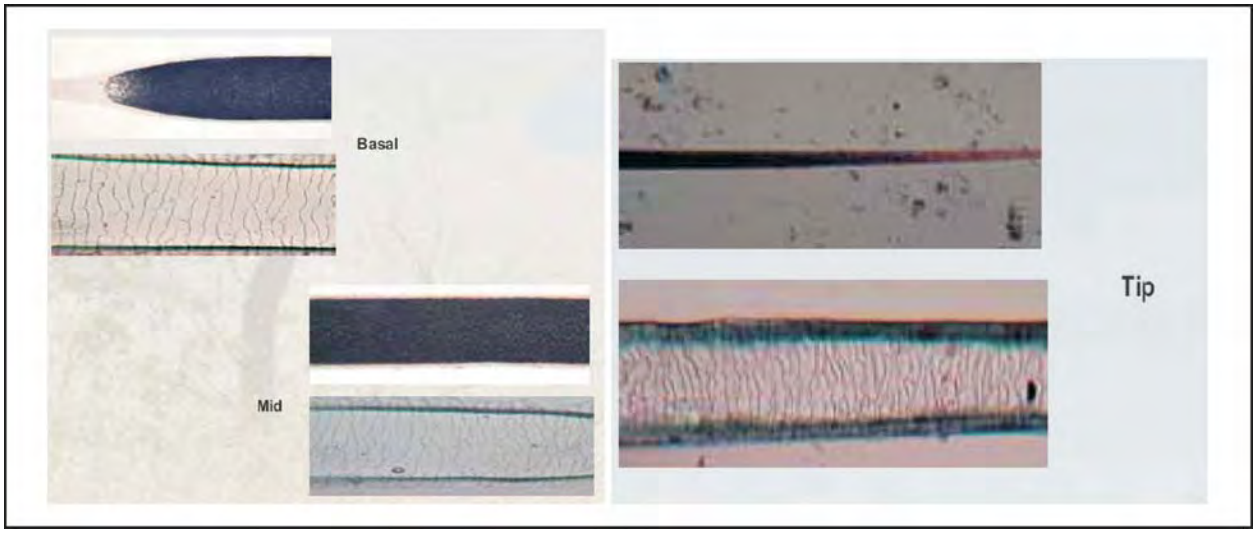


- Sambar antlers are large, rugged typically rosin, the brow lines being simple and the beans forked at the tip. The antler may exceed 101 cm (40 in).
- A sambar antler is typically three tined and the outer top tine is usually the continuation of the main beam while the inner top tine is somewhat shorter.
- Sambar antlers have very little central pith, making it strong and heavy, being mainly bone material
- The antler take 4-6 months for development, during which they are covered with sensitive integument coated with hair.





Sambar hair signature:



27.3.20 Chital

[Axis axis, Sch.III(5)]:

It is poached for its meat, skin & antlers.



General Information

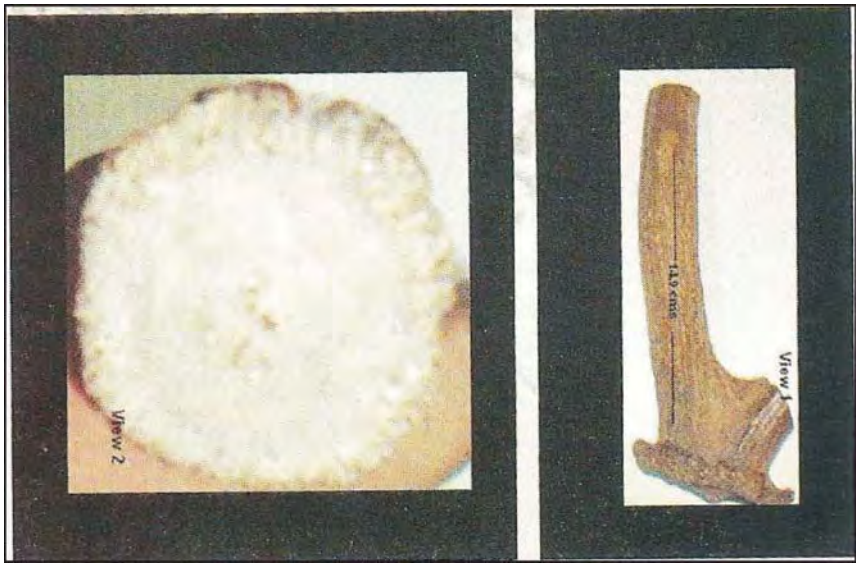
- Its antlers which it sheds annually, are usually three-pronged and curve in a lyre shape and may extend to 75 cm (2.5 ft).
- A chital stands about 90 cm (3 ft) tall at the shoulder and masses about 85 kg (187 lb). Lifespan is around 20-30 years.
- Males sporting hard antlers are dominant over those in velvet or those without antlers, irrespective of their size and other factors..
- **Geographical distribution**: India, Srilanka, Nepal and Bangladesh.

Physical features of the sample

Weight	: 139 gms
Length	: 14.9 cms
Thickness	: 2 cms
Color	: Brown
Mark of Injury	: Nil.
Surface	: Rough and uneven.

Identification Characteristic of cheetal antlers:

- The antlers branch to six points and sweep back into an upward curve
- Antlers curve in lyre shape
- Woody appearance



27.3.21 Wild Pig

[Sus scrofa, Sch. III(19)]:

It is killed for its meat, tusk & fats.



27.3.22 Sand Boa

[Snake Boldae Sch.IV(12iii)]:

It is mainly trapped & traded due to myth that luck will smile on the keeper of this animal.



27.3.23 Kuth

[Saussurea costus, Sch.VI(3)]:

This plant is a member of Asteraceae family, mainly found on middle altitudes ranging from 2600 – 3600 mtrs in Himalayan region especially Kashmir & HP.

Kuth/Kustha/Pooshkarmoola/Uplet

W(P)A Schedule VI
CITES Appendix I

Scientific Name: *Saussurea lappa/Saussurea costus*

Vernacular Names: Kuth, Kustha, Pooshkaramoola, Uplet, Kashmjirja, Pokharmool, Costus, etc.

Family + Distribution:**Asteraceae/Compositae** 2600-3600 M Altitude in the Himalayan Region, Kashmir, Himachal Pradesh.

Uses

Saussurea lappa is used as an anti-inflammatory drug, and a compcnent of the traditional Tibetan medicine The roots of the plant are used in perfumery. Dry roots (Kuth, Costus) are strongly scented and yields an aromatic oil, which is also used in making insecticides. The roots contain an alkaloid, 'saussurine', which is medicinally important.It is an antiseptic,



Used in chronic skin diseases, asthma and high blood pressure and also good for stomach ailment. Also used as carminative, stimulant, prophylactic and sedative. Dry roots constitute the drug 'Saussurea'. The roots have strong and sweet aromatic odour and a somewhat bitter taste. In Kashmir the roots are used to protect woolen fabrics. Kuth is also distilled for its essential oil. Approx. 100 kg of oil / resinoid is produced in India.

Commercial / EXIM data:

Roots used to be exported to China, Japan and Europe. Kulu is the biggest centre of trade for Kuth. The kuth roots are collected and supplied to State Trading Corporation by the State Forest Department and the same from Lahul is collected by Lahul Kuth Grower's Society, Manali and supplied to State Trading corporation. Presently Kuth roots are mostly exported to HongKong, France and Singapore. It is also exported to Thailand, Vietnam, Japan, Siberia and Netherlands. Kuth exported to Europe, primarily France & Netherlands is used for oil production. Export to France started in 1964-65, whereas Japan in 1965-66 with steadily increasing trends. Regarding price of Kuth roots, average export price during 1965-70 was Rs. 2.65/kg, which later increased to Rs. 7.85/kg. Export price varies during a particular period varies among different countries. Export price to Thailand was highest, Rs. 9.77/kg during 1970-74 and tothat of Singapore was Rs. 6.44/kg.





Adulteration of Kuth oil:

Kuth oil is adulterated with oil of vetiver due to their similar physico-chemical properties, which can be detected by their odour. Oil from the roots of Inula helenium is also used for adulteration of Kuth oil. True resinoid is sometimes adulterated with resins from roots after extracting oil with steam.

27.3.24 Tokey Gecko

[Sch.IV(15A)]:

This species is mainly traded for its medicinal value, and it is also a popular pet.



