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In the field of Forensic Chemistry, advances in technology have made it possible to date ink within six months or less until it is approximately 3 to 4 years old. The dating of ink is done in three primary forms:

The first form is chemical date tagging. Approximately one-third of all inks manufactured in North America from the late 1960's until 1994 contained a compound unique for the year of manufacture. An ink chemist can determine which of these chemical date tags, if any, are present in an ink and then consult a reference database to determine the year of production.

The second form of ink dating is by the "first date of production." The earliest possible production date can be established by determining the type and manufacturer of the ink. This is primarily for older questioned documents, such as the "Hitler Diaries".

The third form of ink dating is by the dryness of the ink. Once ink is placed on paper it takes three to four years for it to dry completely. If an ink is completely dry, it has been on the paper for more than three to four years. If it is partially dry, the age of the document often can be determined within six months. The newer the ink, the more accurately the date can be determined.

There are three methods to determine the "dryness" of the ink. They are known as rate of extraction, percent extraction, and dye ratio (the ratios among the dye components of the ink). These tests measure how fast and how easily questioned ink can be chemically removed from paper. The ink chemist then compares these rates and ratios to those of known dated samples from an extensive library of known inks of various ages.

These chemical tests, which will determine when an ink was placed on a document, have been particularly useful in assessing the timing of entries in medical records, billing documents, wills, corporate minute books, individual notes and diaries.

Has a record been tampered with?

Many cases that come into the ink laboratory are related to suspected alterations or fabrications of records and journal entries. Some signs to look for that may indicate "record tampering" are:

- crowded entries;
- entries compressed around other entries;

- entries made in the margins or along the bottom of a page;
- uniformity of handwriting;
- relative length of questioned entries compared to other entries in the chart;
- unnatural spacing between entries;
- entries that shift the blame onto a patient or client, such as “..Pt. refused” or “non-compliant”;
- differences between what the case narrative indicates and what the records indicate; and
- strange notations such as “complained of NO chest pains”.

The preferred practice is to have the document in the ink chemistry laboratory for the ink dating examination; however, if samples are needed and the document cannot be shipped, Speckin Forensic Laboratories makes these options available to the client:

A. A chemist can travel to the documents to take the samples. While this method can become expensive, the advantages are that the chain of evidence is constant and that the chemist can examine the document in its entirety to look for heating, contamination, and other indicators of attempts to simulate aging of the ink.

B. An evidence technician from the laboratory can travel to take the samples. This is a person who is trained in ink dating and who can examine the document for the same items listed above, but at a lower cost.

C. A document examiner from the area where the document is located can take the samples with equipment supplied by the ink laboratory. This person would be needed to testify as to the chain of custody.

However the samples are to be obtained, the ink chemist needs some background information before any samples are taken. This information would include:

1. Copies of the document in question.
2. Identification of the colors and types of inks (ballpoint or non-ballpoint).
3. List of other documents that were kept with this document at or near the same time.
4. In some cases, results of examination with an infrared image converter to determine whether some inks have the potential to be the same as the questioned ink according to their infrared reflection and absorption properties.
5. The type of paper used for the questioned document and which documents in the same me are of similar type paper.
6. Whether any text is written on the reverse side of the questioned document or entry.

Based on this information the ink chemist will determine the number of “plugs” (samples), the manner in which the plugs should be taken, and the location from which the plugs should be taken. The location is always selected with an eye towards causing the least disturbance to any handwriting or other document evidence that may be present. The vials containing the plugs will be labeled and returned to the laboratory along with a worksheet that details the contents of each vial. The number of plugs, the document and the location on the document, the color of the ink, and the type of ink will all be listed on the worksheet by the person taking the samples.

The length of time required for the actual analysis ranges and depends primarily on the backlog of the laboratory system at the time of submission. Typically the turn around time is ten to fifteen working days, but the work can be done as fast as one to two days if there is a dropdead deadline.

Erich J. Speckin is a partner at Speckin Forensic Laboratories in Okemos, Michigan. He has a degree in Chemistry from Michigan State University and deals primarily with the dating of

documents and the dating of inks. Approximately 600 cases per run are done in Speckin Forensic Laboratories, with much of the work dealing with some form of document dating or ink dating. The firm is a full-service forensic firm that deals with all aspects of forensics including DNA, fingerprints, document examination, computer data recovery, and audio tape analysis. The laboratory also houses a VSC 2000, which can be rented for use by any document examiner if requested.