THE CITY OF SAN DIEGO

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TO: Sophia Roach, Assistant Chief Appellate Division, San Diego County District Attorney's Office

FROM: Shawn Montpetit, DNA Technical Manager

SUBJECT: New DNA Interpretation Guidelines at the San Diego Police Department

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In April the San Diego Police Department's (SDPD's) Forensic Biology Unit implemented an improved DNA testing kit for forensic casework. The validation of this new testing kit spanned several months and was conducted in accordance with the quality assurance guidelines for DNA testing labs (Scientific Working Group for DNA Analysis Methods - SWGDAM 2009). As part of the internal assessment, experiments were performed to provide the foundational data for the interpretation guidelines that would be used in forensic casework for the new testing kit.

In June 2010, SWGDAM published a set of mixture interpretation guidelines to provide guidance to the forensic DNA community. The San Diego Police Department's Forensic Biology Unit used this document as a basis for the interpretation guidelines for the new testing kit. The published SWGDAM mixture interpretation guidelines are largely a clarification of existing guidelines and recommendations and some points SWGDAM deemed warranted further explanation.

The interpretation guidelines implemented with the new DNA testing kit reflect changes made in accordance with the published SWGDAM documents as well as changes based on the data obtained from the extensive validation effort by the SDPD laboratory. The interpretation guidelines employed for the previous DNA testing kit were based on validation experiments as well as the combined knowledge and experience obtained through years of analysis.

Outlined below is a summary of the differences between the old and new SDPD guidelines organized by the sections of the SWGDAM mixture interpretation document.

1. Preliminary Evaluation of Data

The SDPD laboratory has always employed the recommended controls and had thresholds in place for DNA testing. The new testing kit, through its improved formulation has a better signal-to-noise ratio and has allowed the laboratory to lower the detection threshold slightly from that of the previous testing kit.

2. Allele Designation
The new SDPD guidelines document practices that have always been employed by the laboratory. The current guidelines do not differ from the previous guidelines to any significant degree.

3. Interpretation of DNA Typing Results
The SDPD laboratory has had the same basic definitions and practice of identifying artifact data and has been performing analyses in the manner section 3 of the SWGDAM mixture guidelines indicates since the implementation of Short Tandem Repeat (STR) testing. The new guidelines further refine many points addressed in section 3 and document practices that had not been formally addressed in prior SDPD interpretation guidelines.

SDPD validation studies have always contained data on peak height ratios; although the validation studies performed on the new testing kit exceed those that have been done in the past. The laboratory has had data for the stochastic thresholds for the kits we employ since approximately 2006 and have continued the practice with the validation of the new testing kit.

The laboratory previously refined mixture interpretation in August 2009 in response to the audit document published by SWGDAM. The 2009 changes involved creating a more defined method of determining major/minor contributors in mixtures and implementing a more consistent method for performing statistical analyses on minor contributor inclusions (modified again with the 2011 SDPD guidelines).

The new interpretation guidelines (2011) provide more detail about making assumptions and handling mixtures of DNA as well as provide additional statistical options (see section 5). A change in the SDPD interpretation guidelines relates to section 3.6.1 of the SWGDAM mixture guidelines, and specifically how comparisons are made with evidence samples.

4. Statistical Analysis of DNA Typing Results
The SDPD laboratory has always used the listed statistical approaches to dealing with mixtures of DNA. The new guidelines provide additional information and guidance to analysts in applying these approaches. Another change to the SDPD interpretation guidelines relates to section 4.6.3 of the SWGDAM mixture guidelines, specifically dealing with how statistics will be performed on samples with low level data when no assumptions can be made about a mixture.

5. Statistical Formulae
The SDPD laboratory has always used the statistical formulae recommended in the National Research Council's 1996 report (*The Evaluation of Forensic DNA Evidence – National Academy Press – 1996*) cited in the SWGDAM mixture guidelines. In August of 2010, the SDPD adopted the ability to use the 2p formula (SWGDAM Mixture Guidelines 5.2.1.3) to deal with situations of undetermined zygosity. The new SDPD guidelines continue the use of 2p and in addition provide information for the use of Random Match Probabilities in DNA mixtures.

In conclusion, the new SDPD mixture interpretation guidelines are a more detailed continuation of past practices employed, some not previously codified, and they provide additional information with respect to utilizing the various statistical options available. The main changes concern how comparisons are made to the evidence and which markers can be used for statistics in samples with low level data when no assumptions can be made. The effect of these changes

will be to alter how minor DNA contributors are interpreted and which DNA markers will be used for statistical calculations on inclusions. It is likely the new SDPD guidelines will result in more samples that cannot be interpreted due to their complexity and/or low level. With regards to the statistical significance applied to inclusions, samples where no assumptions can be made may have more common inclusion statistics estimates, whereas samples for which assumptions can be made are may have more discriminating inclusion statistics provided in the report.

Shawn Montpetit
DNA Technical Manager
SSDPD Crime Laboratory

Patrick O'Donnell
Supervising Criminalist
SDPD Crime Laboratory