



ISSN: 0975-833X

RESEARCH ARTICLE

COMPARATIVE STUDY FOR RECOVERY OF WRITTEN CONTENTS ON DIFFERENT BURNT PAPERS BY VARIOUS TECHNIQUES

Yasar Mirza and *Dr. Lav Kesharwani

Department of Forensic Science, Sam Higginbottom University of Agriculture Technology and Sciences, Allahabad U.P, India- 244001

ARTICLE INFO

Article History:

Received 21st June, 2017
Received in revised form
16th July, 2017
Accepted 26th August, 2017
Published online 29th September, 2017

Key words:

Burnt papers, Projectina, VSC,
Flood light, Luminescence.

ABSTRACT

In this research paper the five different types of papers Plain paper (S1 to S5), Bond paper (S6 to S10), Newsprint paper (S11 to S15), Photography paper (S16 to S20) and Thermal paper (S21 to S25) had taken and prepared for smoldering. All types of paper samples were written by Blue ball point pen only with the text 'BURNT PAPER MESSAGE HERE'. And these papers were burnt in a wood box. These burnt specimens were examined under VSC and Projectina with different illuminations for recovery the written content. Both instruments had recovered the written content from different burnt papers successively The written content of exclusive bond paper, newsprint paper, photography paper and thermal paper have positively recovered under EPI light, Side light L and Side light R, luminescence light and flood light successively. VSC-6000 had given positively good result in comparison of Projectina Docubox HD. But both techniques have the ability in the burnt papers examination for the forensic consideration.

Copyright©2017, Yasar Mirza and Dr. Lav Kesharwani. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Yasar Mirza and Dr. Lav Kesharwani, 2017. "Comparative study for recovery of written contents on different burnt papers by various techniques", *International Journal of Current Research*, 9, (09), 56926-56931.

INTRODUCTION

Paper is a thin material produced by pressing together moist fibers of cellulose pulp derived from wood, rags or grasses, and drying them into flexible sheets. Paper can be produced with a wide variety of properties, depending on its intended to use. Sometimes Papers found at crime scene as physical evidence in the form of suicide note (in suicidal cases or homicidal cases). In the arson cases all the property of victim burnt accidentally or deliberately including the important paper documents which may be very important for the case information. Criminal use the lighter, match box to occur the fire for destroying the documents (wills, stamp paper, promissory note, suicide note, currency note ,bills) deliberately, sometimes it happens accidentally by the unintended contact of components and consequent accidental diversion of the current (short circuit) in office buildings, houses and lab etc. After burning from the fire the writing contents of paper disappear and become charred. Burnt papers become black or brown from its original color after ignition due to heat with or without enough oxygen, because of Combustion. For the safety of burnt documents evidences, non-destructive techniques are needed for examination to decipher the written contents as soon as possible for the

examination of burnt documents. Moorthy *et al* (2016) was used this instrument for the burnt papers examination So the comparative study is needed to know that which Non-destructive technique gives best result on different papers to decipher the written content.

MATERIALS AND METHODS

Preparation of samples

For this study the five different types of papers were taken and each type of paper was divided into five samples. All papers were photographed uses camera so the total 25 samples were prepared for smoldering/scorching. All five types of paper samples were written by Blue ball point pen only with the text 'BURNT PAPER MESSAGE HERE' in English capital letters. So After writing the text on samples, a wood box was taken to keep all the samples for the smoldering. After burning each sample was carefully collected and preserved for further examination. At this stage photography of each paper was then carried out.

Now following two instruments were applied for the examination of burnt papers-

1. Projectina Docubox HD M/S Projectina Ltd, Switzerland
2. VSC 6000(Video spectral comparator) Foster and Freeman Ltd, UK England

*Corresponding author: Dr. Lav Kesharwani,

Department of Forensic Science, Sam Higginbottom University of Agriculture Technology and Sciences, Allahabad U.P, India- 244001

Procedure of Examination

Projectina Docobox HD

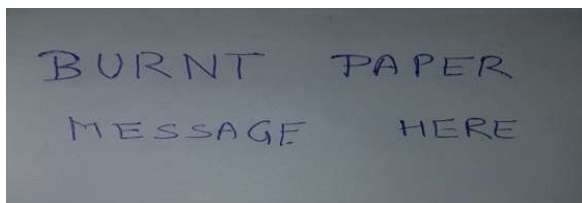
The burnt paper was carefully put over the base of instrument and it was examined by white light /UV light /Visible light /IR light / Luminescence light /EPI Side light.