27.3.25 Birds

Birds are the most commonly traded wildlife species within country. The following are the most common prohibited Indian bird species found in illegal trade:

		
Munias (silver bill), Sch.IV(44)	Munias (green), Sch.IV(44)	Munias (red), Sch.IV(44)
		
unias:(spotted), Sch.IV (44)	Bayas or Weaver birds (all types) : Sch.IV (77)	Owls : Sch.IV(48)
		
Quails:(except mountain quail), Sch.IV (57)	Mountain Quail:Sch.I, Part III(8)	Hill Myna: Sch.I, Part III(8)

		
Myna(Common): Sch.IV(45)	Bulbuls (All): Sch IV(8)	Falcons[Except Shaeen, Peregrine, Saker & Lager, red headed merlin] : ch.IV(24)
		
Babblers: Sch IV(3)	Doves (All types): Sch.IV(19)	Ducks: Sch.IV(21)
		
Swiftlets: Sch.I, Part III(19)	Bazas: Sch I, Part III(1B)	Kingfisher:(White throtted), Sch.IV(37)
		
Parakeet (Alexdrian): Sch.IV(50)	Parakeet (Rose ringed): Sch.IV(50)	Munias (black headed), Sch.IV (44)
		
Partridge (Alltypes): Sch.IV(51)	Pigeons (except blue rock), Sch.IV(54)	Grey Jungle Fowl, Sch.II, Part II(17)



Geese (all types): Sch.IV(29)



Great Indian Bustard,Sch.I,Part III(3)



Hawks: Sch I, Part III(4A)



Cranes (Sarus),Sch.IV(16)



Cheer Pheasant,Sch I Part III(2)



White bellied sea eagle: Sch-I Part III(16)

Photographs of birds seized during interceptions by enforcement agencies













27.3.26 Shells (Mollusca)

[Sch.I,Pt IVB & Sch.IV(19)]:

Prohibited shells are generally found being traded at tourist destinations especially in the coastal regions of the country. Prohibited shell species are also commonly found in souvenir shops and temple markets all over the country. Following are the most common prohibited shell species that are in illegal trade:

	
Nautilus pompilius H/C[Sch.I, Pt.IVB(6)]	Cypraeacassis rufa[Sch.I, Pt.IVB(4)]
	
Nautilus pompilicis[Sch.I, Pt.IVB(6)]	Nautilus pompilicis [Sch.I, Pt.IVB(6)]
	
Cyprea cassis rufa [Sch.I, Pt.IVB(4)]	Cassis cornuta [Sch.I, Pt.IVB(1)]



Tridacna squamosa[Sch.I, Pt.IVB(8)]



Charonia Tritonis [Sch.I, Pt.IVB(2)]



Tridacna squamosa[Sch.I, Pt.IVB(8)]



Tridacna squamosa[Sch.I, Pt.IVB(8)]



Tudicla spirillus[Sch.I, Pt.IVB(9)]



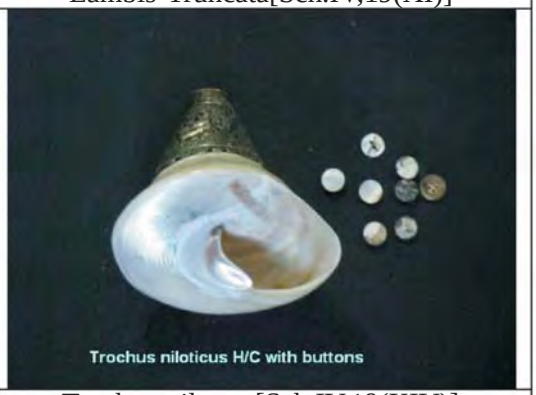
Strombus plicatus sibbalddi[Sch.IV,19(XIII)]



Turbo Mammoratus [Sch.IV,19(XV)]



Turbo Mammoratus [Sch.IV,19(XV)]

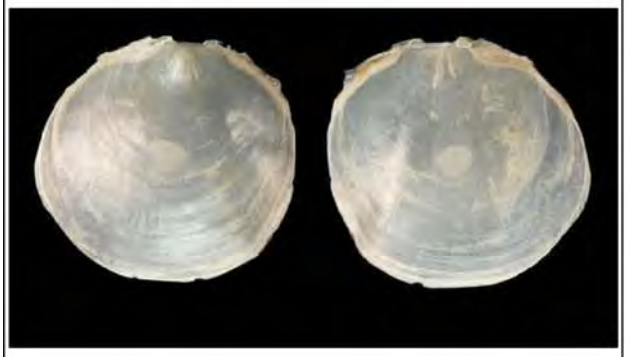
	
Lambis Chiragra[Sch.IV,19(VI)]	Lambis Chiragra [Sch.IV,19(VI)]
	
Lambis Truncata[Sch.IV,19(XI)]	Lambis Truncata[Sch.IV,19(XI)]
	
Trochus nilotus [Sch.IV,19(XIV)]	Trochus nilotus [Sch.IV,19(XIV)]
	
Fasciolaria trapezium[Sch.IV,19(IV)]	Fasciolaria trapezium[Sch.IV,19(IV)]



Cypraea talpa[Sch.IV,19(III)]



Cypraea mappa[Sch.IV,19(II)]



Placenta placenta[Sch.IV,19(XII)]



Placenta placenta[Sch.IV,19(XII)]

27.3.27 Corals (Coelenterates)

[Sch.I,Pt (IVA)]:

Corals are mainly collected for the aquariums. Certain corals have medicinal properties as well. The most commonly traded coral species are as under:



Tubiphora musica [Sch.I,Pt.IVA(3)]



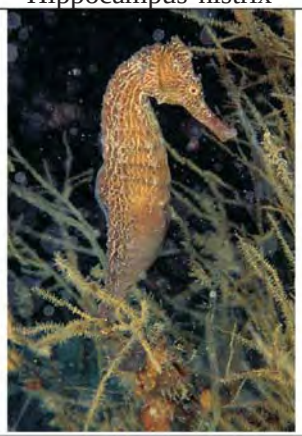
Tubiphora musica [Sch.I,Pt.IVA(3)]

	
Reef building coral [Sch.I,Pt.IVA(1)]	Reef building coral [Sch.I,Pt.IVA(1)]

27.3.28 Sea Horses

[All Sygnathadians, Sch.I, Pt.IIA(3)]:

Sea Horses have international demand for its medicinal properties. Certain species of sea horse are kept in aquariums as well.

	
Hippocampus kuda	Hippocampus histrix
	
Hippocampus trimaculatus	Hippocampus kelloggi



long snout seahorse



Hippocampus erectus



Photographs of Sea horses seized by enforcement agencies:





27.3.29 Sea Cucumber

(Holothuria, Sch.I, Pt.IVC):

Sea Cucumbers are in high demand in China and other South East Asian countries as delicacy.





Dried Sea Cucumber (Holothuria):





27.3.30 Red Sanders (Pterocarpus santalinus)

Though the species is not listed under the Schedules of the "Wildlife Protection Act, 1972, but its rampant exploitation from wild to be smuggled across national borders to international markets mainly China, is matter of serious concern. Red Sanders has highly restrictive distribution in the south eastern portion of Indian peninsula to which it is endemic. It is found

in Palakonda and Seshachalam hill ranges of Cuddapa-Chitoor district of Andhra Pradesh extending slightly into neighbouring Anantpur, Kurnool, Prakasam and Nellore district. Sporadic wild population do occur in the adjoining districts of neighbouring Tamil Nadu, Karnataka & Odisha.

Red Sander wood is traded in almost all possible forms such as logs, wood chips, sawn timber, extracts and dyes. The colour of heartwood of this species varies from red to purple brown or black and its specific gravity is 0.97. Its water extract is light brown and fluoresces with light blue colour. A moist chip of wood leaves a reddish scar on a white cloth when rubbed upon.



Red Sanders demand is mainly for making furniture, traditional Chinese medicines, and musical instruments such as Shamisen, Koto and Erhu.

Red Sander Artefacts



Seized Red Sander Woods



References

Extracts from "A Manual on Wildlife Species in trade (First Edition)", Wildlife Crime Control Bureau, Ministry of Environment and Forests, Government of India, 2011.

28 DIGITAL SIGNATURE OF WILDLIFE PRODUCTS IN INTERNATIONAL TRADE

There have been requests for the enforcement agencies at the exit points and border guarding agencies to develop the skills of their personnel to visually recognize various wildlife contrabands which they come across during inspection, baggage screening, surveillance etc. Based on this felt need, Wildlife Crime Control Bureau (WCCB) has made an honest effort to compile the X-ray images of commonly smuggled wildlife articles out the country. NICFS and WCCB has agreed to insert this chapter in the SOP. This exercise is an attempt to make the identification of wildlife contraband earlier for the personnel handling the scanners so that suspicious items can be detected and put to further confirmatory scientific and forensic examination for legal action against the defaulter.

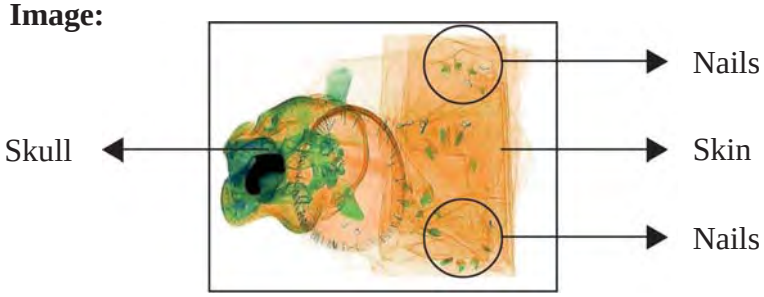
28.1 Tiger Skin

(i) **Common Name** : Tiger
(ii) **Scientific Name** : *Panthera tigris*
(iii) **Items in trade** : Whole skin, nails, claws, bones, trophy, etc.
(iv) **Product** : Tiger skin
(v) **Real Image** :



Whole Skin

(vi) **Scanned Image:**



(vii) **Identifying Features:**

A. Scanned Image: Orange colour is seen for the skin and green colour is seen in case of paws. Nails have bone piece at its base which is visible as green in X-Ray Image.

