



Contact: Public Affairs Division

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## **FIRE RESEARCH LABORATORY**

The Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) Fire Research Laboratory (FRL), built in 2003, is the world's only large-scale research laboratory that is dedicated to fire scene investigations. FRL scientists utilize its unique structure and sophisticated instrumentation to investigate fire scene phenomena, conduct forensic fire science and engineering tests, and analyze fire growth and dynamics questions.

The FRL is accredited by the American Society of Crime Lab Directors (ASCLD) under ISO 17025 (International Organization of Standardization) to conduct investigations related to fire scene reconstructions. Among the types of studies used to perform this function are flashover studies, electrical fire cause evaluation and validation of fire pattern analysis indicators. It also participates in important research regarding such topics as the impact of accelerants on fire growth and spread, ignition studies, and performance of electrical conductors under exposure to fire.

FRL scientists specialize in fire protection; mechanical, structural, chemical, electrical and materials engineering; physics; and metallurgy. During the course of their studies, scientists work with ATF certified fire investigators, prosecutors and the fire investigation community to conduct research and provide case support, training and education regarding fire investigation and analysis.

The FRL provides a range of capabilities from bench-scale fire measurement instruments to a 16,900 square foot burn room that can accommodate items as large as a three-story structure. FRL staff are able to test industrial electrical components, determine their potential role in the cause of fires, analyze timelines, assess witness statements and correlate fire scene damage to fuel loads and ventilation that are present at the time of a fire.

The FRL facility includes state-of-the-art hood and exhaust systems, data acquisition systems and instrumentation that allow researchers to measure data such as the heat release rate, burning rate, heat flux and temperature of burning materials. Its reconfigurable small-scale test areas and bench-scale test equipment allow investigators to predict large-scale fire behavior and perform computer fire modeling for use during fire scene reconstruction and test validation. In addition, the following support features are provided:

- Electrical testing laboratory to perform forensic examinations and facilitate testing and failure analysis of residential and commercial electrical products, components, equipment and wiring.
- State-of-the-art control room; fire safety suppression system; and on-site air and water pollution treatment facilities.
- Classroom and training areas for fire investigation and education programs.
- Support facilities such as shop areas, instrumentation and conditioning rooms and construction/test materials and evidence storage.
- Dedicated space for visiting professors, guest researchers or graduate students who are conducting fire investigation-related research.
- Environmental systems that process and cleanse exhaust air prior to release into the atmosphere.
- Water treatment facilities that eliminate the impact of runoff into the community by collecting and recycling water that is used to suppress test fires.
- Data collection for up to 2,300 instruments in each reconstruction experiment and a sixteen (16) channel digital video recording system that includes high definition video.

The FRL provides a controlled environment in which to test fire investigation theories, reconstruct and test key aspects of fire scenarios, and evaluate the potential cause of fires that fire investigators encounter in the field. As the premiere fire science research facility, the FRL:

- Serves as a national and international model for forensic fire research and for the development of research protocols.
- Conducts scientific research that validates fire scene indicators and improves fire scene reconstruction and fire evidence analysis.
- Supports fire investigations and resolutions of fire-related crimes.
- Develops improved investigative and prosecutorial procedures and fire investigation expertise, and uses validated methods that integrate the assets of ATF and its partners.
- Serves as a central repository for fire investigative research data.

- Publishes findings in scientific and investigative scholarly literature and provides training and education programs.
- Serves as an internationally recognized research and education center for fire cause investigations and fire scene reconstructions.

The FRL works in close cooperation with the National Institute of Justice to support joint research initiatives that are designed to improve fire scene investigation, reconstruction and analysis. FRL personnel attend comprehensive fire, safety and emergency response training programs at the Maryland Fire and Rescue Institute (MFRI) that are similar to those required of industrial fire brigades and emergency response teams. The MFRI program is compliant with occupational safety and health regulations and with National Fire Protection Association standards.

The FRL's technical planning and development came about through a partnership with the University of Maryland's Department of Fire Protection Engineering, the Building and Fire Research Laboratory, National Institute of Standards and Technology and the Factory Mutual Research Corporation. The facility works in cooperation with the International Association of Arson Investigators, the U.S. Fire Administration, the National Fire Academy and the National Fire Protection Association to develop enhanced investigative, prosecutorial and training methodologies.

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