Antonio A. Cantu,[1] *Ph.D.*

The Paper Mate® Ink on the Howard Hughes "Mormon Will"

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ABSTRACT: Ink analysis was performed on the Howard Hughes "Mormon Will" case to determine if the inks matched standard inks available at the alleged date of the will, that is, 16 March 1968. The ink on the will matched a standard ink made by Paper Mate between 1966 and 1972. Consequently, no conclusion can be made regarding authenticity. However, both the proponents and contestants of the will used these inclusive results along with other facts to support their own views of authenticity or fraud.

KEYWORDS: plenary session, questioned documents, inks, Howard Hughes, forgery

On 21 March 1977, the Federal Bureau of Investigation (FBI) hand-carried to the Bureau of Alcohol, Tobacco and Firearms (ATF) Laboratory evidence consisting of an envelope containing three handwritten pages. An ink examination was requested to ascertain if the ink was available at the alleged date of the writing. The envelope had written on it, "Dear Mr. McKay Please see that this will is delivered after my death to Clark County Court House Las Vegas Nevada," and was signed "Howard R. Hughes." This envelope also contained a red Pitney Bowes Meter stamp impression on the back. The three handwritten pages constituted a will allegedly written by Howard R. Hughes on 16 March 1968. The paper of this will was legal size ruled yellow pad paper.

The conditions of this evidence are worth noting. These original documents had not been chemically treated for developing fingerprints; however, the three-page will appeared to have liquid damage as evidenced by the running of inks. There fortunately were sufficient areas where this did not occur and these served to do an adequate ink analysis. The envelope appeared to have scorching as if heat has been applied at one time. This was taken into account in the ink examination.

With regard to the Federal involvement, this and other evidence were originally submitted to the FBI Laboratory by the State of Nevada's Office of the Attorney General for fingerprint, handwriting, ink, and paper analysis. The FBI, in turn, asked ATF for its assistance in analyzing the inks since ATF has this unique capability. Thus the Federal involvement in this seemingly civil case was to honor the request of the Attorney General's Office of Nevada. Since the will involved state property, and since this office suspected fraud and perjury in the will, it could assume authority to bring criminal charges.

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[1]Research chemist, Forensic Science Research Group, Laboratory Division, FBI Academy, Quantico, VA.

On 20 Nov. 1977, the ATF Laboratory received directly from the Nevada's Attorney General's Office two additional pieces of evidence for ink analysis. One was a Latter Day Saints Visitor Center envelope (referred to as the "outer envelope" since it contained the "inner envelope" in which the will was placed), with the handwritten address, "President Spencer W. Kimball, Church of Jesus Christ, Salt Lake City, Utah," and the word "Personal" written on the lower left side. The other was a note carrying the handwritten message, "This was found by Joseph F. Smith's house in 1972. Thought you would be interested." This note was originally in the outer envelope along with the inner envelope containing the will.

The additional evidence had already been chemically treated for fingerprint development by the FBI. Thus it was more difficult to do an adequate ink analysis since the inks were almost completely washed out by the chemical treatment. Simulating chemical treatment of known standard inks was necessary to attempt the identification of the ink.

Before proceeding to the results of the ink analysis, the way such analyses are done should be mentioned. Thus we shall disgress next and discuss the chemical analysis of documents in general and writing ink analysis in particular. Emphasis for our purpose will be on document dating.

The Chemistry of Documents

During the past 10 to 15 years there has been an increasing involvement of chemistry in the field of questioned document examination. Document examiners and chemists are jointly pursuing the forensic science value that several chemical entities found on documents hold. Such chemical substances are included in Table 1.

These substances are analyzed for at least three reasons: dating, source determination, and common origin determination. Each of these cases involves comparison with reliable standards whose quality control is well-known. Comparisons with standards may not be necessary in showing differences in common origin. Determining the first date that a chemical substance first became commercially available is useful in *dating*, as a time is established before which that substance did not exist. *Source determination* involves determining, for example, the country of origin, manufacturer, retailer, or container of the substance. It is a select special case of common origin determination. In the case of writing inks, source could include the type of writing instrument (not the instrument) used. Finally, showing similarities or differences are examples of *common origin determination*. In showing similarities, comparison with standards helps in determining how weak or strong the association among the similar items is by establishing how rare or common the matching standard is. Showing differences could have more forensic science value since this provides eliminations and for this, as mentioned, standards may not be needed. Deciphering obliteration and detecting additions or alterations or both because different inks were used are examples of showing differences.