B. Real Image/Product: Black stripes are present on the yellowish orange coat. Paws are bony.

(viii) **Remarks:** Whole skin, nail, bone, claws, whiskers, etc. all the body parts are being traded. Bones are mainly used to make traditional Chinese medicine.

(ix) **Legal Status:** Listed in Schedule I of the Wildlife (Protection) Act 1972 and Appendix I to the CITES. Export/Import is prohibited as per the provisions of the Export/Import Policy (EXIM).

28.2 Lion Skin

(i) **Common Name :** Lion

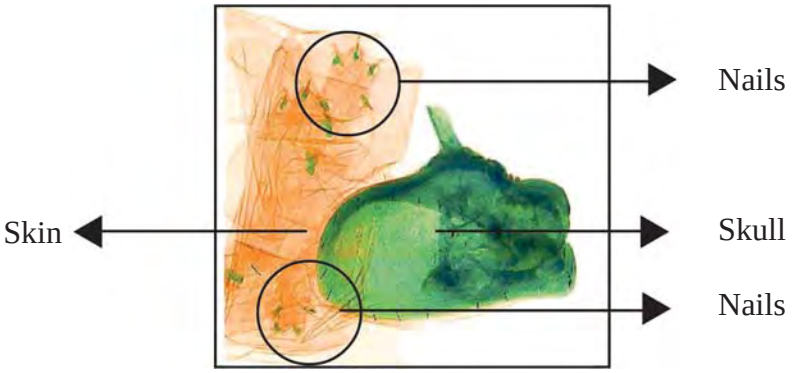
(ii) **Scientific Name :** *Panthera leo*

(iii) **Items in trade :** Whole skin, nails, claws, bones, trophy, etc.

(iv) **Real Image :**



(v) **Scanned Image:**



(vi) **Identifying Features:**

A. Scanned image of skin: Orange colour is seen for the skin and green colour is seen in case of nails.Nails have bone piece at its base which is visible as green in X-Ray Image.

B. Real image/product: A fuller coat, a longer tassel of hair at the end of its tail, a more pronounced tuft of hair on its belly. The mane is light or dark, rarely quite black.

(vii) **Remarks:** Whole skin, nail, bone, claws, whiskers, etc. all the body parts are being traded. Bones are mainly used to make traditional Chinese medicine.

(viii) **Legal Status:** Listed in Schedule I of the Wildlife (Protection) Act, 1972 and Appendix I to the CITES. Export/Import is prohibited as per the provisions of the EXIM Policy.

28.3 Leopard Skin

(i) **Common Name :** Leopard

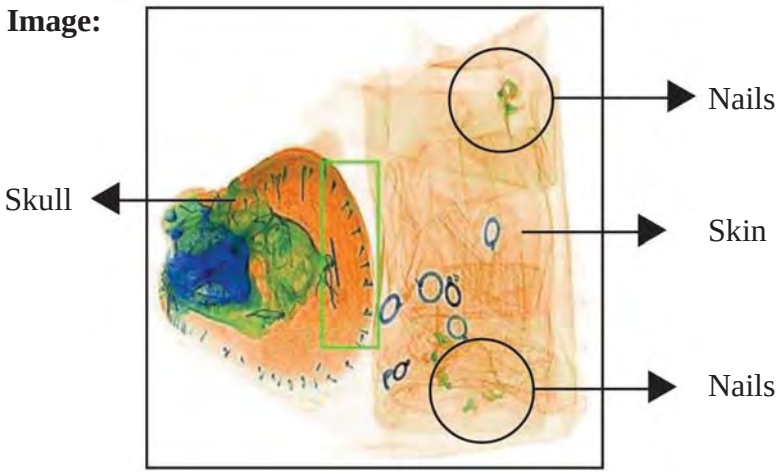
(ii) **Scientific Name :** *Panthera pardus*

(iii) **Items in trade :** Whole skin, nails, claws, bones, trophy, etc.

(iv) **Real Image :**



(v) **Scanned Image:**



(vi) **Identifying Features:**

A. Scanned Image: Orange colour is seen for the skin.

B. Real Image/Product: Coat colour is usually fulvous to bright golden, marked with small close set rosettes and spots. Head, limbs and tail are also spotted.

(vii) **Remarks: T**he substitute species for tiger. Leopard skins and other body parts are traded as trophies, ornaments, items of clothing and for use in traditional Chinese Medicines.

(viii) **Legal Status:** Listed in Schedule I of the Wildlife (Protection) Act, 1972 and Appendix I to the CITES. Export/Import is prohibited as per the provisions of the EXIM Policy.

28.4 Indian Elephant Ivory

(i) **Common Name :** Indian Elephant ivory.

(ii) **Scientific Name :** Elephas maximus

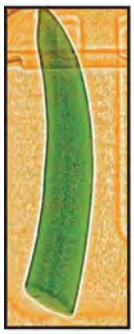
(iii) **Items in trade :** Whole ivory, carved figures, bangles, jewellery, Japanese signature seal etc.

(iv) **Real Image:**





(vi) **Scanned Image:**



Ivory



Ivory

(vi) **Identifying Features:**

A. Scanned Image: Green or bluish green colour. Hollow dental pulp cavity clearly visible in the middle of Tusk/Ivory which may extend to one third or half of the length.

B. Real Image/Product: Creamish white colour. Unlike bone, ivory has no blood vessel system thus denser. Schreger lines are seen (cross markings like finger prints).

(vii) **Remarks:** Ivory includes tusk of Indian Elephant, African Elephant, Mammoth ivory, Walrus tusk, Hippo teeth etc.

(viii) **Legal Status:** Listed in Schedule I of the Wildlife (Protection) Act, 1972 and Appendix I to the CITES. Export/Import is prohibited as per the provisions of the EXIM Policy.

28.5 Indian Elephant Ivory

(i) **Common Name :** Indian Elephant ivory.

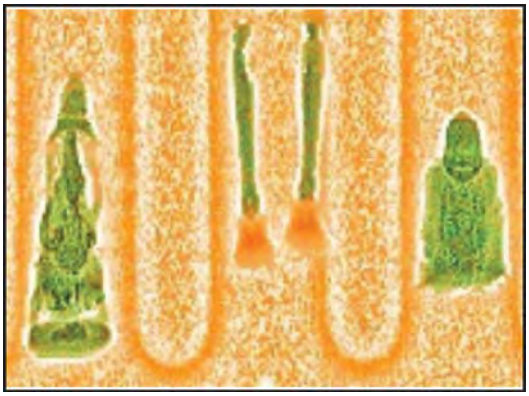
(ii) **Scientific Name :** *Elephas maximus*

(iii) **Items in trade :** Whole ivory, carved figures, bangles, jewellery, Japanese signature seal etc.

(iv) **Real Image:**



(v) **Scanned Image:**



Ivory Articles

(vi) **Identifying Features:**

A. **Scanned Image:** Green colour.

B. **Real Image/Product:** Creamish white colour. Unlike bone, ivory has no blood vessel system thus denser. Schreger lines are seen (cross markings like finger prints).

(vii) **Remarks:** Ivory includes tusk of Indian Elephant, African Elephant, Mammoth ivory, Walrus tusk, Hippo teeth etc.

(viii) **Legal Status:** Listed in Schedule I of the Wildlife (Protection) Act, 1972 and Appendix I to the CITES. Export/Import is prohibited as per the provisions of the EXIM Policy.

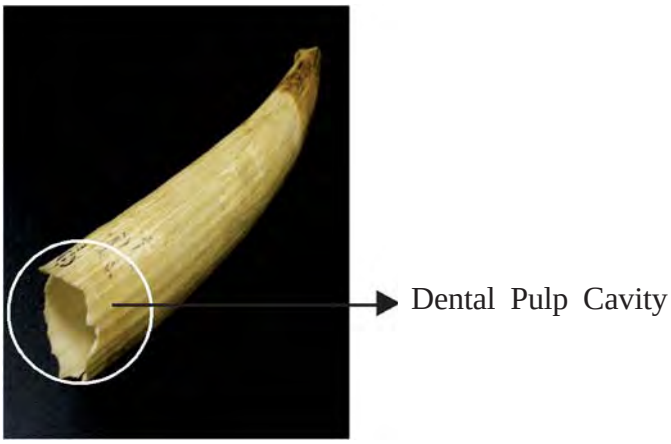
28.6 Walrus Tusk

(i) **Common Name** : Walrus Tusk.

(ii) **Scientific Name** : *Odobenus rosmarus*

(iii) **Items in trade** : Whole tusk

(iv) **Real Image** :



(v) **Scanned Image:**



(vii) **Identifying Features:**

A. **Scanned Image:** Green or brownish green colour. Hollow dental pulp cavity clearly visible in the middle of Tusk/Ivory which may extend to one third or half of the length.

