The TriggerPro Gun Swab Evaluation: Comparing the Use of a Touch DNA Collection Technique to Firearm Fingerprinting

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Executive Summary

From July 2008 through August 2009, Indianapolis Metropolitan Police Department (IMPD) patrol officers in the East District were supplied with pre-packaged kits, known as TriggerPro ID, for use in collecting possible DNA samples from firearms encountered or confiscated during traffic stops or in response to other criminal incidents. The TriggerPro gun swab project was funded by a U.S. Attorney's Office, Southern District of Indiana Project Safe Neighborhood grant for $80,000, awarded May 1, 2008, and another $80,000 grant from the Comprehensive Anti-Gang Initiative, awarded June 1, 2008. TriggerPro gun swab kits are an example of "touch DNA" technology, which is an evidence gathering approach that attempts to collect viable DNA samples from small quantities of skin cells that remain after an individual has touched objects or places. The traditional method of gathering touch DNA evidence involves using a sterile swab moistened by distilled water. TriggerPro kits differ from this in that each kit contains an anti-microbial liquid used to moisten the swab. Forensic use of touch DNA results aims at tying an individual to an evidence item (e.g., a gun) or crime scene.

The pilot project was designed to examine the effectiveness of swabbing firearms to collect DNA samples capable of connecting individuals to firearms. The evaluation of TriggerPro is based on a comparison of two forensic methods: fingerprinting firearms versus collecting touch DNA samples from firearms using TriggerPro gun swabs. Fingerprinting is the baseline against which the TriggerPro kits were compared. Both methods were examined by comparing the production of touch DNA evidence developed from TriggerPro swabs to the viable fingerprint evidence harvested from firearms recovered by the IMPD. As the Southern District of Indiana Project Safe Neighborhoods local research partner, the Indiana University (IU) Center for Criminal Justice Research (CCJR), part of the IU Public Policy Institute and the IU School of Public and Environmental Affairs, conducted the TriggerPro evaluation.

TriggerPro gun swab cases were developed from IMPD East District firearm incidents that occurred from July 14, 2008, to August 31, 2009. Altogether during this period there were approximately 831 firearm incidents/cases in the East District, from which 164 incidents became TriggerPro cases. The TriggerPro DNA samples were processed by Strand Analytical Laboratories (Strand) in 21 batches between July 30, 2008, and February 19, 2010. The Indianapolis-Marion County Forensic Services Agency (IMCFSA) either developed or reviewed the technical laboratory reports produced by Strand describing the DNA samples obtained via TriggerPro gun swab cases. Information on 160 of the TriggerPro cases was assembled by IMCFSA staff; as of late-May 2010, Strand was still processing DNA from four cases.

To establish a set of gun fingerprint cases as the comparison group, data on gun fingerprint cases were obtained from the IMCFSA and the IMPD latent fingerprint unit. These cases were taken from those occurring in the IMPD East District firearm incidents in the year preceding the TriggerPro project (July 1, 2007 to June 30, 2008). During this period, from among the 705 firearm incidents/cases in the East District, there were 147 firearm cases that had fingerprint-related requests submitted to IMCFSA. Data on latent fingerprint development and examination requests were extracted from the IMCFSA laboratory information management system (LIMS). For cases that produced viable prints, the IMPD latent fingerprint unit and the IMCFSA provided additional information regarding the use of those prints in identifying individuals.

Findings

The TriggerPro evaluation focused on two basic questions applied to both evidence collection methods: how much potential forensic evidence could be gathered, and how useful was that information for purposes of suspect identification? Findings related to both these questions are summarized below.

	Fingerprint cases	TriggerPro cases
Total cases with forensic requests	**147**	**160**
Cases producing:		
Viable fingerprint images or DNA profiles	21	104
% total cases	14.3%	65.0%
Positive ID or stats-ID	4	4
% total cases	2.7%	2.5%
Identifiable prints or non-stats ID	7	15
% total cases	4.8%	9.4%
Total evidence items processed	**503**	**367**
Evidence items producing:		
Viable fingerprint images or DNA profiles	23	210
% total evidence items	4.6%	57.2%
Positive ID or stats-ID	4	4
% total evidence items	0.8%	1.1%
Identifiable prints or non-stats ID	11	15
% total evidence items	2.2%	4.1%

Notes: *DNA profiles* include cases resulting in single source or mixture-based profiles of any type.
Positive ID refers to fingerprint images that are individualized.

