ENVIRONMENTAL ASSESSMENT FOR DEVELOPMENT OF A DNA-BASED MULTI-SPECIES IDENTIFICATION AND QUANTIFICATION ASSAY

Prepared By:

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10/31/08

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The following environmental assessment is initiated to fulfill the National Institute of Justice (NIJ) requirement to ensure that the activities conducted in the following award(s) comply with the National Environment Policy Act (NEPA).

**Project Name**
Development of a DNA-Based Multi-Species Identification and Quantification Assay

**Grant Program**
Funding Opportunity Number: 2008-NIJ-1774

Grant #: 2008-DN-BX-K288

October 2008

The environmental assessment was prepared to encompass the proposed activities of the agency for the above referenced award(s).
EXECUTIVE SUMMARY
This Environmental Assessment (EA) has been prepared to address the effects of a research project titled “Development of a DNA-Based Multi-Species Identification and Quantification Assay” at the Molecular Anthropology Laboratory, University of California, Davis. The EA has been prepared in accordance with the requirements of the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA, 40 CFR Parts 1500-1508, and the National Institute of Justice Draft Guidance for Preparing Environmental Assessments.

PURPOSE AND NEED OF THE PROPOSED ACTION
Species identification of forensic samples will allow the determination of appropriate tests for evaluating a wide range of biological evidence. It is important to know the species of origin of the sample before attempting downstream analyses. The ability to accurately detect and quantify target DNA in mixed-species samples is crucial when target templates may be overwhelmed by non-target DNA. Depending on the analytical procedure, standards for quantifying DNA templates recovered by extraction are required by forensic laboratory accrediting agencies. The use of accurate species-determining tests (across animals) will help analysts optimize the typing tests used in a case and minimize the consumption of limited samples. The analysis of non-human DNA will portend an additional means of forensic inquiry. An accurate taxonomic-identification and quantification assay of forensic DNA samples is also important for cost efficient analyses of the evidence.

The need for action results from the inability of the forensic community to easily and quickly identify the source species of biological materials left at crime scenes. The purpose of the action is to create high-throughput taxon identification tests for the forensic community to aid in the genetic analysis of these biological materials. Adequate and rapid species identification and quantification of forensic samples allows the determination of appropriate tests for evaluating a wide range of biological evidence and will therefore improve the timeliness of sample turnover.

PROPOSED ACTION
The proposed action of this project is to develop a DNA-based multi-species identification and quantification assay for forensic samples.

ALTERNATIVES
The proposed action set out above is the only means of obtaining the needs of the project presented. As no other action alternatives meet the purpose and need for action as stated herein, no other alternatives were considered.

NO ACTION ALTERNATIVE
Under the No Action Alternative, a DNA-based multi-species identification and quantification assay for forensic samples would not be developed. Instead, the sustained absence of such an assay would continue to hinder the forensic community in analysis of biological samples.

ENVIRONMENTAL AND SOCIOECONOMIC CONSEQUENCES
The proposed action will have no significant environmental or socioeconomic consequences or impacts.

CONCLUSION
Based upon the alternatives analysis, the preferred alternative is the action alternative. While a small part of the proposed project involves the use of hazardous chemicals, the impact of these chemicals on the environment is controlled by the use of mitigating measures. Based on the above, a Finding of No Significant Impact is appropriate.
**TABLE OF CONTENTS**

EXECUTIVE SUMMARY........................................................................................................ 1

TABLE OF CONTENTS ............................................................................................................. 1

1.0 Description of Proposed Action and Alternatives ......................................................... 1-1

1.1 Background.................................................................................................................. 1-1

1.2 Purpose and Need......................................................................................................... 1-1

1.3 Alternatives.................................................................................................................. 1-1

1.4 Alternatives Considered But Not Carried Forward....................................................... 1-2

2.0 Affected Environment and Environmental Impacts................................................... 2-1

2.1 Solid Waste Management............................................................................................ 2-2

2.2 Other Impacts.............................................................................................................. 2-2

2.3 Intergovernmental Review and Other Federal Agency Reaction to the Project .... 2-3

2.4 Cumulative Impacts.................................................................................................... 2-3

2.5 Unavoidable Adverse Impacts...................................................................................... 2-3

2.6 Mitigation Measures...................................................................................................... 2-4

2.7 Conclusion.................................................................................................................... 2-4

3.0 Works Cited ................................................................................................................... 1

4.0 List of Preparers ............................................................................................................ 2
1 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

1.1 BACKGROUND
Researchers have used animal DNA to link suspects or victims to one another or to a crime scene and solve wildlife related offenses. Species identification of forensic samples will allow the forensic examiner to determine the most appropriate tests to use to further characterize a sample since forensic animal samples analyses tend to be specific to a family group. The ability to accurately detect and quantify target DNA in mixed-species samples is crucial when target templates may be overwhelmed by non-target DNA. The analysis of non-human DNA will provide additional means of forensic inquiry.