B. **Real Image/Product:** Creamish white in colour. Size 9” to 12”

(viii) **Remarks:** Ivory includes tusk of Indian Elephant, African Elephant, Mammoth ivory, Walrus tusk, Hippo teeth etc.

(ix) **Legal Status:** Listed Appendix III (Canada) to the CITES. Export/Import is prohibited as per the provisions of the EXIM Policy.

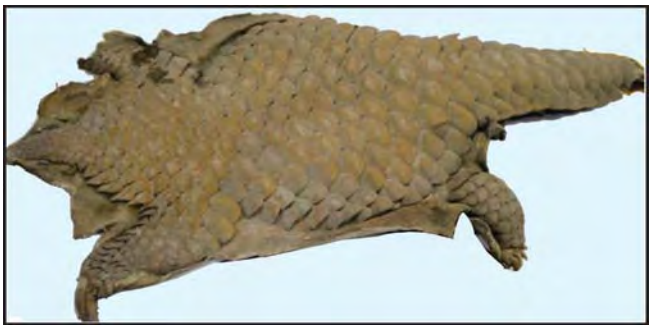
28.7 Pangolin Skin

(i) **Common Name** : Indian Pangolin.

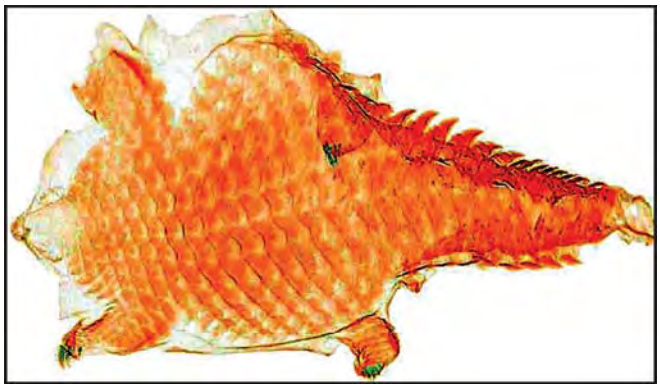
(ii) **Scientific Name** : *Manis crassicaudata*

(iii) **Items in trade** : Skin/scales

(iv) **Real image** :



(v) **Scanned Image:**



(vi) **Identifying Features:**

A. **Scanned Image:** Orange colour. Scale patterns are visible. Nails are green in colour.

B. **Real Image of the product:** Light to dark brown in colour. The physical appearance of pangolins is marked by large, hardened, plate like scales (made of keratin).

(vii) **Remarks:** Pangolin skin and scales are mostly traded for its medicinal value. They are used to make rings and other decorative items.

(viii) **Legal Status:** Listed in Schedule I of the Wildlife (Protection) Act, 1972. Export/Import is prohibited as per the provisions of the EXIM Policy.

28.8 Rhino Horn

(i) **Common Name** : One-Horned Rhinoceros.

(ii) **Scientific Name** : *Rhinoceros unicornis*

(iii) **Items in trade** : Horns

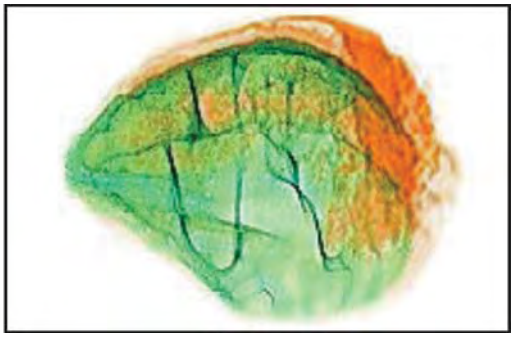
(iv) **Real Image** :





(v) **Scanned Image:**





(vi) **Identifying Features:**

A. **Scanned Image:** Orange colour (sample without bone content whereas a sample with bone reflects green colour.

B. **Real Image/Product:** Grayish brown to black. The texture of rhino horn is rough due to the presence of rough hair on the surface of the horn (made of keratin).

(vii) **Remarks:** Rhino horns are used in East Asian Traditional medicines.

(viii) **Legal Status:** Listed in Schedule I of the Wildlife (Protection) Act, 1972, and Appendix I to the CITES. Export/Import is prohibited as per the provisions of the EXIM Policy.

28.9 Wild Boar Tusk

(i) **Common Name** : Wild Boar Tusk.

(ii) **Scientific Name** : *Sus scrofa*

(iii) **Items in trade** : Full tusk.

(iv) **Real Image** :



(v) **Scanned Image:**



(vi) **Identifying Features:**

A. **Scanned Image:** Slightly greenish in colour.

B. **Real Image/Product:** The upper tusks are bent upwards in males, and are regularly ground against the lower ones to produce sharp edges. The tusks normally measure about 6 cm (2.4”), in exceptional cases even 12 cm (4.7”). Females also have sharp canines, but they are smaller, and not protruding like the male’s tusks.

(vii) **Remarks:** Used as Talismans.

(viii) **Legal Status:** Listed in Schedule III of the Wildlife (Protection) Act, 1972. Export/Import is prohibited as per the provisions of the EXIM Policy.

28.10 Deer Antler of Sambhar & Chital

(i) **Common Name** : Deer Antler of Sambhar & Chital.

(ii) **Scientific Name** : *Axis axis & Cervus unicolour*

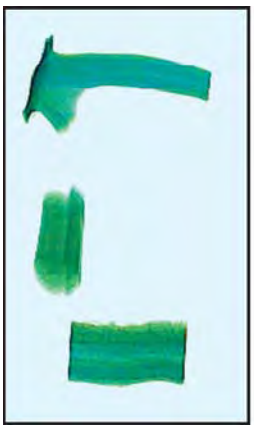
(iii) **Items in trade** : Antler & articles like handles, button etc.

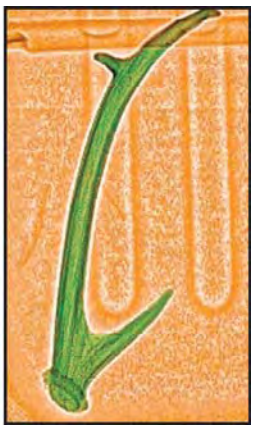
(iv) **Real Image** :





(v) **Scanned Image:**





(vi) **Identifying Features:**

A. **Scanned Image:** Green or bluish green colour. Solid structure, with a narrow cavity at the core. Shape of Deer Antler and uneven surface visible.

B. **Real Image/Product:** Light to dark brown in clolor. Unlike bone, antler has no blood vessel system thus denser.

(vii) **Remarks:** Deer Antlers are used in cutlery handles, revolver butts, buttons, handicrafts etc.

(viii) **Legal Status:** Listed in Schedule III of the Wildlife (Protection) Act, 1972. Export/Import is prohibited as per the provisions of the EXIM Policy.

28.11 Pallas's Gull

(i) **Common Name** : Pallas's Gull/Great Black Headed Gull

(ii) **Scientific Name** : *Larus ichthyaetus*

(iii) **Items in trade** : Live birds

(iv) **Real Image** :



(v) **Scanned Image:**



(vi) **Identifying Features:**

A. Scanned Image: Skeleton is seen as green and rest of the body is seen as orange in colour. Since, it is a stuffed bird, the internal metal wire supports are seen as blue.

B. Real Image/Product: Head blackish. The adults have grey wings and back, with conspicuous white "mirrors" at the wing tips. The legs are yellow and the bill is red.

(vii) **Remarks:** Gulls are typically medium to large birds, usually grey or white, often with black markings on the head or wings. They typically have harsh wailing or squawking calls, stout, longish bills, and webbed feet. This species breeds in colonies in marshes and islands from southern Russia to Mongolia. It is migratory, wintering in the Eastern Mediterranean, Arabia and India.

28.12 White Cockatoo/Umbrella Cockatoo

(i) **Common Name** : White Cockatoo/Umbrella Cockatoo

(ii) **Scientific Name** : *Cacatua alba*

(iii) **Items in trade** : Live birds

(iv) **Real Image** :



(v) **Scanned Image:**



(vi) **Identifying Features:**

A. **Scanned Image:** Skeleton is seen as green and rest of the body is seen as orange in colour. Since, it is a stuffed bird, the internal metal wire supports are seen as blue.

B. **Real Image/Product:** This threatened white parrot has brown or black eyes and a dark grey beak. When surprised, it extends a large and striking crest, which has a semicircular shape. The undersides of the wings and tail have a pale yellow or lemon colour which flashes when they fly.

(viii) **Remarks:** Endemic to the islands of Halmahera, Bacan, Ternate, Tidore, Kasiruta and Mandiole in North Maluku, Indonesia. The White Cockatoo is considered vulnerable by the IUCN. Its numbers in the wild have declined owing to capture for the cage bird trade and habitat loss. Mostly used as Pet Birds.

(ix) **Legal Status:** This bird is coming under the order Psittaciformes and all Psittaciformes species are listed in different Appendices to the CITES. Export/import is restricted.