VSC 6000(Video spectral comparator)

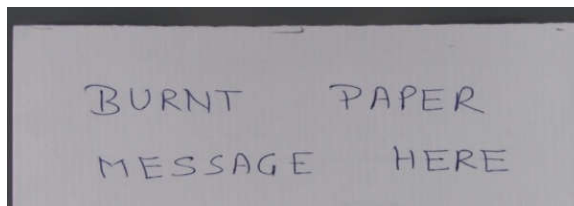
The burnt paper was carefully put over the base of instrument and it was examined by Side light L/side light R/Flood light/Co-axial light/OVD light/UV 365/ Spot light.

RESULTS

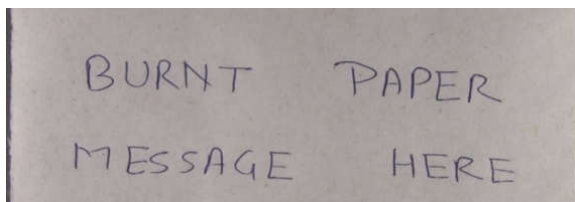
This work was carried out with objectives to recover the written contents on different burnt papers by various techniques” and to propose the best technique for recovery of written contents from Burnt papers here. The S1 to S5 indicates the plain paper sample-1. S6 to S10 denote the Exclusive bond paper sample-2. S11 to S15 indicate the Newsprint paper sample-3. S16 to S20 enlighten the Photography paper sample-4. S21 to S25 denotes the thermal paper sample-5. These burnt specimens were then examined under VSC and Projectina with different illuminations such as – White light, Luminescence light, IR light, Flood light, Spot light, UV Light, Side light Left, Side light Right, Coaxial light, EPI side light and Optical.



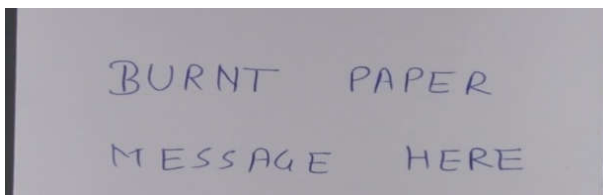
Sample – 1 Plain paper



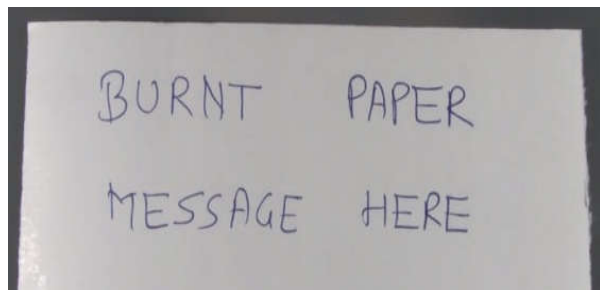
Sample -2 Exclusive Bond paper



Sample- 3 Newsprint paper



Sample- 4 photography Paper



Sample- 5 Thermal paper burning process of samples in Wood Box



Table 1. Result of recovered contents under VSC-6000 and Projectina Instruments

Sample No.	Samples	Projectina	RESULTS	VSC-6000	RESULTS
		LIGHTS	RESULTS	LIGHTS	RESULTS
S2	Plain paper	Luminescence	Faint Readable	Side R	Faint Readable
S3	Plain paper	Luminescence	Readable	Side L	Faint Readable
S4	Plain paper	EPI=L+R	Readable	Spot light	Readable
S6	Bond paper	White Light	Not recover	Flood Light	Faint Readable
S8	Bond paper	EPI=L+R	Readable	Side R	Readable
S9	Bond paper	Luminescence	Readable	OVD View	Readable
S11	Newsprint paper	White Light	Faint Readable	Flood light	Faint Readable
S12	Newsprint paper	IR Light	Not recover	Flood light	Readable
S13	Newsprint paper	EPI=L+R	Faint Readable	UV 365	Not recover
S14	Newsprint paper	UV light	Not recover	OVD View	Faint Readable
S16	Photography paper	White Light	Not recover	Flood light	Faint Readable
S17	Photography paper	IR Light	Not recover	OVD View	Faint Readable
S18	Photography paper	EPI=L+R	Readable	Side L	Readable
S19	Photography paper	LED	Readable	Co-axial	Faint Readable
S22	Thermal paper	EPI=L+R	Faint Readable	OVD View	Faint Readable
S23	Thermal paper	EPI=L+R	Faint Readable	Side L	Faint Readable
S24	Thermal paper	EPI=L+R	Faint Readable	Spot Light(400-640)	Not recover