The Molecular Anthropology Laboratory is located at the University of California, Davis in Young Hall. The purpose of this project is to develop a polymerase chain reaction (PCR) assay to determine the species from which a biological forensic sample originated and the quantities of DNA present.

This Environmental Assessment (EA) analyzes the potential impacts related to “Development of a DNA-Based Multi-Species Identification and Quantification Assay” at the Molecular Anthropology Laboratory, University of California, Davis. The EA has been prepared pursuant to Section 102(2)(c) of the National Environmental Policy Act of 1969 (NEPA), (42 USC 4321 et seq.), the regulations of the Council on Environmental Quality (CEQ) that implement NEPA procedures (40 CFR 1500-1508), and National Institute of Justice (NIJ) Draft Guidance for Preparing Environmental Assessments. The information presented in this document will serve as the basis for deciding whether implementing the proposed action would result in a significant impact to the environment, requiring the preparation of an Environmental Impact Statement, or that no significant impacts would occur, and therefore a Finding of No Significant Impact (FONSI) would be appropriate.

1.2 PURPOSE AND NEED
The need for action results from the inability of the forensic community to easily and quickly identify the source species of biological materials left at crime scenes. The purpose of the action is to create high throughput taxon identification tests for the forensic community to aide in the analysis of these biological materials. Adequate and rapid species identification of forensic samples allows the determination of appropriate tests for evaluating a wide range of biological evidence and will therefore improve the timeliness of sample turnover.

1.3 ALTERNATIVES

1.3.1 Proposed Action
The proposed action of this project is to develop a DNA-based multi-species identification and quantification assay for forensic samples. These animal genes will provide robust results even with the small and/or degraded DNA samples often associated with forensic investigations because they exist in multiple copies within cells. The assay will be initially designed for a specific group of taxa, comprising animals often encountered in crime scene investigation, but can be expanded to include any number of taxa.

Making use of the real-time PCR technology in the project will enable forensic laboratories to readily implement the test for their forensic casework since most laboratories already have real-time instrumentation for human DNA quantification. The research project would use chemicals that are commonly used in biological research laboratories and would follow all requirements of the UC Davis Office Environmental Health and Safety related to the use, transport, and disposal of hazardous chemicals.
The proposed action will take place at the Molecular Anthropology Laboratory, University of California, Davis, Young Hall. No construction or demolition will be required for the proposed action, although two new employment positions will be created. All equipment required for the research is available at the laboratory. Chemicals will be disposed of in the manner appropriate to the chemical, in accordance with State, Local, Federal and Campus requirements. The project is consistent with the UC Davis 2003 Long Range Development Plan (LRDP) and would create no environmental effects that were not addressed in the 2003 LRDP Environmental Impact Report.

1.3.2 No Action
Under the No Action Alternative, a DNA-based multi-species identification and quantification assay for forensic samples would not be developed. Taking no action will result in continued delay in the processing and use of biological forensic samples. No action will also increase the potential for the loss of finite usable forensic samples as they are analyzed using assays that are inappropriate for the sample’s source species.

1.4 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD
No alternative actions are available which would increase the timeliness and quality of the analysis of biological samples collected in forensic contexts, or that meet the purpose and need for action. No viable alternative currently exists that would provide species testing and DNA quantification for these purposes.
2 AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS

This chapter describes the existing condition of environmental resources potentially affected by the “Development of a DNA-Based Multi-Species Identification and Quantification Assay.” The boundaries of the affected environment vary according to the nature of the potential impact and the aspect of the environment under consideration. Certain potential impacts (e.g., impacts on topography or drainage patterns) are site-specific and are likely to be contained entirely within the project boundaries. Other impacts (e.g., potential economic impacts or impacts to traffic patterns) may affect areas outside of the identified project area.