28.13 Crocodile Bags

(i) **Common Name** : Crocodile

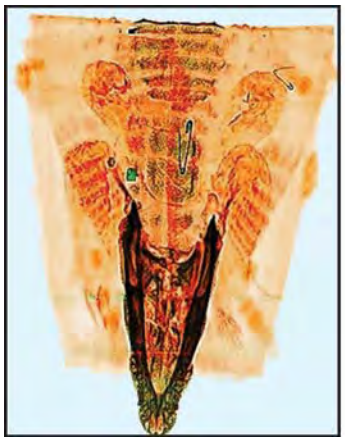
(ii) **Scientific Name** : *Crocodilus sp.*

(iii) **Items in trade** : Shoes, whole skin, purses, wallets, watch straps etc.

(iv) **Real Image** :



(v) **Scanned Image:**





(vi) **Identifying Features:**

A. Scanned Image: Orange colour. Contours of scales visible. Mandible portion is green.

B. Real Image/Product: Distinctive scale pattern. Rough surface.

(vii) **Remarks:** Alligator, Caiman, Gharial Skins also in the trade and look similar. Other manufactured products include, purses, wallets, watch straps, full skins etc.

(viii) **Legal Status:** Listed in Schedule I of the Wildlife (Protection) Act, 1972 and Appendix I/ II to the CITES. Export/Import is prohibited as per the provisions of the EXIM Policy.

28.14 Crocodile Shoes

(i) **Common Name** : Crocodile Shoes

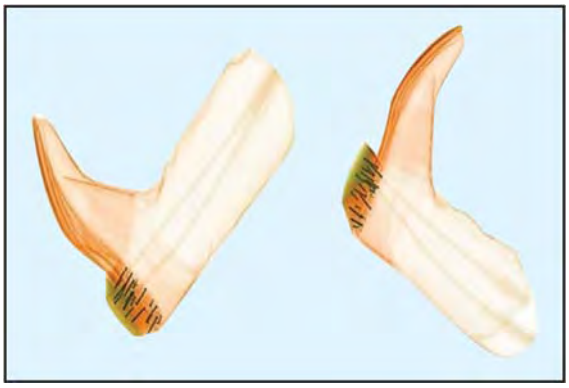
(ii) **Scientific Name** : *Crocodilus sp.*

(iii) **Items in trade** : Shoes, whole skin, purses, wallets, watch straps etc.

(iv) **Real Image** :



(v) **Scanned Image:**



(vi) **Identifying Features:**

A. Scanned Image: Orange colour. Contours of scales visible. Mostly handmade so nails in sole are clearly visible.

B. Real Image/Product: Distinctive scale pattern. Rough surface.

(vii) **Remarks:** Alligator, Caiman, Gharial Skins also in the trade and look similar. Other manufactured products include, purses, wallets, watch straps, full skins etc.

(viii) **Legal Status:** Listed in Schedule I of the Wildlife (Protection) Act, 1972 and Appendix I/ II to the CITES. Export/Import is prohibited as per the provisions of the EXIM Policy.

28.15 Star Tortoise

(i) **Common Name** : Star Tortoise

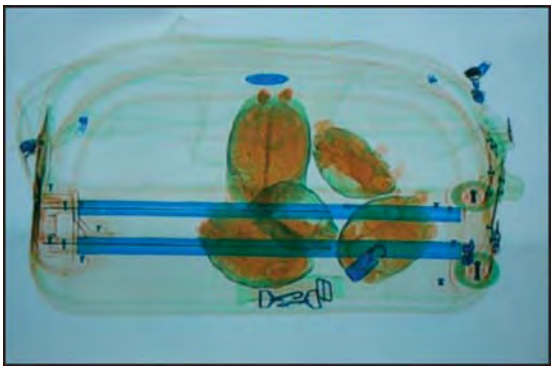
(ii) **Scientific Name** : *Geochelone elegans.*

(iii) **Items in trade** : Live animal

(iv) **Real Image** :



(v) **Scanned Image:**



(vi) **Identifying Features:**

A. **Scanned Image:** Orange colour, Oval shape. Four appendages and head visible in the scan carapace visible as green rim due to dermal bone.

B. **Real Image/Product:** Live tortoise with star shaped markings on the carapace. Size upto 10 inches.

(vii) **Remarks:** Used as a pet and food item.

(viii) **Legal Status:** Listed in Schedule IV of the Wildlife (Protection) Act, 1972 and Appendix II to the CITES. Export/Import is prohibited as per the provisions of the EXIM Policy.

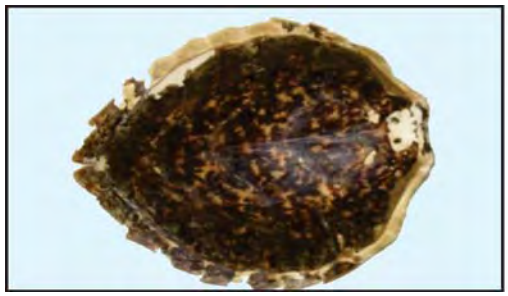
28.16 Turtle Carapace

(i) **Common Name** : Turtle Carapace/Turtle Shell

(ii) **Scientific Name** : *Eretmochelys imbricata*

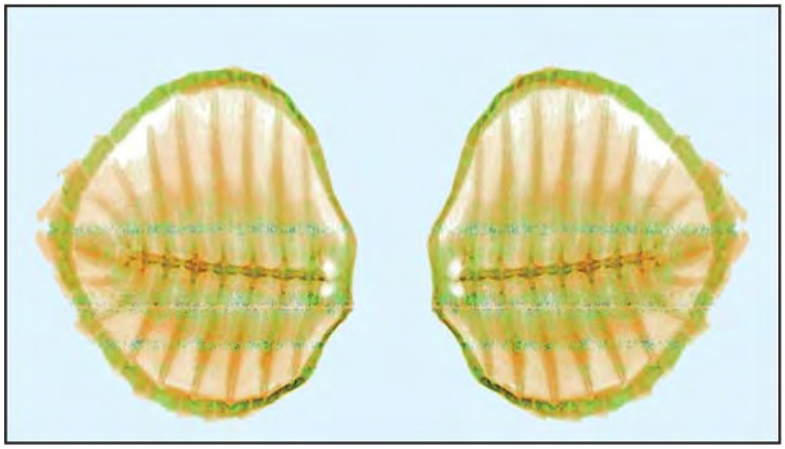
(iii) **Items in trade** : Whole carapace, made into spectacle frames, etc.

(iv) **Real Image** :





(v) **Scanned Image:**



(vi) **Identifying Features:**

A. Scanned Image: Greenish orange in colour. Rim visible as green due to dermal bone.

B. Real Image/Product: The carapace is the dorsal (back), convex part of the shell structure of a turtle, consisting of the animal's ribcage combined with dermal bone. It is blackish yellow in colour.

(vii) **Remarks:** Turtle shell is made into spectacle frames, boxes, earrings, bangles, etc. In some cases the carapaces are stuffed and sold as souvenirs. These are also used to make traditional musical instrument.

(viii) **Legal Status:** Listed in Schedule I of the Wildlife (Protection) Act, 1972 and Appendix I to the CITES. Export/Import is prohibited as per the provisions of the EXIM Policy.

28.17 Sea Horse

(i) **Common Name** : Sea Horse

(ii) **Scientific Name** : *Hippocampus spp.*

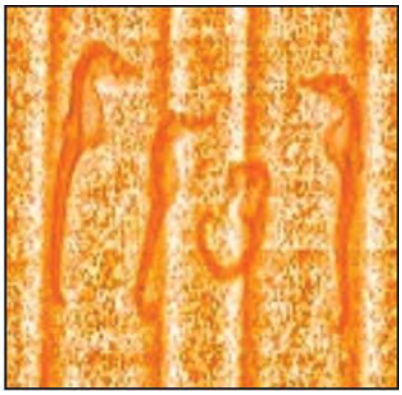
(iii) **Items in trade** : Dried fish, live fish for aquarium

(iv) **Real Image** :



(v) **Scanned Image:**





(vi) **Identifying Features:**

A. Scanned Image: Orange in colour, shape appears as in real image.

B. Real Image/Product: Elongated semi flexible body with armoured bony plates. Head like horse, snout tubular. Hence it is called Sea Horse.

(vii) **Remarks:** Sea horses have great commercial value. It is a good ornamental (aquarium) fish and also stuffed to make decoration pieces. Dry fish used in traditional Chinese medicine.

(viii) **Legal Status:** Listed in Schedule I of the Wildlife (Protection) Act, 1972 and Appendix II to the CITES. Export/Import is prohibited as per the provisions of the EXIM Policy.

28.18 Horned Helmet

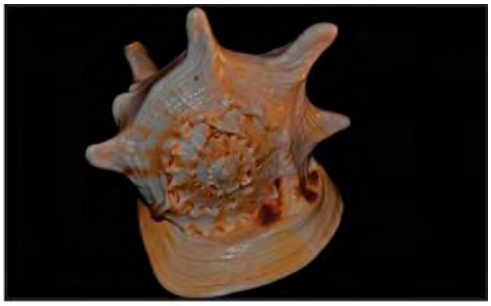
(i) **Common Name** : Horned Helmet

(ii) **Scientific Name** : *Cassis cornuta*

(iii) **Items in trade** : Whole shell.

