

3 Facilities

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Crime Laboratory security and facility requirements are described in the quality manual. The Forensic Biology-DNA Section floor plan can be found in the "Supporting Documents" section of the Crime Laboratory Forensic Biology intranet site. In addition to procedures and policies in the quality manual, the following policies apply to the DNA section.

3.1 Work Areas

The DNA section will have designated space for the following activities. These activities must occur only in these designated areas:

- **DNA extraction** - DNA extraction, purification, and concentration; microscopy may also be performed in this area.
- **PCR setup** - setup of real-time PCR quantification and PCR amplification reactions. A laminar flow hood or PCR setup hood dedicated to amplification setup is recommended **when manual set-ups are performed.**
- **Amplified DNA product** - generation, analysis, and storage of amplified DNA product.

The extraction of known samples will be performed at a separate time or location from the extraction of evidentiary samples to prevent known to unknown sample contamination. Decontamination of work areas **shall** be performed between set-up of the evidentiary samples and set-up of the known samples.

The DNA extraction area and PCR setup area will be separate from each other. This is accomplished by maintaining separate physical spaces for each task or by conducting these tasks at separate times. If conducted in the same space at separate times, the space will be decontaminated between tasks.

The amplified DNA product area will be physically separate from all other areas. Doorway(s) to the amplified product area will have a door that is to remain closed at all times, **except for passage.** Once amplified, no samples will leave the amplified DNA product area unless securely packaged. Equipment, reagents, and supplies in the amplified product area are dedicated and will not be removed unless properly decontaminated through treatment with UV or thorough wiping with a decontaminant.

3.2 Contamination

Samples can become contaminated with DNA from the environment, from other samples during sample preparation, or from amplified DNA product from a previous amplification. Reagent blanks, negative **quantification and** amplification blanks, and possible substrate controls are used to detect contamination.

Contamination will be suspected and investigated when a mixture is obtained in samples expected to be of one source, or when a reagent blank or negative control yields peaks above the minimum analysis threshold. If possible peaks below the minimum threshold are observed in reagent blank or negative control, the Technical Leader will determine if the event should be

further investigated. In addition, contamination may be suspected and investigated under other circumstances at the discretion of the examiner, Technical Leader, or supervisor.

Prevention and decontamination

The following policies are designed to prevent contamination of DNA samples:

1. To minimize the potential for contamination from staff and/or visitors, unnecessary traffic into each of the work areas should be avoided.
2. Use 10% bleach or DNAway as a decontaminant. Other commercially available decontaminants may be used if they are shown to completely inactivate DNA for the purposes of amplification. UV treatment and/or autoclaving is also acceptable for decontamination. **Selection of either bleach or DNAway should take into consideration the potential caustic effects of the surface being decontaminated. For example, DNAway should be used to clean rotors of centrifuges and surfaces of the Tecan robots. Bleach is appropriate for decontaminating writing utensils and bench tops. Ethanol should be used to clean the EZ1 instruments and Tecans.**
3. In general, clean glassware after each use wearing gloves, and using an appropriate soap, e.g., Liquinox or Alconox, and water. Rinse with deionized or distilled water and allow to air-dry inverted. DNA reagent bottles require sterilization after cleaning; autoclave or rinse with sterile water prior to use. For glassware in the amplified product area, rinse thoroughly with water after each use, with a final rinse of distilled or deionized water, and invert to air-dry.
4. Wear disposable gloves **and face masks** during all testing (**face masks are optional in post-amplification**). Change gloves frequently and whenever gloves may have become contaminated. Discard gloves when leaving a work area, **except when transporting samples or reagents**. Centrifuge all liquid to the bottom of closed microcentrifuge tubes before opening. A de-capper or a clean kimwipe may be used for opening microcentrifuge tubes. Use sterile, disposable pipet tips and microcentrifuge tubes. Use aerosol-resistant pipet tips while working with any sample that may be subsequently amplified. Change pipet tips between samples. **Set up reagents and tools in work space in such a way that used tips do not cross over or near stock reagents or clean tubes/wells.**
5. In the DNA extraction area, clean work surfaces thoroughly with decontaminant at least at the beginning and the end of each DNA extraction session. Limit talking during sample handling.
6. In the PCR setup area, add DNA template last to the PCR setup tubes to minimize inadvertent transfer between setup tubes and **stock reagents**. Limit talking during sample handling. It is recommended that the lab irradiate work surfaces and equipment in the PCR setup area with ultraviolet germicidal lamps, for 15-20 minutes. Surfaces not irradiated will be treated with decontaminant. Timers for UV lights are recommended; if operated manually, wear UV protective glasses when turning UV lights on and off.
7. In the amplified DNA product area, wear a dedicated, disposable lab coat when handling amplified samples. Do not wear the lab coat **or gloves** outside the amplified DNA product area. These lab coats will be disposed of when necessary. Clean work surfaces thoroughly with decontaminant after use.
8. Each Biology section examiner's DNA profile will be determined for all systems currently in use. The DNA profile for other staff and visitors may also be required, in order to

ensure the detection of contamination. All DNA profiles should be stored by the laboratory.

Detecting and Responding to Possible Contamination Events

Any suspected contamination incident must be immediately brought to the attention of the Technical Leader. The Technical Leader will define and direct the investigation and corrective action for the event. **Qualifying** actions will be documented via the incident reports/correction actions policy detailed in the quality manual.

Investigation and corrective action should be guided by the nature of the specific event, and may include the following:

1. Compare the unknown profile to the staff/visitors database.
2. Compare the unknown profile to profiles from samples worked with the contaminated sample.
3. Work backwards to determine where the contamination occurred:
 - a. Re-inject the sample from the injection tray.
 - b. Re-prepare the amplified product (addition of formamide and internal lane size standard) and re-inject.
 - c. Re-amplify and analyze the DNA extract.
 - d. Re-extract and analyze the sample (if this may be done without consuming the sample).
4. Extract, amplify, and/or inject known samples (to test suspected reagents and/or equipment).
5. Discard suspected buffers and prepared reagents, and clean reagent bottles.
6. Clean and decontaminate work areas, glassware, pipets, etc.

3.3 Safety

There are biological and chemical hazards in the laboratory. Each lab employee is responsible for familiarity with the Lab Safety Manual. Any incident or condition that occurs in or under the control of the laboratory that threatens the immediate or future health of any individual must be immediately brought to the attention of the section supervisor and laboratory safety officer. Laboratory management will define corrective action.