Potential impacts of the action alternatives are discussed in this chapter in terms of short- and long-term impacts. Short-term impacts are those of a limited duration, such as the impacts that would occur during the implementation of the action. Long-term impacts are those of greater duration, including those that would endure for the life of the proposed project and beyond, including impacts associated with the operation of the action. These terms are further qualified as being negligible, minor, moderate, or major. Impact thresholds for each resource are established in the environmental consequences section for that resource. For impacts judged to be less than significant, a range is given to facilitate comparisons among the alternatives, using the terms of negligible, minor, and moderate. Impacts that are “major” for a resource are considered to be a significant impact.

The Proposed Action was evaluated for applicability to the impact areas in to NIJ’s Draft Guidance for Preparing Environmental Assessments. It was determined that certain environmental and socioeconomic resources that frequently receive attention in NEPA analyses would not be applicable to the Proposed Action. The following are the resources areas that have been dismissed from analysis, and the reason for their dismissal:

- **Air Quality**: This project involves a research project in an existing facility. No new emissions would be created or result as the implementation of this action. There would be no impacts to air quality.
- **Water Resources (Water Quality, Surface Water, Wetlands, Floodplains, Coastal Barrier Resources, Wild and Scenic Rivers)**: The Proposed Action involves a research and testing action within an existing facility. No additional construction would occur and any wastes generated from this research would be disposed of in accordance with all applicable state, federal, and local regulations and would not impact water resources. No impacts to water resources would occur.
- **Geology, Topography, Soils (Includes Farmland Protection)**: The Proposed Action involves a research and testing action within an existing facility. No additional construction or other ground disturbing activities would occur. There would be no impacts to geology, topography or soils.
- **Land Use**: The Proposed Action would occur within an existing facility and involves research and testing activities. These activities would not require a change in land use of the site or would not result in a change of land use on surrounding sites. There would be no impacts to land use.
- **Transportation**: The Proposed Action would not generate new traffic or create an additional need for parking. No impacts would occur to the regional traffic network.
- **Natural Environment (Wildlife, Wildlife Habitat, and Vegetation)**: The Proposed Action would occur within an existing facility and involves research and testing activities. No impacts to the natural environment would occur.
• **Endangered Species**: The Proposed Action would occur within an existing facility and involves research and testing activities. No impacts to endangered species would occur.

• **Human Population (Socioeconomics/Environmental Justice)**: The Proposed Action would not change the composition of the population, change housing demand or employment levels, or change property values. Furthermore, the action would not occur in an area that has a high proportion of minority residents or residents living below the poverty level. There would be no impacts to the human population, including socioeconomics and environmental justice.

• **Historic Preservation**: The Proposed Action would occur within an existing facility, Young Hall, which was originally constructed in 1941 and is not considered a historic site by the California State Historic Preservation Office. The proposed project does not require any modification to the building, and no historic or cultural resources would be impacted by this action.

• **Construction**: The Proposed Action would occur within an existing facility and involves research and testing activities. No additional construction would occur and there would be no impacts.

• **Energy Impacts**: The Proposed Action would occur within an existing facility and involves research and testing activities. Testing activities would not require additional energy or put additional demand on the regions energy supply. There would be no impacts to energy supply.

• **State Environmental Policy Act**: The State of California does have a State Environmental Policy Act called CEQA (California Environmental Quality Act) but the CEQA does not apply to our action because we are not doing any new construction work, our facilities are already hosting existing NIH and NIJ funded genetic/DNA lab work and no additional waste will be produced.

### 2.1 SOLID WASTE MANAGEMENT

#### 2.1.1 Solid Waste Management Affected Environment

The Molecular Anthropology Laboratory at the University of California, Davis is in compliance with applicable State and local regulations pertaining to solid waste management. All solid bio-hazardous waste generated by the laboratory including used consumable supplies and protective clothing soiled with body fluids are packaged according to regulations, removed and disposed of by licensed hazardous waste contractors. All hazardous waste generation, transportation, and disposal is overseen by the UC Davis Office of Environmental Health and Safety.

#### 2.1.2 Solid Waste Management Environmental Consequences

**Proposed Action**

The proposed action may generate small amounts of additional solid waste, especially during the early part of the project (i.e. from DNA extractions from biological samples). However, this additional solid waste is so small that Molecular Anthropology Laboratory will not need to change the way in which it currently disposes of solid waste, and will continue to dispose of this waste in compliance with federal, state and local regulations.

**No Action**

No Action would not generate additional solid waste. There would be no impacts to solid waste management under No Action.

