10.4 Building Materials Analysis

10.4.1 Introduction

Note for White Powder Analysis submitted to the laboratory that was previously suspected of containing Biological Warfare agents, *please also see Trace Procedure 10.20 Powder Analysis* (Example - White Powder) and *Safety Manual SM7 - Reception of Evidence Suspected of Containing Biological Warfare Agent*

Building materials may include roofing materials, insulation, plaster, plasterboard, concrete, mortar, brick, glass, paint, wood, and any other material used in building construction. Specimens of these materials taken from the point-of-entry can be compared with small particles of material found on the clothes, tools, or in the vehicle belonging to the suspect.

Due to bulk manufacturing it is not possible to state that a certain building material came from a specific building to the exclusion of all others; however, the presence of a few particles of a single building material may have definite probative value when taken within context of other evidence gathered by the investigating officer.

(Source: FBI Law Enforcement Bulletin, February 1973.)

10.4.2 Safety Considerations

Standard Laboratory Precautions

10.4.3 Preparations

Obtain the necessary known samples if a comparison is going to be made. Use of in-house building material collections, if available or applicable, is acceptable.

10.4.4 Minimum Standards & Controls

Microscopic comparison to a submitted known or in-house reference sample.

It is ideal to have all building materials possibly involved submitted by the agency for comparison purposes.

10.4.5 Instrumentation

Standard Laboratory Instrumentation.

10.4.6 Procedure or Analysis

Upon receiving evidence for building material examinations, the following steps should be taken:

10.4.6.1

Follow general evidence handling procedures.

10.4.6.2

Visual examination of the known(s) and questioned exhibit(s).

10.4.6.3

Stereoscopic examination of tools, knowns, and questioned debris or particles.

10.4.6.4

If other evidence types are observed during examintion (such as tar, asphalt, metal fragments, glass or paint, they should be collected (when appropriate) and turned over to a trace chemistry examiner for analysis along with any the appropriate standards from the scene.

10.4.6.5

The question and known samples (except wood), must be compared using their physical, optical, and chemical properties.

10.4.6.5.1

Physical properties are compared using visual and stereoscopic methods.

10.4.6.5.2

Optical properties are compared using high-power microscopes, i.e., polarized light and phase contrast microscopes.

10.4.6.5.3

Chemical properties can be compared by (1) microchemical tests or TLC with confirmation by instrumental methods, or (2) instrumental methods alone. Some available instrumental methods are u-XRF, SEM/EDS, or FTIR.

Care should be taken in identifying by chemical name without an identification being made by the appropriate instrumental method.

10.4.6.5.4

The examiner should keep in mind that the questioned samples (debris) may be from activities or crimes previously committed.

10.4.6.6

A building material reference collection should be kept at each laboratory performing this type of examination.

10.4.7 Report Wording

If the examiner is to state that the questioned sample could have originated from the source as the standard sample, then both samples must have the same physical, optical, and chemical properties without any unexplained differences.

If the questioned sample is of insufficient size for instrumental methods but is consistent with the known in physical and optical properties, then a weaker conclusion has to be reached. For example, "The questioned and known samples displayed the same physical and optical properties; however, no further testing was performed due to insufficient questioned sample size."

10.4.8 References

Brady, George S.; Clanser, H. R. Materials Handbook, 12th ed.; McGraw-Hill: New York, 1986.

United States Gypsum Gypsum Construction Handbook, U. S. Gypsum: Chicago, IL, 1982.