If considered as the baseline method, fingerprinting firearms had perhaps a higher rate of viable print production than originally suspected. About one in five gun cases (147 out of 705) resulted in requests for latent print development. If investigators asked for prints, viable prints were generated in 14.3 percent of the cases. (It should be noted that obtaining viable, identifiable fingerprints was considered an "all or nothing" proposition—that is, in contrast to DNA profiles which can be partial or complete, there was no such thing as a "partial fingerprint.") Out of the 147 gun cases with print requests, 7.5 percent (11 cases) produced print images that either were or could be individualized to a specific person.

TriggerPro produced more *potentially* probative or investigative evidence than firearm fingerprinting, but just because a DNA profile was developed did not automatically mean it had any value for identification purposes. Various types of DNA profiles obtained from crime scenes samples can *possibly* have probative value. Depending on the nature of the DNA sample and the availability of reference standards (e.g., DNA samples obtained from suspects), the profiles *could be* used to include or exclude an individual as a contributor. In this sense, the TriggerPro kits collected a substantial amount of DNA material (i.e., the sum of single source DNA samples and DNA mixtures) that could *potentially* be used as evidence. However, although 57 percent of gun swabs (210 of 367 evidence items), or 65 percent of TriggerPro cases (104/160), generated various DNA profiles, it should be emphasized that the actual usefulness of those profiles for criminal identification was limited: only 5.2 percent of evidence items had any value for identification or exclusion of an individual. This was in comparison to gun fingerprinting, in which 4.6 percent of evidence items (23/503), or 14.3 percent of cases (21/147), produced viable fingerprints.

Therefore, despite the larger quantity of DNA material collected with TriggerPro gun swabs, criminal identification outcomes between the two methods of firearm evidence collection were similar. The greater volume of potential forensic evidence from the TriggerPro kits did not translate into a significantly larger number of identifications than gun fingerprinting. On one hand, the incidence of positive

identifications in the two groups was roughly equivalent—both samples produced four individualized identifications that linked a specific person to the evidence item (for fingerprints, these are called positive IDs; for touch DNA these are called stats-IDs). Considering the probability an evidence item would produce a positive identification (i.e., be tied to a specific person), fingerprinted items yielded a 0.8 percent rate (4/503 items), compared to a 1.1 percent rate for gun swabs (4/367 items)—not a big difference.

On the other hand, the sample of gun fingerprint cases produced an additional 11 identifiable fingerprints (though not individualized to a specific person), while the TriggerPro gun swab cases produced 15 additional DNA profiles capable of including or excluding the suspect's reference sample as the source of the evidentiary sample (called non-stats IDs). If the most valuable identification outcomes for the two methods are compared (i.e., positive fingerprint IDs combined with identifiable prints, versus stats-IDs plus non-stats IDs), the rate of success among fingerprint evidence items was 3 percent, while the rate among DNA evidence items (swabs) was 5.2 percent. Considering the larger quantity of potential forensic evidence generated by gun swabs in comparison to firearm fingerprinting, the identification outcome differences between the two were comparatively small.

Evidence items uploadable to federal databases were generally minimal for both approaches. Only three TriggerPro cases were eligible for uploading to the FBI's Combined DNA Index System (CODIS). Conversely, gun fingerprints could be uploaded to the FBI's Integrated Automated Fingerprint Information System (IAFIS) more frequently. All identifiable prints from evidence items could potentially have been uploaded to the federal IAFIS database, or used to search IAFIS. The FBI officially permits only complete DNA profiles (all 13 loci, or partial profiles with nine or more loci) from qualifying crimes to be used to search within or upload to CODIS. At the state level, states have different policies governing uploading and searching state DNA databases, as well as some differences in qualifying crimes. Indiana requires at least eight loci, and qualifying crimes include sex offenses, offenses against children, murder, assault and battery, robbery, kidnapping, and burglary. Because the pilot project did not focus on specific qualifying crimes or infractions, TriggerPro samples rarely met Indiana state or FBI CODIS criteria.