(iv) **Real Image** :





(v) **Scanned Image:**





(vi) **Identifying Features:**

A. Scanned Image: Green in colour with internal structures are seen.

B. Real Image/Product: Solid, heavy, cream coloured shell. Ornamented with faint spiral rows of spots, heavy knobs, etc.

(vii) **Remarks:** Whole shell is sold as souvenirs or decoration pieces. Handicraft products/ souvenirs may also be made such as lampshades.

(viii) **Legal Status:** Listed in Schedule I of the Wildlife (Protection) Act, 1972. Export/Import is prohibited as per the provisions of the EXIM Policy.

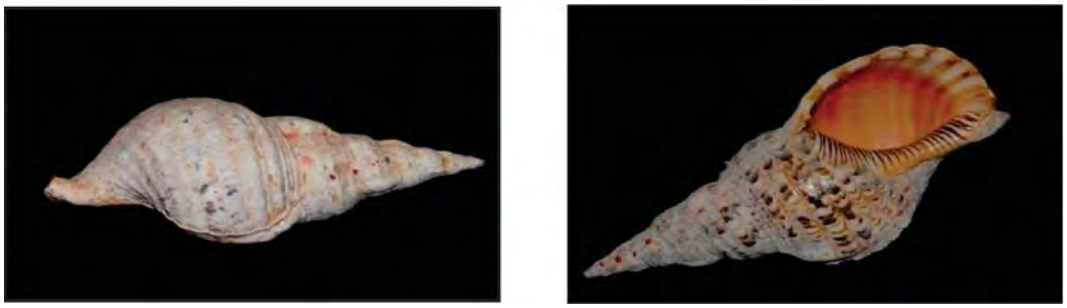
28.19 Trumpet Triton

(i) **Common Name** : Trumpet Triton

(ii) **Scientific Name** : *Charonia tritonis*

(iii) **Items in trade** : Whole shell.

(iv) **Real Image** :



(v) **Scanned Image:**



(vi) **Identifying Features:**

A. Scanned Image: Internal Spiral characters in green colour are seen.

B. Real Image/Product: Creamy pink shell with dark brown patches on it. Broad body whorled with two prominent varices.

(vii) **Remarks:** The shell is used for manufacturing lime in lime industries. It is a collectors' item. It is also used as a form of trumpet.

(viii) **Legal Status:** Listed in Schedule I of the Wildlife (Protection) Act, 1972. Export/Import is prohibited as per the provisions of the EXIM Policy.

28.20 Helmet Shell

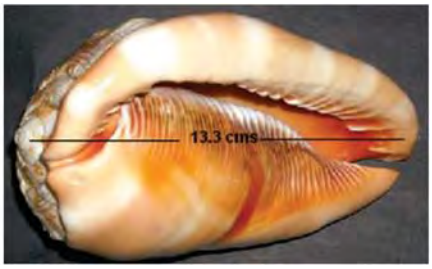
(i) **Common Name** : Helmet Shell

(ii) **Scientific Name** : *Cypraecassis rufa*

(iii) **Items in trade** : Sea shells.

(iv) **Real Image** :





(v) **Scanned Image:**





(vi) **Identifying Features:**

A. **Scanned Image:** Green colour. Helmet type shape. Three dimensional shell linings clearly visible in the image.

B. **Real Image/Product:** Colour : Reddish Brown. Extremely thick, heavy, very glossy with rows of rounded knobs.

(vii) **Remarks:** Polished shell used as decorative item.

(viii) **Legal Status:** Listed in Schedule I of the Wildlife (Protection) Act, 1972. Export/Import is prohibited as per the provisions of the EXIM Policy.

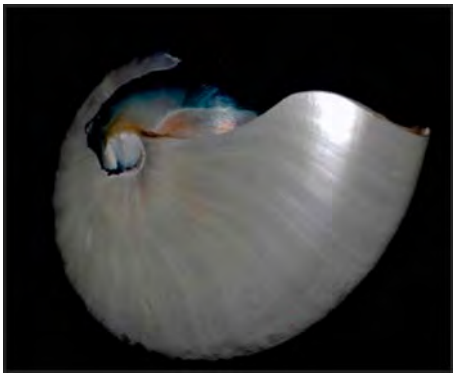
28.21 Chambered Nautilus

(i) **Common Name** : Chambered Nautilus

(ii) **Scientific Name** : *Nautilus pompilius*

(iii) **Items in trade** : Whole Shell, made into handicraft.

(iv) **Real Image** :





(v) **Scanned Image:**





(vi) **Identifying Features:**

A. Scanned Image: Slightly greenish spiral chambers are visible.

B. Real Image/Product: White or cream coloured shell, partitioned, bilaterally symmetrical, spirally coiled, resulting chambers are connected with each other by a hollow tube.

(vii) **Remarks:** The shell is geometrically perfect. Whole shells are sold as such or polished and made pure white. It is often made into different kinds of handicrafts especially alongwith silver metal (EPNS). Also found to be declared as "MOP Birds".

(viii) **Legal Status:** Listed in Schedule I of the Wildlife (Protection) Act, 1972. Export/Import is prohibited as per the provisions of the EXIM Policy.

28.22 Elongate Giant Clam

(i) **Common Name** : Elongate Giant Clam

(ii) **Scientific Name** : *Tridacna maxima*

(iii) **Items in trade** : Whole shells

(iv) **Real Image** :



(v) **Scanned Image:**





(vi) **Identifying Features:**

A. Scanned Image: Deep green coloured.

B. Real Image/Product: Bivalve shell, solid, triangular, concentrically sculptured with closely spaced undulate growth lines.

(vii) **Remarks:** These giant clams are the constituents of pottery glazes and also used in making floor tiles.

(viii) **Legal Status:** Listed in Schedule I of the Wildlife (Protection) Act, 1972 and Appendix II to the CITES. Export/Import is prohibited as per the provisions of the EXIM Policy.

28.23 Trapezium Conch

(i) **Common Name** : Trapezium Conch

(ii) **Scientific Name** : *Fasciolaria trapezium*

(iii) **Items in trade** : Whole shell.

(iv) **Real Image** :



(v) **Scanned Image:**





(vi) **Identifying Features:**

A. Scanned Image: Internal spiral characters in green colour are seen.

B. Real Image/Product: Strong & heavy reddish, cream coloured shell. Spiral rows of large tubercles at periphery of spire whorls and shoulder of the body whorl.

(vii) **Remarks:** Commonly traded in India especially along the coast at tourists spots as whole shells or made into decorative pieces, table-lamps, pen stands, etc.

(viii) **Legal Status:** Listed in Schedule IV of the Wildlife (Protection) Act, 1972. Export/Import is prohibited as per the provisions of the EXIM Policy.

28.24 Chiragra Spider Conch

(i) **Common Name** : Chiragra Spider Conch

(ii) **Scientific Name** : *Lambis chiragra*

(iii) **Items in trade** : Whole shell, handicrafts.

(iv) **Real Image** :





(v) **Scanned Image:**





(vi) **Identifying Features:**

A. **Scanned Image:** Internal spiral characters in green colour are seen. Spines are also seen.

B. **Real Image/Product:** Shell white, with crowded zigzag streaks of purple brown colour. 5 large labial digitations with one siphonal canal (spine like structures) present.

(vii) **Remarks:** Sold as whole shells, pen stands, lamp shades, show-pieces, ashtrays, etc. Used in lime industries also.

(viii) **Legal Status:** Listed in Schedule IV of the Wildlife (Protection) Act, 1972. Export/Import is prohibited as per the provisions of the EXIM Policy.

28.25 Truncate Spider Conch

(i) **Common Name** : Truncate Spider Conch

(ii) **Scientific Name** : *Lambis truncata*

(iii) **Items in trade** : Whole shell, handicrafts

(iv) **Real Image** :





(v) **Scanned Image:**





(vi) **Identifying Features:**

A. Scanned Image: Internal Spiral characters in green colour are seen. Spines are also seen.

B. Real Image/Product: Whitish shell with 6 slightly arching labial digitations and one straight siphonal canal (spine like).

(vii) **Remarks:** Traded as decorative sea-shells. Used in lime industries.

(viii) **Legal Status:** Listed in Schedule IV of the Wildlife (Protection) Act, 1972. Export/import is prohibited as per the provisions of the EXIM Policy.

28.26 Great Green Turban

(i) **Common Name** : Great Green Turban

(ii) **Scientific Name** : *Turbo marmoratus*

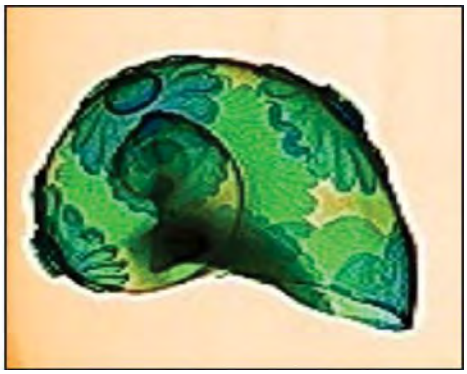
(iii) **Items in trade** : Whole shell, handicrafts

(iv) **Real Image** :



(v) **Scanned Image:**





(vi) **Identifying Features:**

A. Scanned Image: Green colour.

B. Real Image/Product: Solid, heavy, coiled shell. Shell marbled with dark brown, green and cream coloured blotches.

(vii) **Remarks:** Commercially important, if dissolved in dilute acid, an exquisite Mother of Pearl layer is exposed. Made into knick-knacks like ashtrays, agarbatti stands, flower vases, etc.

