

B O R T O L O T D A Y B R E A K

C O R P O R A T I O N

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SAMPLES FOR TL AUTHENTICITY DATING

Before taking a sample for TL authenticity dating, please call Daybreak to discuss applicability of the technique to an object, and to review any parts of the sampling procedure that may be unclear. This is especially necessary if there has been any exposure of the object to radiation or to heat in excess of 200C.

Below is a short, commonsense guide to taking samples when a representative of Daybreak is not available to do so.

1. DOCUMENTATION

Each sample for TL dating actually consists of two parts: the actual physical sample, and proper documentation. The documentation is nearly as important as the sample itself, as it connects the test report to the object sampled. Because of this, we have developed the following requirements over many years of experience. They are all common sense, and make it possible for us to state in the report that the object tested is the actual object in question. We must ensure this, as collectors and dealers are (unfortunately, but justifiably) a suspicious lot, and we must do everything possible to avoid the slightest suggestion that a substitution has taken place.

The easiest way to document the object is to use our Sample Submission form, which we would be happy to mail or fax to you. In addition to this, we require two photographs that positively identify the object. Polaroid snapshots are adequate, as long as they clearly depict the object. They should be of the same view. One we keep in our files, the other is annotated with the test result and returned with the report. The person taking the sample should sign and date both photos. If that person has any financial interest in the object or is an employee or relative of the owner or his agent, then the sample-taking must be witnessed, and both the form and photos must be signed by the witnesses. Finally, the sample, form, and photos should be sealed into an envelope, signed across the flap by a witness or the sample taker (if a disinterested party), and mailed to Daybreak without being left in the possession of an interested party. These requirements may seem to be overkill, but without them, we cannot have reasonable assurance that the sample is from the object concerned. If these conditions are not met, we can state on the test report only that "the sample is said to be from the object shown in the photograph". If the sample-taker is a representative of Daybreak, who will be a disinterested party, most of this will be automatically taken care of.

2. SAMPLING BY DRILLING

There are three important considerations to bear in mind when taking the sample. First, the sample area must be free of restoration. If it is not clear what portions are the original, then more than one sample may be needed. Secondly, there must be no contamination with dirt or any other unfired material. Since dirt, not having been fired, looks very old, only a minute quantity mixed into the sample will be sufficient to invalidate the test. It usually is quite evident from the measurements when this has occurred. Lastly, the sampling must be done under low light conditions, avoiding any exposure of the powdered sample to sunlight or fluorescent lights. This is because the UV component can "optically bleach" the TL, causing a reduction in the signal (and thus the age). This effect is used to good

advantage in geological dating, but obviously must be avoided here. Subdued incandescent (bulb) light should be used. A small, low voltage desk lamp makes it easy to control the amount of light hitting the sample, keeping the room lights off. Keep the light level just high enough to work, and keep the lamp from shining directly on the sample powder as you drill. The sample is then to be put into a clean container (see below), and covered with an opaque wrapping.

The type of drill used is not too important. Any clean, sharp drill bit (high speed steel twist drill or carbide spade bit) should suffice. We prefer carbide dental burrs (about 2 mm tip diameter) in a small palm-size hobby drill for the control this combination offers. A Foredom-type flexible shaft motor is another fine choice. Dremel AC operated tools have a fan at the chuck end that will blow the sample away, unless a flexible shaft is used. Contrary to what you may think, it is best to run the drill at very high speed, 10-20,000 rpm. At low speeds, considerable pressure is exerted on the pottery grains, and they are ground up. This leads to a troublesome spurious signal that interferes with the TL measurements. At high speed, the clay grains are flicked off with little damage. This is really only important for relatively hard ceramics. NOTE: never use diamond tools, as diamond is highly thermoluminescent, and contamination is likely, making the sample useless.

Blow the object off to remove any loose dirt and dust. In some cases, where no amount of gentle cleaning removes all the loose dirt, you should wrap the object in a cloth or paper towels, leaving only the sample area exposed. To take the sample, first examine for restoration, and then having picked an inconspicuous, original spot, clean off the sample area with the drill and discard the outer millimeter of surface. Now, lower the lights and drill out the sample, collecting it on a clean sheet of white paper (the back of the sample submission form will do) that is out of direct light. We need about 100 mg of sample, equivalent to the powder from a hole the size of a very small pea, or about one-third the volume of a pencil-end eraser. Carefully examine the sample for evidence of any loose dirt that may have fallen onto the paper, and try again if any is found. Once a satisfactory sample is obtained, put it into a sample vial and label it clearly. This may be virtually any small clean container of glass or solvent resistant plastic. Gelatin capsules are not acceptable in the summer when the humidity causes the sample to stick, and glassine envelopes are disastrous. We use the 1.5 ml polypropylene microcentrifuge vials with the caps conveniently on a strap, but glass sample bottles or metal pill boxes (put tape around the joint to prevent sample loss!) are fine. Another method may be more convenient for you: take a piece of aluminum foil the size of a piece of typing paper, fold it in half and flatten to make a double thickness, and dump the sample into the center. Fold it over the sample and then fold all the edges over to trap the sample. Flatten this little packet, and seal with a tab of tape. This can then go into an envelope with the sample submission form with no additional packing.

3. FRAGMENT SAMPLE

For relatively recent objects, and in cases where it is difficult to obtain a drilled sample free from contamination, a fragment at least the size of a pea should be sent. We can clean the surface ourselves.

4. PLEASE CALL FOR ASSISTANCE IF YOU HAVE ANY QUESTIONS

A quick phone call to clear up any questions, and to ensure a good sample, may save time and aggravation later. Good luck!



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