Recommendations

When the kits were used, TriggerPro produced some type of DNA profile from 57 percent of the evidence items (or, alternatively, in 65 percent of the cases). Yet this overstates the actual value of these profiles in criminal identification. As such, any recommendations to broadly use touch DNA methods of evidence collection such as TriggerPro must be qualified in several ways. Decisions to continue use of pre-packaged touch DNA kits such as TriggerPro should be based on several considerations, some of which could not be analyzed fully in this evaluation.

First, a serious problem with mold appeared in the early stages of the TriggerPro pilot project. Approximately 80 to 90 percent of TriggerPro gun swabs developed some amount of mold. Although Forensic ID has modified the kits to reduce the likelihood of mold (after the pilot project was mostly completed), the new kits are currently undergoing a validation study to determine if the mold problems have been eliminated. An interim report was submitted (by Sorenson Genomics), but it recounted only 90 days of a one-year study, so its results are inconclusive. Thus, the re-designed TriggerPro product is still undergoing validation, and any widespread adoption should await the final results of the ongoing study.

Second, the actual use of touch DNA evidence, whether produced by TriggerPro or traditional swab/sterile water approaches, in Marion County prosecutions was not systematically examined in this evaluation. Appendix 1 provides summary information of the disposition or circumstances of 19 cases; a few of these cases suggest the TriggerPro results proved useful, but more systematic analysis is needed to determine the ultimate value of touch DNA results in criminal prosecutions.

Third, further use of TriggerPro should await answers to questions about comparative costs. The total cost of processing touch DNA samples requires much closer analysis before concluding that the larger quantities of potential DNA evidence embodied in touch DNA methods make it far superior to fingerprinting. If there is little difference in outcomes between two methods, cost should be a more important deciding factor in the choice of forensic technologies. Or to phrase this differently, if the cost of processing touch DNA samples is substantially higher than the costs of processing fingerprint development and examination, any comparative efficiency of touch DNA methods would be less obvious. Determining the comparative costs of touch DNA versus fingerprints in firearm cases deserves more analysis. Before moving forward with widespread use of approaches such as TriggerPro, questions about the overall costs of touch DNA applications should therefore be addressed.

A fourth related issue regarding the comparative usefulness of TriggerPro gun swabs versus fingerprint approaches to firearm evidence is the time required to complete full forensic processing. Although this evaluation did not systematically compare the time periods required from initial evidence submission through the release of the IMCFSA lab report on the item(s), the more complex scientific processing associated with developing and analyzing DNA samples—in comparison to developing or examining latent fingerprints—means DNA-related evidence requests are likely to take longer to complete than fingerprint-related requests. For example, in calendar year 2009, the IMCFSA turnaround time for latent fingerprint processing was 43.2 days, compared to 72 days for DNA processing (Indianapolis Marion County Forensic Services Agency, 2010). Thus, both the time element and the total costs associated with touch DNA evidence processing deserve more detailed analysis.

Fifth, implementation issues in the field regarding the use of touch DNA kits such as TriggerPro deserve some attention. Because TriggerPro was considered a pilot project, there was probably less discretion used in the application of gun swabs to crime guns confiscated in the field. This is because one objective of the TriggerPro pilot project was to swab as many guns as possible in as short a time as possible. While this was an objective, it was clear that many firearms recovered in the East District during the pilot period were *not* swabbed—TriggerPro cases included only about 20 percent of all East District firearm incidents during the time period of the pilot project. This suggests that all East District patrol officers were not equally engaged in the implementation of TriggerPro, and that future initiatives should emphasize the importance of using any new and available forensic identification tools after such tools are deployed. Additionally, firearms might have been swabbed during the pilot project that would not have been swabbed under normal circumstances (e.g., the gun was taken directly from an individual's pocket, or an involved individual stipulated it was his firearm). With more officer discretion and careful targeting of particular crimes, better reference and elimination standard collection rates, and the use of police officer reference standards, the use of DNA profiles produced by gun swab kits might become more useful in actual suspect identification and criminal prosecutions. Related to this, use of touch DNA tools for crimes such as burglary, vehicular theft, assault, and other violent crimes could increase the number of Indianapolis-Marion County DNA samples capable of uploading to or searching the Indiana state DNA database or the federal CODIS system. Expanding the number of profiles contained in these systems can help future criminal investigations.