Since the thrust of the work on the "Mormon Will" was on dating, let us briefly discuss some aspects of document dating. Of utmost importance is the fact that showing nonauthenticity is

TABLE 1—*Some chemical substances on documents.*

1. Inks	2. Paper
a. Writing	3. Pencil
b. Printing	4. Correcting material
c. Typewriter ribbon	5. Erasure residue
d. Carbon copy	6. Adhesives
e. Photocopier toner	7. Stains (coffee, tea, and so forth)
f. Stamp pad	8. Fingerprints
g. Paper ruling	

easier than showing authenticity. This we share also with the field of art dating. Simply, identifying items not in existence at the alleged date of use positively establishes nonauthenticity. This was the case, for example, in the Hitler Diaries that surface about two years ago. Paper optical brightners, introduced into the paper industry around 1950, were found on some of the pages supposedly dated in the late 1930s and early 1940s. However, if every item analyzed on a document was available at the alleged date of its use, then no conclusion could be drawn. One could say that no evidence was found to suggest that the document was made at a later time than purported and thus imply authenticity; but this may be a weak argument. True, if discontinuance dates for these items are available, if the items are currently found to be rare or nonexistent, and if the alleged date and suspected true date are widely different, then authenticity is more strongly suggested—but not proved. This latter situation is the key feature in the Howard Hughes "Mormon Will" case. As we shall see later, this and other information suggested authenticity to the proponents while the contestants provided additional information to downplay the arguments for authenticity.

Another aspect of document dating is that there are well established traditional methods for doing the examinations; the chemical methods, as mentioned, are recent developments. Among these traditional methods are analysis of paper watermarks, printing characteristics, typewriting, and handwriting. As will be discussed by Mr. John Harris, *it was the handwriting analysis that positively established that the whole case was fraudulent*. As far as the chemical substances subject to chemical analysis, there were only the paper, the writing ink, the ruling ink, the Pitney Bowes stamp pad ink, and the envelope adhesives.

Analysis of the envelope adhesive was done by the FBI; the paper and ruling inks were analyzed by both the FBI and ATF. Neither laboratory was able to detect nonauthenticity. ATF was left with the writing ink and stamp pad ink analysis. ATF has this capability for historical reasons; before 1972 ATF was known as the Alcohol, Tobacco Tax Division (ATD) of the Internal Revenue Service (IRS), and since IRS is the law enforcement agency most interested in detecting backdating fraud, the ATD laboratory saw the need to develop chemical methods for analyzing and dating inks. In 1968, the laboratory began to amass its now unique library. Currently, there are over 5000 different standard ink formulas in the library. It is with these standards that questioned inks are compared.

Ink analysis involves nondestructive and semidestructive examinations. The nondestructive physical examination determines characteristics such as color, ink type (for example, ballpoint or nonballpoint), ultraviolet (UV) fluorescence, infrared (IR) absorbance, and IR luminescence. The semidestructive chemical examinations use multiple thin-layer chromatography (TLC) to obtain a profile of the dye composition of the ink. High pressure liquid chromatography (HPLC) is sometimes used to complement the conventional analysis.

When a questioned ink is matched to a unique standard ink in their chemical and physical characteristics, then the questioned ink is "identified" as that standard ink to the exclusion of all other inks in the library. For each standard ink, the manufacturer provides us with at least five useful pieces of information:

(1) the manufacturer,
(2) the first date of production,
(3) the discontinuance date, if discontinued,
(4) the type of writing instrument(s) that use the ink, and
(5) how rare or common the ink is.

The second and third points address the dating of the ink, the fourth addresses source determination, and the fifth addresses common origin determination.

With this as background, let us now look at the results of the ink analysis of the Howard Hughes "Mormon Will" case.

Results of the Ink Analysis

On 2 May 1977, ATF issued its first report on the ink analysis of the inner envelope and the three-page will. The report and subsequent depositions stated that one ink was used to prepare the three-page will and also the writing on the envelope. This ink matched a Paper Mate® blue ballpoint ink formula[2] which was first made in 1966 and discontinued in 1972. Since the ink was available in 1968, the alleged date of the will, then no conclusion could be drawn regarding the authenticity.

This report came as a pleasant surprise to the proponents of the will. They saw strong suggestions of authenticity in it. The reason is twofold: In the first place, they had a witness testify that back in 1968 Howard Hughes used to buy Paper Mate pens by the dozen and that he used them frequently. Thus, seeing that the evidence involved a Paper Mate pen implied to them an interesting coincidence. In the second place, the discontinuance date of 1972 provided them with another unusual coincidence, particularly since the contestants of the will were alleging that the will was forged in 1976 when it surfaced. Thus, to them this double coincidence carried great weight in their argument for authenticity.

One part of the ATF report that the proponents hardly mentioned was the fact that the red Pitney Bowes stamp impression was not made with the ink Pitney Bowes uses in their meters. It matched a standard ink made by the Sanford Corp. of Chicago which was available in 1968. However, it not being a Pitney Bowes ink obviously tended to support nonauthenticity and this was well emphasized by the contestants of the will.

