

In the United States, Crime Scene Investigation (CSI) and forensic science standards, particularly for evidence collection and imaging equipment, are guided by a combination of federal and state regulations, professional guidelines, and accrediting bodies. There is no single federal department that universally oversees all CSI activities, as responsibilities are distributed across various agencies depending on jurisdiction and case type. Below, I outline the key standards, regulations, and responsible entities for crime scene investigation and evidence collection, focusing on the use of imaging equipment.

Departments Responsible for Crime Scene Investigation in the U.S.

Crime scene investigation is primarily handled by **local, state, and federal law enforcement agencies**, depending on the nature and scope of the crime. Key entities include:

1. Local Law Enforcement Agencies:

- Most crime scene investigations are conducted by local police departments or sheriff's offices, which have dedicated CSI units. For example, the Baltimore Police Department's Crime Scene Sciences Section provides inspection services, evidence collection, photography, and documentation.
- These units are responsible for processing crime scenes, collecting physical evidence (e.g., fingerprints, DNA, blood), and maintaining the chain of custody.

2. State Agencies:

- State crime laboratories, such as the California Department of Justice Bureau of Forensic Services or the Wisconsin State Crime Laboratories, provide forensic support, including evidence analysis and guidelines for collection.
- State agencies often set standards for evidence handling and may require accreditation for forensic labs.

3. Federal Agencies:

- The **Federal Bureau of Investigation (FBI)** oversees investigations for federal crimes (e.g., terrorism, organized crime) and provides forensic support through its Laboratory Division in Quantico, Virginia. The FBI's Evidence Response Teams (ERTs) process crime scenes for federal cases.
- The **Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF)** may handle crime scenes involving firearms or explosives.
- The **National Institute of Justice (NIJ)**, under the U.S. Department of Justice, funds research and publishes guidelines for crime scene investigation, including evidence collection and documentation.

4. Coroners and Medical Examiners:

- In cases involving death, forensic pathologists or medical examiners (often at the county or state level) are responsible for examining bodies and reconstructing crime scenes. They may collaborate with law enforcement to document and collect evidence.

No single federal department has exclusive authority over CSI norms. Instead, standards are developed collaboratively by professional organizations, accrediting bodies, and government agencies.

Forensic Standards for Evidence Collection

Forensic evidence collection, including the use of imaging equipment, follows strict protocols to ensure evidence is admissible in court. Key standards and guidelines include:

1. Chain of Custody:

- A critical aspect of evidence collection is maintaining the chain of custody to ensure evidence integrity. This involves documenting who collected, handled, and stored evidence, along with dates, times, and locations.
- Evidence must be collected, preserved, marked, and packaged to prevent contamination or loss. For example, items like blood or hair are placed in sterile containers or envelopes, and all packaging is labeled with case numbers and investigator initials.

2. National Institute of Justice (NIJ) Guidelines:

- The NIJ's *Crime Scene Investigation: A Guide for Law Enforcement* outlines best practices for documenting crime scenes, collecting evidence, and maintaining chain of custody. It emphasizes photography, measurements, and detailed note-taking.
- Evidence types include biological (e.g., blood, DNA), latent prints (e.g., fingerprints), footwear/tire tracks, and trace evidence (e.g., fibers, glass).

3. Organization of Scientific Area Committees (OSAC) for Forensic Science:

- OSAC, coordinated by the National Institute of Standards and Technology (NIST), develops standards for forensic disciplines, including crime scene investigation. The *Crime Scene Investigation & Reconstruction Subcommittee* has published standards such as:
 - *Standard for the Documentation of Scenes by Crime Scene Investigators:* Emphasizes detailed documentation using photography, sketches, and notes.
 - *Standard Practice for the Collection of Primer Gunshot Residue Particles:* Specifies methods for collecting trace evidence.

- OSAC's standards are not legally binding but are widely adopted by forensic professionals to ensure consistency and reliability.

4. **Scientific Working Group on Imaging Technology (SWGIT):**

- SWGIT provides *Recommended Guidelines for Developing Standard Operating Procedures* for forensic imaging. These guidelines cover photography and videography at crime scenes, ensuring images are accurate, reproducible, and admissible in court.
- Key recommendations include using high-resolution cameras, documenting overall, medium, and close-up views, and maintaining a log of technical and descriptive information for each photograph.

5. **Accreditation Standards:**

- Forensic laboratories and CSI units may be accredited by organizations like the **American Society of Crime Laboratory Directors Laboratory Accreditation Board (ASCLD/LAB)** or the **ANSI-ASQ National Accreditation Board (ANAB)**. These bodies enforce quality standards for facilities, equipment, and analyst qualifications.
- For example, the Baltimore Police Department's Crime Scene Unit is accredited to ISO/IEC 17020 standards for quality assurance.