Table 2. Result of recovered contents under Projectina Instrument





						Recovered Text	Result		
1	Sample Plain paper	Operating conditions Light	Filter	field of view	Mag		"BURNT MESSA--GE"	Written Content was faint readable in lumine-scence light.	
	S2	Lumi light	570	75X42	7.1 x				
	S3	Lumi light	630	130x98	3.0 x				
	S4	EPI=L+R (Side)light	570	142x80	3.8 x				
2	Bond paper						"PER HER"	Written Content was readable in EPI light	
	S8	EPI=L+R light	N	75X42	3.0 x				
	S9	Lumi light	530	142x80	3.8 x				

Table 3. Result of recovered contents under Projectina Instrument

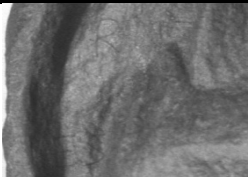

						Recovered text	Result	
3	Sample News Print paper	Operating conditions Light	Filter	field of view	Mag		"RNT ME ESSAGE"	Written Content was faint readable in white light
	S11	white light	N	101x57	5.3x			
	S13	EPI=L+R light	N	101x57	5.3 x			
4	Photo- graphy paper						"BURNT PAPER MESSAGE"	Written Content was readable in EPI light
	S18	EPI=L+R light	N	130x98	3.0 x			
	S19	LED light	N	130x98	3.8 x			

Table 4. Result of Recovered contents under Projectina Instrument





Sample	Thermal paper	Operating conditions			Mag	Recovered text	Result
		Light	Filter	field of view			
S21	White light	N	75x42	7.1x		"ESSAGE HERE"	Written Content was not readable in white light
S22	Ring light	N	75x42	7.1 x		"PAP HERE"	Written Content was faint readable in Ring light.
S23	EPI=L+R light	N	101x57	7.1 x		'PAP HERE"	Written Content was faint readable in EPI light
S24	EPI=L+R light	N	142x80	3.8 x		"PA HER"	Written Content was faint Readable in EPI light.

Table 5. Result of recovered contents under VSC-6000 Instrument

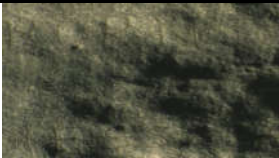


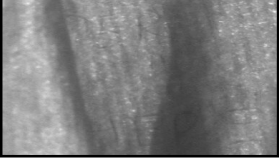


Sample	Plain paper	Operating conditions			Mag	Recovered text	Result
		Light	Filter	Integration			
S2	Side R light	Long Pass visible	500 ms	6.59		"BURNT MESSA"	Written Content was Faint readable in side R light.
S3	Side L light	Long Pass visible	420ms	4.40		"BURN MESS"	Written Content was faint readable in Side light.
S4	Spot Light	Long Pass visible	92 ms	3.74		"BURNT MESSAGE"	Written Content was readable in EPI light.
S6	Floodlight	570	74 ms	4.00		"PER "HERE"	Written Content was faint readable in flood light.
S8	Side R light	Long pass Vis.	3.3s	4.02		'PER" 'HERE'	Written Content was readable in Side R light.
S9	OVD View	Long pass Vis.	1.4s	4.02		'PER" 'HERE'	Written Content was readable in OVD light

Table 6. Result of recovered contents under VSC-6000 Instrument

Sample	Operating condition				Mag	Recovered text	Result
	Light	Filter	Integration				
3. News print paper S11	Floodlight	Long Pass visible	174 ms		4.02	“N” “P” “ESSAGE”	Written Content was readable in Flood light.
S12	Flood Light	Long Pass visible	250 ms		4.02	“BURNT” “ESSAGE”	Written Content was readable in Flood light.
S14	OVD Light	Long Pass visible	1s		4.02	“ESSAE”	faint readable in OVD light.
Photography paper S16	Flood Light	Long Pass visible	22ms		2.08	“BURN “ME”	Faint readable in flood light.
S17	OVD Light	Long Pass visible	595 ms		2.08	“BURNT PAPER MESSAGE	Faint readable in OVD light.
S18	Side L light	Long Pass visible	500 ms		4.08	“BURNT PAPER MESSAGE HERE”	Written Content was readable in Spot light.
S19	Co-axial Light	Long Pass Visible	149 ms		1.50	“PAPER MESSAGE HERE”	Faint readable in Co-axial light.

Table 7. Result of Thermal Paper under VSC-6000 Instrument

Sample	Operating condition				Mag	Recovered text	Result
	Light	Filter	Integration				
10. Thermal paper S21	Flood light	Long Pass visible	31 ms		3.73	“PER MESSAGE”	Written Content was not Readable in flood light
S22	OVD Light	Long pass visible	177 ms		3.73	“PAP” “HERE” MESSAGE	Written Content was Faint readable in OVD light.
S23	Side L light	Long Pass visible	500 ms		2.08	“PAR” “HERE”	Written Content was faint Readable in Side L light.