The contestants also presented arguments to downplay the two critical points used by the proponents to suggest authenticity. First, they had evidence which indicated that Howard Hughes used a variety of pens to write his memos in 1968 and other times. Second, they had their own ink expert analyze the standard Paper Mate inks used by ATF. This expert was from the ink industry. He found that the standard ink which matched the questioned ink on the will could not be differentiated from that found on the market at the time (1976); that is, he could not differentiate Formula 307 (MBSN or PAGO) and the newer Formula 316 as ATF could. The implication here was to indicate that a Paper Mate pen bought at the time could have been used to backdate a document to 1968. This would weaken the proponents' argument that the chances are very low for a currently bought pen to have an ink which was discontinued four years before.

The proponents then had an academic expert look over the results of the contestants' expert. His conclusion was that the TLC plates from which the contestants' expert drew his conclusions about the similarity of the standard inks were overloaded. This would explain why the differences in the inks were not seen. To support this, he reanalyzed the same standards using TLC and proper loading and agreed with the ATF findings that these inks could be distinguished. The pendulum thus made a slight swing back toward authenticity.

Then there occurred an interesting turn of events. On 28 Nov. 1977, ATF issued its report on the ink analysis of the outer envelope and note. On deposition it was brought out that the questioned inks matched each other and had characteristics in common with each of the Paper Mate standards used, that is, Paper Mate 307 (PAGO), 307 (MBSN), and 316, and with no other standard ink. A unique match was not possible in this case because of the chemical treatment this ink received while processing the evidence for fingerprints. Thus, the ink on this additional evidence matched the Paper Mate class of blue ballpoint inks.

It was on this outer envelope that Melvin Dummar's fingerprint was found. This led Dummar to confess that he wrote on this envelope and the note in 1976—and ATF showed it was a

[2]This is Paper Mate formula number 307(PAGO). Another very similar formula was 307(MBSN) made between 1958 and 1966 and between 1972 and 1974. These formulas are identical except for the source of the copper phthalocyanine dye—PAGO by Gillette and MBSN by Dupont. Formula 307 was replaced by Formula 316 in 1974 and was in use in 1977.

Paper Mate pen. Thus, an association was made between the fradulent outer envelope and note, and the inner envelope and will. This now swung the pendulum toward nonauthenticity.

Conclusion

Ink analysis gave no conclusive results in detecting backdating fraud: The will could still contain this fraud or it could be authentic. The analysis simply did not detect the fraud if it were there. To suggest authenticity—based on the fact that the ink on the will was available at the alleged date of the will (1968), the fact that the ink was discontinued (1972) four years before the date the will was suspected to be forged (1976), and the fact that the same type of pen was used on the will as Howard Hughes seemed to have used back when the will was allegedly made—is tempting, but dangerous. This argument, as we have seen, was used by the proponents of the will.

The contestants attempted to weaken these arguments, but their major contribution to the ink problem came when they established an association between the ink on the known fraudulent documents and the ink on the will and its envelope. This suggests nonauthenticity but, as in the previous case, it is dangerous since it is also unproven.

Thus, the inconclusive results about the ink on the "Mormon Will" were combined with other tenuous facts by the opposing attorneys to permit them to stretch these facts to favor their view. Clearly, caution should have been exercised in either case as no proofs could have been made.

Afterthoughts

In closing it may be of interest to reflect on what might have been the case if the Electrostatic Detection Apparatus (ESDA) or the knowledge of the relative aging of inks was around back in 1977. ESDA might have been able to detect indentations on the will from writing done on paper which was once on top of the will—if this had been the case. These indentations could have given strong indications of authenticity or nonauthenticity, if not proof. Since the will appeared to have had liquids spilled on it, the indented writing, if any, might have been destroyed.

The current work on the relative aging of ink, begun at the ATF laboratory and presently being continued at the FBI Forensic Science Research Group, may have had applications in this case. Essentially the idea here is that, as ball pen ink dries or sets, the extraction efficiency decreases. Measuring relative extraction efficiencies essentially measures relative aging. The ideal situation for these determinations is when the inks being compared are of the same formula and are of the same paper. If the inks are on separate sheets of a similar type of paper, then knowledge of their storage history is critical. Suppose, for example, that in the Howard Hughes case there had been documents known to have been written in 1968 with the same Paper Mate ink formula [307 (PAGO)] and on the same type of paper (yellow pad) as the will. Suppose, further, that these documents had been exposed to less age-inducing conditions than the strongly age-accelerating conditions (apparent heat) of the will. Then the comparison of the inks could only have valid meaning if the questioned ink appeared newer than the known ink—indicating nonauthenticity.

Unfortunately, since the will and its envelope were subsequently chemically treated for fingerprint development, they have been essentially destroyed for further ink and ESDA analysis.

Address requests for reprints or additional information to
Antonio A. Cantu, Ph.D.
Forensic Science Research Group
Laboratory Division
FBI Academy
Quantico, VA 22135