Charred documents and Techniques apply for their Forensic Examination: An Update

Gaurav kumar Singh¹, Ankita Guleria²

1. Research Scholar, Department of forensic science, Chandigarh University, Gharuan Mohali, Punjab, India
2. M.Sc. Student, Department of forensic science, Chandigarh University, Gharuan Mohali, Punjab, India

*Corresponding author: gauravkumar.uips@cumail.in (Singh)

Abstract

A document is a piece of printed, written or electronic matter i.e. generally consisting signatures, handwritings or some modified data providing information and makes a record. Questioned documents are those documents whose legitimacy or authenticity is disputed. Charred documents are those which have become blackened and fragile by extreme heat or burning in the arson case, accidental fires, financial and insurance issues etc. In this present paper, the introduction to charred documents, the cases in which charred documents are supposed to found, their handling and all the related information up to their forensic examination with a case study has been reviewed in this review paper.

Keywords- Charred document, Fragile, Questioned Document, Arson, and Document

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1. Introduction-

A document is a piece of printed, written or electronic matter i.e. generally consisting signatures, handwritings or some modified data providing information and makes a record. Questioned documents are those documents whose legitimacy or authenticity is disputed. [1][2] According to the Indian Penal Code (IPC), document is defined in the section 29, states that, ‘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 these means, intended to be used or which may be used, as evidence of that matter.’ [3] Charred documents are defined as, ‘A document or a record that has gotten darkened and fragile by burning or subjecting to extreme heat is named as charred or burnt document.’ Charred documents are mostly found in the arson case, sudden fire, deliberate fire, revealing of examination papers, financial and insurance issues etc. Forensic science is defined as the application of scientific knowledge in the court of law for legal issues and proceedings. [4]

Principle of Forensic Document Examination-

The forensic document experts deal with the questioned documents or can say with the questions of those documents whose authenticity is disputed. To determine whether a document is genuine, an examiner may attempt to confirm who created the document, determine the timeframe in which it was created, identify the materials used in its preparation or uncover modifications to the original text. Documents can be examined for evidence of alterations, obliterations, erasures and page substitutions. The ink, paper, writing tools, ribbons, stamps and seals used in production of the document may all reveal important clues. The examiner may even discover valuable evidence in a document's invisible
impressions. The forensic examination of the documents consisting of handwriting and signatures based of the following three principles-

a. No two persons can exhibit same handwriting.
b. There is always a range of natural variations in the/ her handwriting.
c. No writer can go beyond his or her skill level. [5]

Figure-i) and ii) showing the charred documents

2. Tools and techniques used in Questioned Documents

The tools and techniques used for the examination of questioned documents are represented in the following figures (figure -iii) [6] [7] -

<table>
<thead>
<tr>
<th>Basic Measurement Tools</th>
<th>Magnification and Light Sources</th>
<th>Chromatography</th>
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<td>• scale</td>
<td>• Magnifiers-</td>
<td>• TLC</td>
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<tr>
<td>• protractor</td>
<td>magnifying glass or</td>
<td>• HPLC</td>
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<td></td>
<td>hand lens</td>
<td>• GC</td>
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<td>• Microscopes-</td>
<td>• MS</td>
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<th>Spectroscopy</th>
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<tbody>
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<td>• Infra-Red Spectroscopy</td>
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<td>• UV-Visible spectroscopy</td>
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</tr>
<tr>
<td>• XRF</td>
<td>• Electrophoresis</td>
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</tbody>
</table>

3. **Crime Scene investigation of charred documents** [2]

During the field investigation, the charred documents at the crime scene should be handled with utmost care due to the fragile nature of documents. So, to prevent pointless breakage, proper care should be taken and proper procedure should be followed. The crime scene investigation should be carried out as follow-

- Protect and secure the crime scene.
- The crime scene should be preserved with the least possible disturbance of any physical evidence and contamination.
- Proper maintenance of the documents and all the related details at the crime scene.

![Figure-iv) showing the charred documents found at the scene of crime.](image)

- Firstly, separate the unburnt -evidential documents at the crime scene and keep them under the custody.
- The documents should be photographed at the crime scene on arrival as a proof further in the legal proceedings to prove that these documents were actually recovered from the scene of crime.

4. **Handling and transportation of the charred documents**[2]

Proper handling and transportation of the charred documents should be carried out as follow-

1. The crime scene should be secured.
2. Restrict the flow of wind by closing the window and turning off the fans and by this means burning of documents or other materials is also restricted.
3. The container in which document is burnt should not be bothered until it is transported to the laboratory.
4. When there is a stack of charred documents, make an effort to secure half burnt documents from the central middle part of the stack as unburnt documents may be obtainable due to incomplete burning.
5. Do not disturb the heap of papers. Let them be in their original position.
6. The scattered papers should be lifted carefully by using spatula and then transfer to the sheet of glass. Place a cotton over that and again transfer to the cardboard box one after the other.
7. Use plastic sheets for preservation.
8. The transportation of the exhibits should be done in a way so that there are least chances of damage.
9. Handling of charred documents requires a great patience.