Variable device viewer etc. during examination. After the examination it was observed that the Projectina instrument examination of the plain paper samples S2, S3 written content was recovered in Luminescence light (Table 2), the text was faint readable in S3 and readable in S4 under EPI side Light (Table 2). The EPI side light had given good result in all the burnt samples (Table 1). In this light the text were recovered in S4 (Plain paper), S8 Bond paper (Table 2). S13 Newsprint paper, S18 Photography paper (Table 3). S22, S23 and S24 (Thermal paper) Table 4.4. While on other hand the written content was not recovered in S6 (Bond paper), S11, S14 (Newsprint paper) and in S16 (photography) under white light, UV light and IR light. The artificial LED light was suitable to recover the written content on the burnt Photography paper. Comparatively the burnt papers were also given the positive result under the Video Spectral Comparator-6000. Under this instrument the plain paper sample S2 (table 4.5), S18 photography paper (4.6), S23 thermal paper (4.7) and S3 plain paper was recovered under Side light R and Side light L with faint readable text (Table 5). While S4 was readable under spot light with long pass visible filter in 92ms integration value. The S6 bond paper had given faint readable written content. S8 and S9 had given readable text under side R light and optical variable device viewer light. The S11 and S12 newsprint paper were also gave positively good result under flood light (Table 6). The written content in all five types of paper samples, the text was not recovered under UV 365 light. The written content in S14 (Newsprint paper), S17 (Photography paper) and S22 (thermal paper) were recovered under the optical variable device viewer with faint readable text. All these different papers were divided in 25 sub-samples(S). The result was depend on condition of paper and condition of papers burning. Similar observations were also reported by Moorthy *et al.* (2016) in their study the video spectral comparator (VSC-6000) was used for to determine the effectiveness of flood light and white spot beam light in VSC by using on the charred documents. In this study they had taken the different writing instruments and the different types of papers were taken which were available in Malaysia.

Conclusion

The written content of exclusive bond paper, newsprint paper, photography paper and thermal paper have positively recovered under EPI side light, luminescence light in Projectina Docubox HD and flood light, Side light L and Side light R successively in video spectral comparator-6000. Written content of 15 samples could be seen under VSC in out of 25 samples. While written content of 12 samples could be seen under Projectina in out of 25 samples. It was concluded that VSC-6000 is the best technique for recovery the written content from burnt papers.

REFERENCES

- American Board of Forensic Document Examiners: Profile of a Forensic Document Examiner *American Board of Forensic Document Examiners, Houston*, n.d.
- Bartha, A. and Duxbury N. 2013. "Restoration and Preservation of Charred Documents", *Canadian Society of Forensic Science Journal*, vol. 1, Issue (1), 1-4.
- Bauchner, E. 2014. Document Analysis, *Mason Crest Publishers*, United States, 2014.
- Black, A. 1948. "Decipherment of Charred Documents", *Journal of criminal Law and Criminology*, Vol. 38, Issue (5), 542-546.
- Denmana, A. John, Skinnera, M. William, Kirkbrideb, K. Paul and Kempsona Ivan M. 2009. "Organic and inorganic multivariate statistics" *Australian Federal Police, Forensic and Data Centres*, 256, 2155-2163.
- Doud, D. 1953. "Charred Documents, their handling and Decipherment", *Journal of criminal law and Criminology*, vol. 43, issue (6), 812-826.
- Ellen, D. 1997. Scientific Examination of Documents Methods and Techniques Third Edition.
- Grant, J. 1942. "Deciphering charred document-some recent work and a new method", *journal royal society of chemistry* issue (791), 42-46.
- Hirth, S. and Royd, D. 2012. "Stabilization of charred documents using alkyl -2- cyanoacrylate Ester (Super glue fuming)", *Australian Journal of forensic Sciences*, Vol. (45), issue (1), 103-105.
- Host, E. 2005. "Checking Burnt or charred Documents", *Ebsco Host Connection*, 77-78.
- Khasrithong, N. and Rchitaree, 2010. "Recovering written contents of a burnt paper by IR reflected photography", *Thai Journal of Physics Series*, 6, 235-237.
- Mahesh R. 2007. "Burning paper", *India's National Newspaper- THE HINDU*, 2007 Jan 4 [News article].
- Mokrzycki GM. 2000. Advances in document examination: The video spectral comparator 2000. *Forensic Science Communication*, 1999, (1), 1-6.
- Nataraja, Narayanan K. 2016. Enhancement of Handwritings on Selected Charred Documents using Video Spectral Comparator (VSC), *Arab Journal of Forensic Sciences & Forensic Medicine*, vol. 1 Issue (4), 406-413.