Standards for Imaging Equipment in Evidence Collection

Imaging equipment, such as cameras and 3D laser scanners, is critical for documenting crime scenes. Specific standards and practices for imaging include:

1. **Photography Standards:**

- Crime scene photography must capture the scene's general appearance, evidence locations, and close-up details. A log is maintained with technical details (e.g., camera settings, angles) and descriptive information.
- Equipment includes 35mm or high-resolution digital cameras, evidence measuring scales, and flags for marking evidence in photographs.
- The *Scientific Working Group on Imaging Technology (SWGIT)* provides guidelines for photographing footwear and tire impressions, ensuring images are clear and measurable.
- Photos are stored in secure digital repositories (e.g., Evidence.com used by the Baltimore Police Department) to maintain integrity.

2. 3D Imaging and Laser Scanning:

- Advanced technologies like 3D laser scanners (e.g., LEICA BLK360) are increasingly used to create high-resolution 3D digital models of crime scenes. These allow for accurate measurements, reproducibility, and manipulation of images using software.
- Benefits of 3D imaging include portability, minimal training requirements, and the ability to capture data unaffected by ambient lighting. Applications include wound measurement, bullet trajectory analysis, and bloodstain pattern analysis.
- Close-range digital photogrammetry is used to measure 3D coordinates of objects, creating precise composite images from multiple angles.

3. Equipment Requirements:

- The NIJ's *Crime Scene Investigation: Guides for Law Enforcement* lists essential imaging equipment, including:
 - Forensic light sources (e.g., alternate light source, UV lamp) for detecting trace evidence.
 - Measurement scales and marker stickers for documenting evidence size and location.
 - High-intensity lights and flashlights for proper illumination.
- Cameras must produce clear, high-quality images, and investigators use tools like acetate sheet protectors and lift tape for preserving latent prints captured in photographs.

4. Best Practices for Imaging:

- Photographs must include overall, medium, and close-up views to provide a comprehensive record of the scene.
- Images are taken before evidence is disturbed to preserve the scene's original state.
- Investigators avoid altering evidence during photography (e.g., using gloves to prevent contamination).

- Digital images are uploaded to secure systems, and metadata (e.g., date, time, camera settings) is preserved for court admissibility.

Why Are Standards Necessary?

Standards for evidence collection and imaging are critical for several reasons:

- **Admissibility in Court:** Evidence must be collected and documented following strict protocols to be admissible. Improper handling or lack of documentation can lead to evidence being deemed inadmissible.
- **Accuracy and Reliability:** Standardized procedures ensure evidence is collected and preserved accurately, reducing the risk of contamination or misinterpretation.
- **Chain of Custody:** Proper documentation and packaging maintain the integrity of evidence, ensuring it can be traced from collection to courtroom.
- **Public Trust and Justice:** Consistent standards prevent errors that could lead to wrongful convictions or acquittals, addressing concerns raised in investigations like the FRONTLINE report on forensic science flaws.

Conclusion

In the U.S., crime scene investigation is conducted by local, state, and federal agencies, with no single department overseeing all activities. Standards for evidence collection and imaging are set by organizations like NIJ, OSAC, and SWGIT, emphasizing documentation, chain of custody, and quality assurance. Imaging equipment, including cameras and 3D laser scanners, must adhere to guidelines ensuring high-resolution, reproducible, and admissible images. These standards ensure evidence integrity, support accurate investigations, and uphold justice in the legal system.

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在美国，犯罪现场调查（CSI）和取证科学，尤其是证据收集和成像设备的使用，遵循一系列联邦、州和专业组织的规范。没有单一的联邦部门统一管理所有 CSI 活动，职责根据案件类型和管辖区分配在不同机构之间。以下是关于犯罪现场调查、证据收集和成像设备规范的概述，以及负责机构和规范的必要性。

美国负责犯罪现场调查的部门

犯罪现场调查主要由地方、州和联邦执法机构负责，具体包括：

1. 地方执法机构：

- 大多数犯罪现场由地方警察局或治安官办公室的 CSI 单位处理。例如，巴尔的摩警察局的犯罪现场科学部门负责现场检查、证据收集、摄影和记录。
- 这些单位负责处理犯罪现场，收集物证（如指纹、DNA、血液）并维护证据链。

2. 州级机构：

- 州犯罪实验室（如加州司法部法医服务局或威斯康星州犯罪实验室）提供取证支持，包括证据分析和收集指导。
- 州级机构通常制定证据处理标准，并可能要求实验室获得认证。

3. 联邦机构：

- ****联邦调查局（FBI）****负责联邦案件（如恐怖主义、有组织犯罪）的调查，通过其位于弗吉尼亚州匡蒂科的实验室部门提供取证支持。FBI 的证据响应小组（ERT）处理联邦案件的犯罪现场。
- ****酒精、烟草、火器和爆炸物管理局（ATF）****处理涉及枪支或爆炸物的案件。
- ****国家司法研究所（NIJ）****隶属于司法部，资助研究并发布犯罪现场调查指南，包括证据收集和记录。