Finally, and with respect to application of touch DNA methods by police patrol officers, users in the field should seek higher collection rates of reference and elimination standards from suspects or other involved individuals. However, because suspects must give informed consent, getting buccal samples is partly a function of how individuals in the field respond. Nonetheless, proper ways of obtaining buccal swabs should be part of training law enforcement officers to use touch DNA methods of evidence collection. In addition, wider use of law enforcement officer reference standards could reduce the number of unknown profiles developed using touch DNA methods.

Introduction and Overview

The TriggerPro gun swab project was funded by a U.S. Attorney's Office, Southern District of Indiana Project Safe Neighborhood grant for $80,000, awarded May 1, 2008, and another $80,000 grant from the Comprehensive Anti-Gang Initiative, awarded June 1, 2008. The project was implemented within the Indianapolis Metropolitan Police Department (IMPD) East District in July 2008.

Beginning July 15, 2008, TriggerPro gun swabs were distributed to patrol officers in the East District for use on firearms seized or recovered in the field. After the swabs were used, police officers were to complete the information forms located on the TriggerPro (plastic) evidence bags, and seal the swabs within the bags. The gun swab evidence bags were then delivered to the IMPD property room to await subsequent forensic processing. Periodically, an IMCFSA forensic evidence specialist retrieved the TriggerPro gun swab kits from the IMPD property room and delivered them to the IMCFSA serology section.

An IMCFSA serologist would ensure that the swabs had been used properly and that IMPD case numbers were assigned, and then would assign IMCFSA lab numbers to the IMPD cases that included TriggerPro items. Following this process, batches of TriggerPro kits were sent to Strand Analytical Laboratories (Strand). During the 19-month period beginning July 30, 2008, and ending February 11, 2010, there were 21 batches of gun swab cases delivered to Strand.

Strand then performed various procedures (i.e., extraction, amplification, and analysis of DNA samples) on the evidentiary items delivered from IMCFSA. After processing the samples, Strand sent the results back to IMCFSA. In the earlier stage of the project (from July 2008 to approximately April 2009), Strand produced only batch digital data describing the results (e.g., the raw, uninterpreted electropherograms and associated tabular data), with no full technical reports or analytical conclusions. After receiving the technical output during this period, IMCFSA staff then examined the Strand results, interpreted the findings, developed conclusions about the DNA profiles that were produced, and wrote final technical laboratory reports for each of the cases. In the latter stages of the project (after April 2009), Strand performed the basic interpretation, analysis, and conclusions regarding the DNA profiles developed, and the IMCFSA staff reviewed the Strand findings.[1]

The TriggerPro pilot project was designed to examine the effectiveness of swabbing firearms to collect DNA samples capable of connecting firearms to individuals. These individuals might have possessed the firearm illegally or used the firearm in the commission of a crime. The evaluation of TriggerPro is based on a comparison of two forensic methods: fingerprinting firearms versus collecting DNA evidence from firearms. Both methods are examined by comparing the production of touch DNA evidence and viable fingerprint evidence from firearms recovered by the IMPD.