(iii) **Legal Status:** Listed in Schedule IV of the Wildlife (Protection) Act, 1972. Export/Import is prohibited as per the provisions of the EXIM Policy.

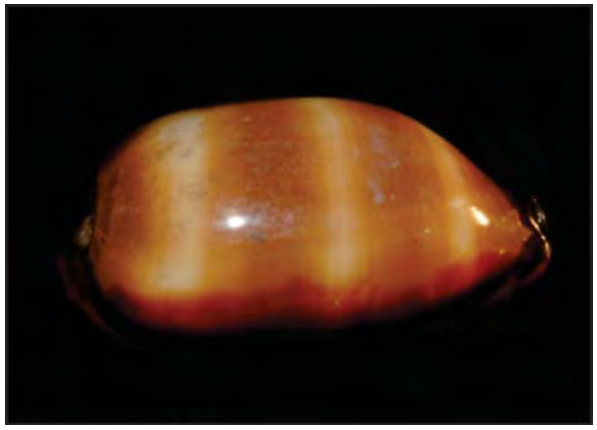
28.27 Mole Cowrie

(i) **Common Name** : Mole Cowrie

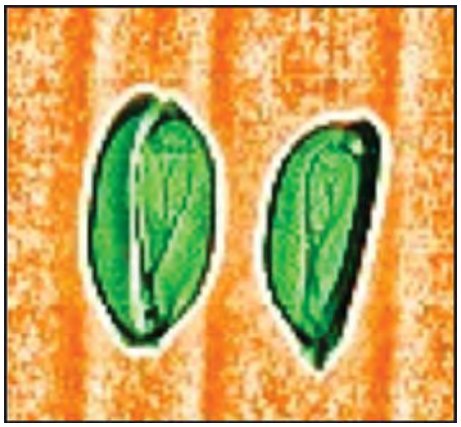
(ii) **Scientific Name** : *Cypraea talpa*

(iii) **Items in trade** : Whole Cowrie

(iv) **Real Image** :



(v) **Scanned Image:**



(vi) **Identifying Features:**

A. Scanned Image: Greenish orange in colour.

B. Real Image/Product: Alternate band of dark and light coloured (brownishorange). Margins chocolate brown, whitish between the teeth.

(vii) **Remarks**: This is bigger in size compared to normal cowries. The entire shell is collected as collector's item.

(viii) **Legal Status:** Listed in Schedule IV of the Wildlife (Protection) Act, 1972. Export/ Import is prohibited as per the provisions of the EXIM Policy.

28.28 Spiral Tudicla

(i) **Common Name** : Spiral Tudicla

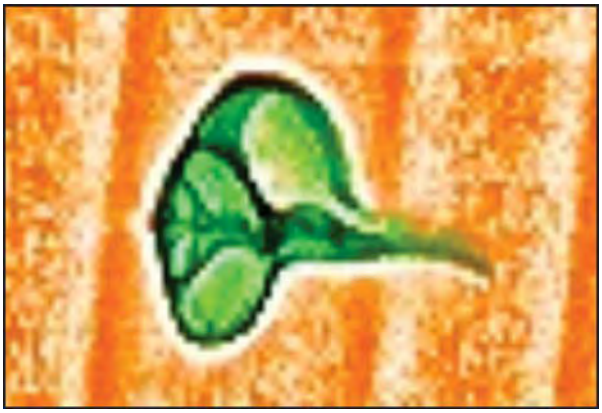
(ii) **Scientific Name** : *Tudicla spirillus*

(iii) **Items in trade** : Whole shell

(iv) **Real Image** :



(v) **Scanned Image:**



(vi) **Identifying Features:**

A. Scanned Image: Light green in colour.

B. Real Image/Product: Solid shell, brownish grey with irregularly placed reddish brown blotches, compressed spire above body whorl, long siphonal canal.

(vii) **Remarks:** Traded as decorative sea-shells.

(viii) **Legal Status:** Listed in Schedule I of the Wildlife (Protection) Act, 1972. Export/Import is prohibited as per the provisions of the EXIM Policy.

28.29 Sibbald's Conch/Pigeon Conch

(i) **Common Name** : Sibbald's Conch/Pigeon Conch

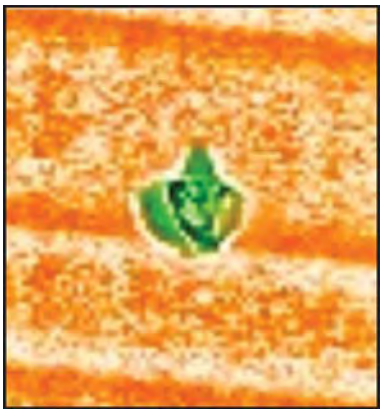
(ii) **Scientific Name** : *Strombus plicatus sibbaldii*

(iii) **Items in trade** : Whole shell

(iv) **Real Image** :



(v) **Scanned Image:**



(vi) **Identifying Features:**

A. Scanned Image: Light green in colour.

B. Real Image/Product: Shell white, semi glossy, very small shell upto 50mm in length, winged.

(vii) **Remarks:** Different handicrafts are made from these shells, maximum use is for keyrings. Sometimes used to make porcelains.

(viii) **Legal Status:** Listed in Schedule IV of the Wildlife (Protection) Act, 1972. Export/ Import is prohibited as per the provisions of the EXIM Policy.

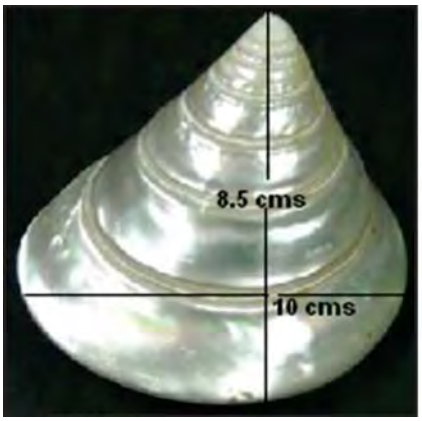
28.30 Commercial Trochas / Top shell

(i) **Common Name** : Commercial Trochas / Top shell

(ii) **Scientific Name** : *Trochus niloticus*

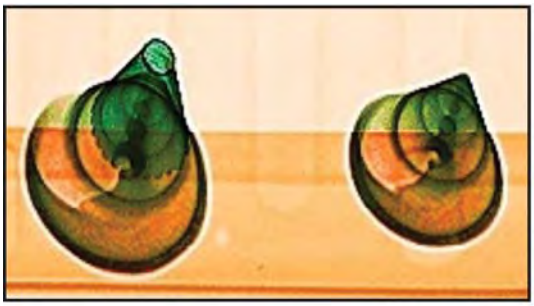
(iii) **Items in trade** : Whole shell, jewellery, handicrafts etc.

(iv) **Real Image** :





(v) **Scanned Image:**





(vi) **Identifying Features:**

A. **Scanned Image:** Green colour. Pyramid like shape with concentric & three dimensional rings.

B. **Real Image/Product:** Solid, heavy, large, conical shell upto 150 mm in length. Body whorls widely flattened, more wide than long. Shell almost swollen at the base. Base flat, excavated in the middle. Thin horny operculum concentric sculpture fine and wavy.

(vii) **Remarks:** Used as decorative item as whole shell, handicrafts, jewellery etc.

(viii) **Legal Status:** Listed in Schedule IV of the Wildlife (Protection) Act, 1972. Export/ Import is prohibited as per the provisions of the EXIM Policy.

28.31 Capiz Shell

(i) **Common Name** : Capiz Shell

(ii) **Scientific Name** : *Placuna placenta / Placenta placenta*

(iii) **Items in trade** : Whole shell, handicrafts.

(iv) **Real Image** :



(v) **Scanned Image** :



(vi) **Identifying Features:**

A. **Scanned Image:** Light bluish green colour. Irregularly rounded often thin and translucent.

B. **Real Image/Product:** Irregularly rounded often thin and translucent, smooth or sculptured. Sub-circular, flat fragile, very compressed shell up to 180 mm diameter. Surface smooth, glossy, displaying a brilliant pearly iridescence.

(vii) **Remarks:** Used as decorative item as whole shell, handicrafts, jewellery, lamps, chandlier etc.

(viii) **Legal Status:** Listed in Schedule IV of the Wildlife (Protection) Act, 1972. Export/ Import is prohibited as per the provisions of the EXIM Policy.

28.32 Sclerarctinian Coral

(i) **Common Name** : Sclerarctinian Coral

(ii) **Scientific Name** : *Siderastrea sp.*

(iii) **Items in trade** : Whole Coral

(iv) **Real Image** :



(v) **Scanned Image** :



(vi) **Identifying Features:**

A. Scanned Image: Deep green colour.

B. Real Image/Product: White coloured. Colonies are encrusting to boulder shaped. Corallites are rounded or polygonal. Walls are composed of network of septa with cross linkages.