4. 验尸官和法医：

- 涉及死亡案件时，法医病理学家或验尸官（通常在县或州级）负责检查尸体和重建犯罪现场，与执法部门合作记录和收集证据。

没有单一联邦部门全面负责 CSI 规范，标准由专业组织、认证机构和政府部门协作制定。

证据收集的取证规范

取证证据收集，包括使用成像设备，遵循严格的协议以确保证据在法庭上可被接受。主要规范包括：

1. 证据链（Chain of Custody）：

- 证据链是确保证据完整性的关键，需记录证据的收集、处理和存储人员、时间及地点。
- 证据需妥善收集、保存、标记和包装，以防污染或丢失。例如，血液或毛发需放入无菌容器或信封，包装上需标明案件编号和调查人员姓名。

2. 国家司法研究所（NIJ）指南：

- NIJ 的《犯罪现场调查：执法指南》概述了记录犯罪现场、收集证据和维护证据链的最佳实践，强调摄影、测量和详细记录。

- 证据类型包括生物证据（如血液、DNA）、潜指纹、鞋印/轮胎痕迹和微量证据（如纤维、玻璃）。

3. 科学领域委员会组织（OSAC）：

- OSAC 由国家标准与技术研究院（NIST）协调，制定取证标准，包括犯罪现场调查。其《犯罪现场调查与重建分委员会》发布标准，如：
 - 《犯罪现场调查员现场记录标准》：强调使用摄影、草图和笔记进行详细记录。
 - 《枪弹残留物收集标准实践》：规定微量证据的收集方法。
- OSAC 标准非法律强制，但被广泛采纳以确保一致性和可靠性。

4. 成像技术科学工作组（SWGIT）：

- SWGIT 提供《制定标准操作程序的推荐指南》，涵盖犯罪现场摄影和录像，确保图像准确、可重现且法庭可接受。
- 建议包括使用高分辨率相机，记录整体、中景和特写视图，并为每张照片维护技术与描述信息日志。

5. 认证标准：

- 取证实验室和 CSI 单位可能由美国犯罪实验室主任协会实验室认证委员会（ASCLD/LAB）或 ANSI-ASQ 国家认证委员会（ANAB）认证。这些机构对设施、设备和分析人员资格设定质量标准。
- 例如，巴尔的摩警察局的犯罪现场单位获得 ISO/IEC 17020 标准认证。

成像设备在证据收集中的规范

成像设备（如相机和 3D 激光扫描仪）对记录犯罪现场至关重要。具体规范包括：

1. 摄影规范：

- 犯罪现场摄影需捕捉现场全貌、证据位置和细节，需维护摄影日志，记录技术细节（如相机设置、角度）和描述信息。
- 设备包括 35 毫米或高分辨率数码相机、证据测量尺和标记旗，用于在照片中标记证据。
- SWGIT 提供鞋印和轮胎痕迹摄影指南，确保图像清晰可测量。
- 照片存储在安全数字存储库（如巴尔的摩警察局使用的 Evidence.com）中以维护完整性。

2. 3D 成像和激光扫描：

- 3D 激光扫描仪（如 LEICA BLK360）用于创建高分辨率 3D 数字模型，允许精确测量、可重现性和图像操作。
- 3D 成像优点包括便携性、培训要求低、不受环境光影响，应用于伤口测量、弹道分析和血迹模式分析。

- 近距离数字摄影测量用于测量物体的 3D 坐标，从多角度生成精确复合图像。

3. 设备要求：

- NIJ 指南列出必要成像设备，包括：
 - 取证光源（如紫外灯）用于检测微量证据。
 - 测量尺和标记贴纸用于记录证据尺寸和位置。
 - 高强度灯和闪光灯用于适当照明。
- 相机需生成清晰、高质量图像，调查人员使用透明保护膜和提取胶带保存潜指纹照片。

4. 成像最佳实践：

- 摄影需包括整体、中景和特写视图，全面记录现场。
- 在证据未被扰动前拍摄，以保留现场原始状态。
- 调查人员避免在摄影时更改证据（例如使用手套防止污染）。
- 数字图像上传至安全系统，保留元数据（如日期、时间、相机设置）以确保法庭可接受性。

为何需要规范？

证据收集和成像的规范至关重要，原因如下：

- **法庭可接受性：**证据需按严格协议收集和记录以被法庭接受，处理不当或记录不足可能导致证据不可用。
- **准确性和可靠性：**标准化程序确保证据准确收集和保存，降低污染或误解风险。
- **证据链：**妥善记录和包装维护证据完整性，确保从收集到法庭的全程可追溯。
- **公众信任与司法公正：**一致的规范防止错误，避免冤案或错判，回应类似 FRONTLINE 报告中对取证科学缺陷的担忧。

结论

在美国，犯罪现场调查由地方、州和联邦机构执行，无单一部门全面负责。证据收集和成像规范由 NIJ、OSAC 和 SWGIT 等组织制定，强调记录、证据链和质量保证。成像设备（如相机和 3D 激光扫描仪）需遵循确保高分辨率、可重现和法庭可接受的指南。这些规范确保证据完整性，支持准确调查，维护司法公正。