The TriggerPro gun swab kits are an example of "touch DNA" technology, which is an evidence gathering approach that attempts to collect and produce viable DNA samples from small quantities of skin cells deposited or left after an individual has merely touched objects or places (Wickenheiser, 2002; Raymond et al., 2004). Forensic use of touch DNA results is aimed at tying an individual to a crime evidence item (e.g., a gun) or scene. As a method of identifying suspects in property crimes such as burglary and vehicle theft, touch DNA evidence collection approaches have had some success in both the United Kingdom (Bond & Hammond, 2008) and the United States (Roman et al., 2008). IMPD and the

[1]Responsibility for the production of final technical reports of the TriggerPro DNA test results became a point of contention by April 2009. After April 2009, having Strand produce full technical reports had a major impact on the total costs of the pilot, and resulted in a smaller sample of TriggerPro kits than proposed in the original grant (182 actual guns versus 400 proposed).

IMCFSA have used touch DNA in a number of burglary, property crime, and other incidents, but they did not use pre-packaged touch DNA kits such as TriggerPro. Instead, a sterile swab and distilled water were the standard collection mechanisms. In addition, IMCFSA conducted a number of touch DNA swabs of firearms in other cases before the TriggerPro project began.

In considering the performance of the TriggerPro gun swab approach, it should be noted that touch DNA evidence collection techniques are more likely to produce small or degraded DNA samples (e.g., less than complete profiles) because of the low numbers of cells harvested using a surface swabbing technique. Fewer cells collected results in low quantities of DNA less likely to produce viable profiles. Accordingly, it should be recognized from the start that touch DNA evidence collection will produce fewer usable DNA profiles than DNA sampling using buccal swabs (i.e., the collection of buccal cells from swabbing the inside of a person's cheek) or blood samples from persons involved. It should also be added that the use of buccal swabs is an important component of gun swabbing because the success of touch DNA gun swabs—or any forensic case involving DNA—depends on the collection of other complete DNA samples (via buccal swabs) from individuals believed to be linked to the firearm incident; these samples are much more likely to produce complete profiles to serve as reference or elimination standards against which to compare the gun swab samples.

Evaluation Approach: Comparing TriggerPro to Fingerprinting

The underlying evaluation approach is to compare touch DNA swabbing of firearms to fingerprinting. The rationale is that as the older, more traditional forensic technology, gun fingerprint processing can be established as the baseline standard against which to compare TriggerPro gun swabs. The analysis addresses two primary research questions regarding how TriggerPro gun swabs compare to firearm fingerprints. The first question deals with whether usable forensic evidence was produced by the evidence items that were processed, and the second deals with how forensic evidence produced was—or could be—used for purposes of criminal identification.

Question one: production of forensic evidence

What is the comparative effectiveness of touch DNA swabbing versus fingerprinting to harvest usable forensic evidence? That is, for a given seized firearm, does it produce a viable latent fingerprint or a DNA profile? In this context, "viable" is defined as follows. A fingerprint image capable of being individualized to a specific person or a complete DNA profile from a swab are clearly viable and usable for purposes of identification. Further, certain partial DNA profiles as well can be usable because they do not eliminate an individual from having contributed the DNA sample. However, partial fingerprints are not considered to be viable. Thus, in general terms, the comparison here involves determining the probability that a recovered firearm will yield a viable DNA profile versus the probability it will produce a viable fingerprint.

The measure of success for fingerprinting would be the development of at least one viable fingerprint image (from firearm-related evidence) capable of being individualized (linked to a specific person) or used for further investigative or forensic purposes. This analysis does not examine the potential use of "partial" fingerprints, because as examined herein a fingerprint image will either be usable for potential identification purposes or not. By definition, partial fingerprints are of no forensic use. This is markedly different from DNA samples, in which partial profiles can, under the right circumstances, have probative or investigative value in identifying individuals or including them as possible contributors to a sample.

The measure of success for touch DNA gun swabbing would be the production of at least one DNA profile capable of including or excluding one or more individuals as having contributed DNA to the firearm. A complete DNA profile is considered to have the highest (potentially) probative value. A partial DNA profile can have probative or investigative value if it is at least capable of including an individual as a possible contributor (i.e., the individual cannot be excluded from being a contributor), in which case its investigative value would be that it could demonstrate that an individual should be included or excluded as a suspect.