(vii) **Remarks:** Used in Praval Bhasma as a calcium supplement & as decorative items.

(viii) **Legal Status:** Listed in Schedule I of the Wildlife (Protection) Act, 1972 and Appendix II to the CITES. Export/Import is prohibited as per the provisions of the EXIM Policy.

28.33 Sclerarctinian Coral Acropora

(i) **Common Name** : Small Polyp Stony Coral

(ii) **Scientific Name** : *Acropora sp.*

(iii) **Items in trade** : Whole Coral, handicrafts

(iv) **Real Image** :



(v) **Scanned Image** :



(vi) **Identifying Features:**

A. Scanned Image: Deep green in colour.

B. Real Image/Product: White coloured. Colonies are composed of large, tapered, prostate branches.

(vii) **Remarks:** Used as decorative items as well as in Praval Bhasma.

(viii) **Legal Status:** Listed in Schedule I of the Wildlife (Protection) Act, 1972 and Appendix II to the CITES. Export/Import is prohibited as per the provisions of the EXIM Policy.

28.34 Organ Pipe Coral

(i) **Common Name** : Organ Pipe Coral

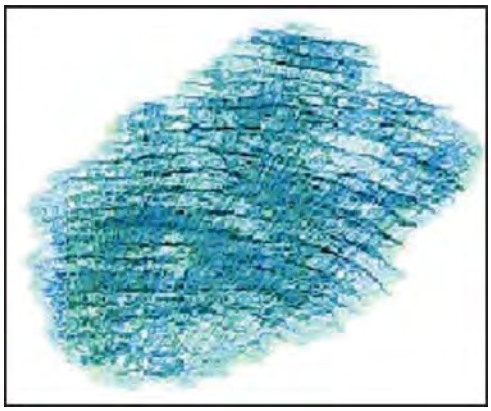
(ii) **Scientific Name** : *Tubipora musica*

(iii) **Items in trade** : Whole Coral

(iv) **Real Image** :



(v) **Scanned Image** :



(vi) **Identifying Features:**

A. Scanned Image: Blue/green colour. Reticulate pattern of tubes clearly visible.

B. Real Image/Product: Bright Red colour. Dried coral has a pattern of tubes like an organ pipe trumpet hence the name organ pipe coral.

(vii) **Remarks:** Used as medicine & decorative item.

(viii) **Legal Status:** Listed in Schedule I of the Wildlife (Protection) Act, 1972 and Appendix II to the CITES. Export/Import is prohibited as per the provisions of the EXIM Policy.

28.35 Antipatharia (Black Coral)

(i) **Common Name** : Black Coral

(ii) **Scientific Name** : *Antipatharia*

(iii) **Items in trade** : Whole Coral

(iv) **Real Image** :



(v) **Scanned Image** :



(vi) **Identifying Features:**

A. Scanned Image: Blackish orange in colour.

B. Real Image/Product: Deep water tree like corals. Skeleton distinctive black or dark brown in colour.

(vii) **Remarks:** Used to make coral handicrafts.

(viii) **Legal Status:** Listed in Schedule I of the Wildlife (Protection) Act, 1972 and Appendix II to the CITES. Export/Import is prohibited as per the provisions of the EXIM Policy.

28.36 Sea Fan (Gorgonea)

(i) **Common Name** : Sea Fan

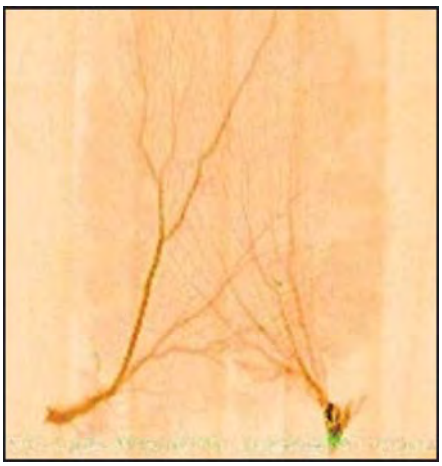
(ii) **Scientific Name** : *Gorgonea*

(iii) **Items in trade** : Whole Coral

(iv) **Real Image** :



(v) **Scanned Image** :



(vi) **Identifying Features:**

A. Scanned Image: Blackish orange in colour.

B. Real Image/Product: Orange coloured tree like structure.

(vii) **Remarks:** Used to make coral handicrafts.

(viii) **Legal Status:** Listed in Schedule I of the Wildlife (Protection) Act, 1972. Export/ Import is prohibited as per the provisions of the EXIM Policy.

28.37 Sea Cucumber

(i) **Common Name** : Sea Cucumber

(ii) **Scientific Name** : *Holothuria*

(iii) **Items in trade** : Whole dried animal

(iv) **Real Image** :



(v) **Scanned Image** :



(vi) **Identifying Features:**

A. Scanned Image: Orange colour. Animal internal structure (inner linings) clearly visible in the image.

B. Real Image/Product: Black dark brown colour. Average size: 10 to 30 cms; body ranges from spherical to worm like. Shape like dried banana.

(vii) **Remarks:** Used as a food item in Chinese/Japanese food preparations.

(viii) **Legal Status:** Listed in Schedule I of the Wildlife (Protection) Act, 1972. Export/ Import is prohibited as per the provisions of the EXIM Policy.

28.38 Red Sanders

(i) **Common Name** : Red Sanders

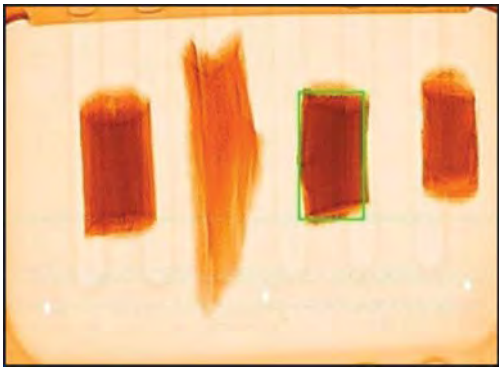
(ii) **Scientific Name** : *Pterocarpus santalinus*

(iii) **Items in trade** : Wood logs, wood piece, handicrafts, furniture, musical instrument

(iv) **Real Image** :



(v) **Scanned Image** :



(vi) **Identifying Features:**

A. Scanned Image: Orangish red in colour.

B. Real Image/Product: Deep red coloured wood.

(vii) **Remarks:** One of the rare pieces of Indian timber found only in three districts of Andhra Pradesh.

(viii) **Legal Status:** Listed in Appendix II to the CITES. Export/Import is prohibited/ restricted as per the provisions of the EXIM Policy.

References

Extracts from "X-Ray Images of Wildlife Products, A catalogue of Wildlife Contraband Commonly Carried in Personal Baggage", Wildlife Crime Control Bureau, Ministry of Environment and Forests, Government of India, 2012.

A Forensic Guide for Crime Investigators : *Standard Operating Procedures (SOPs)* attempts to serve the need of the Investigating Officers (I.Os.) to look into the vast range of physical evidences as well as newer types of evidences recovered from a scene of crime, that needs forensic examination.

Keeping in mind the development of technology at a rapid pace, the suggestions in this SOP are examined in the context of current technology and practices prevalent in the country. Each chapter has not only been reviewed by the internal faculty but also vetted by external experts on the relevant subject. Besides, each case is a unique one; thus, it may require action other than those described in the related chapter. Users may have to refer to the other chapters also for the appropriate forensic tool that suits them.

Apart from covering a wide range of issues that need to be addressed during a crime investigation, this handbook also provides model queries that the I.O. needs to ask the forensic experts and medico legal experts. This voluminous work will be useful not only for the I.Os. but also judicial officers and prosecutors as efforts have been made to make this book user friendly. However, this book is for ready reference only and does not claim the absolute necessity or correctness of the prescribed procedure.

About the Institute

The Institute of Criminology and Forensic Science was established in 1972 to undertake teaching and research in Criminology and Forensic Science and to impart in-service training to senior functionaries of the criminal justice system. The Institute was renamed as National Institute of Criminology and Forensic Science (NICFS) in 1991 and again renamed after Lok Nayak Jayaprakash Narayan in 2003. In 43 years of its existence, the Institute has made significant headway in the areas of training of criminal justice functionaries and others, as well as research in applied aspects of the twin subjects. More than 38,892 officers from Police, Civil Administration, Prosecution, Judiciary, Correctional Administration, Customs, Defence and Forensic Science Laboratories including foreign trainees have undergone orientation and specialized courses offered by the Institute. Since 2004, the Institute has been offering M.A./M.Sc. degree courses in Criminology and Forensic Science, which are open to general public.

LN JN National Institute of Criminology and Forensic Science
(Ministry of Home Affairs, Government of India)
Sector-3, Outer Ring Road, Rohini, Delhi – 110 085
Phone : 011-27521091, 27514161, 27511580 **| FAX**: 011-27510586, 27511571
Email: director.nicfs@nic.in **| Website**: www.nicfs.nic.in