### 2.2 OTHER IMPACTS

#### 2.2.1 Other Impacts Affected Environment
As a Molecular Laboratory, the current operation of the facility uses certain hazardous chemicals and generates certain liquid wastes associated therewith. All hazardous chemicals and bio-hazardous waste is packaged in accordance with state and federal law and disposed of through licensed hazardous waste contractors who must comply with environmental safety regulations to retain their license (see attachments A1 & A2).

2.2.2 Other Impacts Environmental Consequences

Proposed Action
While some additional chemicals are to be used under the proposed project, (see attached list) these chemicals do not pose any significant risk to the environment as they will be used, stored and disposed of in strict accordance with established safety and quality control protocols and local, state and federal law: in the same manner as the chemicals presently in use. All flammable liquids are stored in a Flammable Liquids Cabinet. Used chemicals are placed in federally approved containers and stored in a fume hood until they are picked up by our on-campus Environmental Health & Safety department. These chemicals are also used only by staff with specialized training in the use of hazardous chemicals. All chemicals to be used in the proposed project will be used and stored in compliance with all local, state and federal guidelines. All chemicals used in the proposed project as well as the chemicals presently in use, are and will be disposed of by agencies certified in the state in which they operate to comply with all local, state and federal laws. See attachment “A3”. Due to the small amount of chemical waste produced by the use of these chemicals, as set out herein, these chemicals remain on site for approximately one month before removal by authorized agencies.

During that time, they are stored in a secure area separated from other chemicals and flammable materials. Based on the above, there will be no additional Environmental Impacts through the storage and use of the chemicals to be purchased and used under the auspices of the grant.

No Action
No Action would not generate additional chemical usage and storage. There would be no impacts under “No Action”.

2.3 INTERGOVERNMENTAL REVIEW AND OTHER FEDERAL AGENCY REACTION TO THE PROJECT
Not applicable.

2.4 CUMULATIVE IMPACTS
There are no known cumulative impacts of this proposed project with past, present, or reasonably foreseeable future actions. The EPA conditionally exempts generators who create 100kg or less of hazardous waste per motion (S261.5, 40CFR Ch. 1, 7-1-99 edition). Any impact from this proposed project, even when combined with concurrent federally funded projects, is well below the quantity of reagent needed to invoke an impact assessment.

2.5 UNAVOIDABLE ADVERSE IMPACTS
The only adverse impacts identified in the above analysis were: the potential exposure of laboratory personnel to chemicals. It should be noted that these personnel are already in contact with other hazardous materials and chemicals on a daily basis, and this project will not increase their exposure.
2.6 **Mitigation Measures**
Mitigation measures include: extensive protocols dealing with proper chemical use, Personal Protective Equipment, training in the use of hazardous chemicals and materials, maintenance of all Material Safety Data Sheets for chemicals used.

2.7 **Conclusion**
Based upon the alternatives analysis, the preferred alternative is the action alternative. While a small part of the proposed project involves the use of hazardous chemicals, the impact of these chemicals on the environment is controlled by the use of mitigating measures. The implementation of “Development of a DNA-Based Multi-Species Identification and Quantification Assay”, as proposed, is not expected to result in significant adverse impacts on the environment; therefore, an environmental impact statement is not required and a Finding of No Significant Impact (FONSI) is appropriate.
List of Preparers

**Applicant Agency**

**UC Davis**

Matt Dulcich, Associate Environmental Planner  
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Bethany Joy-Elise Erickson, Staff Research Associate  
Sree Kanthaswamy, Assistant Research Geneticist  
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**Grantee Agency**

**National Institute of Justice**

Lois A. Tully, Ph.D., National Institute of Justice, 202-307-0694.

Lois A. Tully, Ph.D., National Institute of Justice, 202-307-0694.
1.1 Background: Project Area
# CHEMICAL INVENTORY

## SEROLOGY/DNA

*Health, Flammability, Reactivity, and Protective Equipment, and Disposal Codes are located on the next worksheet titled Code Key*

<table>
<thead>
<tr>
<th>CHEMICAL</th>
<th>Health Code</th>
<th>Flammability Codes</th>
<th>Reactivity Code</th>
<th>Protective Equipment</th>
<th>Source of Information</th>
<th>Chemical Abstract Service Number</th>
<th>Use of Chemical</th>
<th>Storage Location</th>
<th>Disposal Codes</th>
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## CHEMICAL INVENTORY
### SEROLOGY/DNA

*Health, Flammability, Reactivity, and Protective Equipment, and Disposal Codes are located on the next worksheet titled Code Key*

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<th>CHEMICAL</th>
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REVISED 5/16/00