Figure-v) showing the methodology being followed at the crime scene for the charred documents

5. **Collection and packaging of Charred documents –[2]**
   1. Close up photography with a high resolution camera at the scene of crime should be done of the burnt or charred documents prior.
   2. Wet and burnt documents should be sent to the chilled storage to avoid the cast formation.
   3. Place the documents under the controlled air condition to eradicate the moisture.
   4. To provide strength to the charred documents, the solution of polyvinyl acetate (3%; 3gm polyvinyl acetate in 100 ml acetone) or methyl methacrylate should be sprayed out on the burnt documents. By doing this the charred documents would gain some weight and can be placed on glass for further examination.
   5. The charred documents are usually found twisted or curled. So there is a need to carefully remove or segregate those curled sheets.
   6. No forceful attempts should be made.
   7. All the documents should be dried, restored and refilled.

6. **Methodology**
   6.1 **Decipherment of charred documents**-
   Deciphering of charred documents can be done in the following ways-

The methods for the decipherment of Charred documents are explained as below [8] [9]-

5.1.1) Photographic methods-
   a. **Contact method** - In this method, the fragment brought in contact with the certain gases and vapours without exposure to light.
   b. **Filter photography** - This method requires the Wratten # 48 deep blue filter paper along with a commercial film. This method helps to differentiate between the charred documents background with the printing ink containing papers.
   c. **Infra Red photography** – It is one of or highly broadcasted method for the decipherment. This method involves the Wratten 87, deep red filter in combination of the Eatsman infra plates.

6.1.1) Visual methods-
   a. **Reflectivity method** - Among all the decipherment procedures, the reflectivity method is one of the simplest and versatile methods. This method involves the examination of charred documents directed at various angles relative to the paper surface under a controlled light source.
   b. **Alcohol-glycerine Immersion method** - In this method, the charred documents are immersed in a solution of alcohol-glycerine dissolved in a ratio of 5:3:2 i.e. alcohol, glycerine and water respectively for a varying intervals of time.
   c. **Potassium ferrocyanide method** - Iron is found in all variety of writing inks which are available and in use nowadays. Some chemical reagents results in the formation of a colour compound when they get combined with the iron. So, this kind of phenomenon is also used to decipher the writings on the charred documents under some ideal conditions the traces of iron base inks present on paper will give positive reactions.
d. **Silver nitrate method** - 5% silver nitrate (aqueous) solution is poured on the piece and then second glass plate will be placed over that piece. Direct sunlight should be avoided and after three hours the writings will be deciphered against the grey background of the paper as a black image.

e. **Chloral hydrate method** - In this method the fragments of charred documents immersed in the 25% of the chloral hydrate solution dissolved in the alcohol and then drying at a temperature of about 60°C. After the fourth or fifth immersion, ten percent of the glycerine will be added to the same solution and dry it as same as before. The crystals of chloral hydrate will be deposited on the charred paper surface which can be further deciphered by the reflectivity method making it likely to read the characters at certain angles of reflected light.

f. **Visual spectral comparator (VSC)** - The VSC provides a good, reliable and alternative approach to enhance the writings on the charred documents. For the same, the white spot light and flood light settings can be used to decipher the writing. [8] [9]

7. **Case Study**

   In a Nationalized bank, the bank manager has defrauded the large amount of money from the bank by altering the number of bank documents. He then tried to spoil all the essential documents by setting up the fire so that there will be no crucial evidence. During the crime scene investigation, a gas cylinder was found at a remarkable place. And all the essential documents were found partially or burnt or completely burnt near the area along with the dead body of the manager. During the CSI, it was also found that the all those crucial documents related to bank fraud were also destroyed in the fire including some other bank appliances. The examination of the charred documents led to a conclusion that enormous fraud was committed by the bank manager which involved the huge amount of transactions by him. It was also found that the fire was caused intentionally by the bank manager rather than the accidental fire. The bank manager could not be able to escape at that time as the record room was closed and he died there due to the suffocation caused by the flaming of the documents and lack of oxygen.

**Conclusion**

Charred documents are brittle, blackened and become fragile due to the heat exposure. So, there is a need to handle the charred documents very carefully and with a great patience. The following conclusions should be kept in mind-

- Visual decipherment methods consume more time as compared to photography methods.
- Photography methods are extremely cost efficient.
- Photographic method is non destructive as compared to those visual methods.

**References**

3. [IPC -https://devgan.in/ipc/section/29/](https://devgan.in/ipc/section/29/)
5. [http://www.forensicsciencesimplified.org/docs/QuestionedDocuments.pdf](http://www.forensicsciencesimplified.org/docs/QuestionedDocuments.pdf)