Question two: use of evidence for purposes of identification

Given that usable forensic evidence is collected, what is the comparative effectiveness of touch DNA swabs versus fingerprints to provide a positive identification of an individual? This question focuses on the frequency at which a viable DNA profile or viable fingerprint was harvested from firearms, and then used to link an individual to the firearm, or (in the case of DNA samples) fail to exclude an individual from having contributed to the sample. The comparison here will involve the probability that a recovered firearm will produce some type of DNA profile that can be matched to a reference sample (from a suspect) versus the probability that a recovered firearm will produce a viable fingerprint that is matched to an individual. The basic identification outcome here is confirmation or exclusion of a suspect as the sample contributor.

An additional aspect of question two is the possibility of additions (uploads) of DNA samples to DNA files at the state and national levels, or the addition of firearm fingerprints to uploadable databases (e.g., the FBI's Integrated Automated Fingerprint Information System—IAFIS). Only complete profiles (or profiles with at least nine loci) linked to qualifying crimes are permitted to be uploaded to the FBI's Combined DNA Index System (CODIS). However, partial DNA profiles containing results from eight genetic loci may be entered into the Indiana state DNA database.

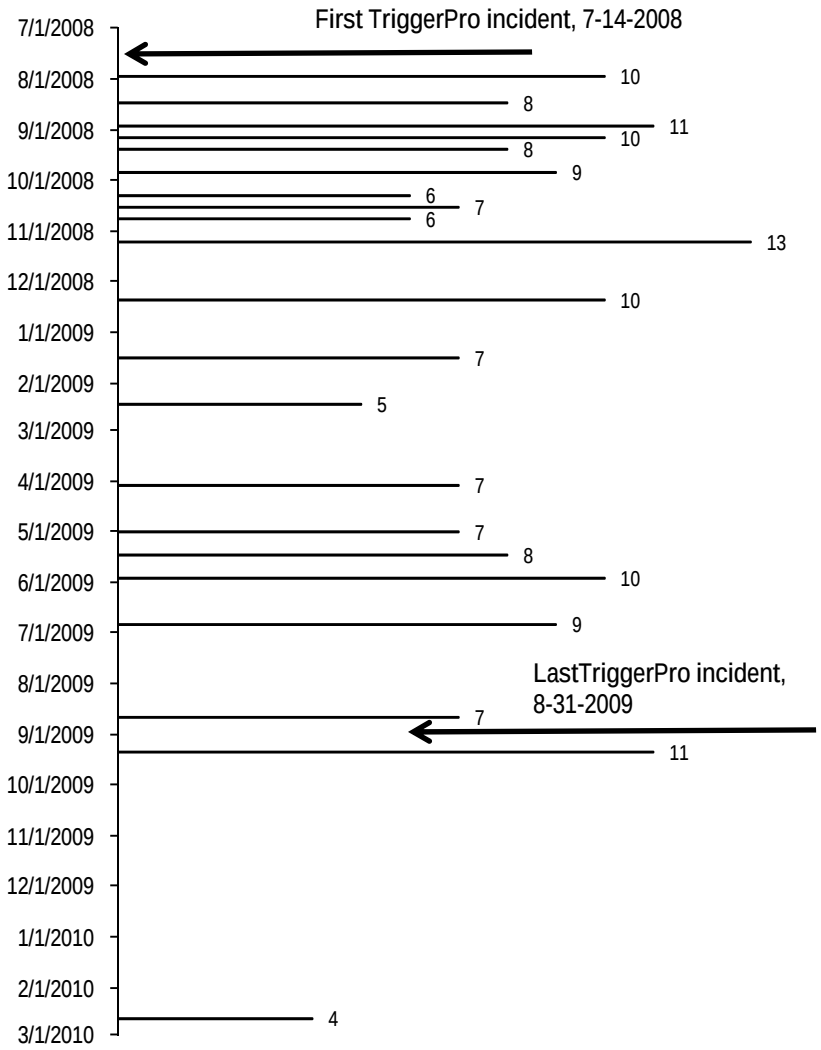
Data Sources and Evaluation Terms

The analysis required open collaboration among several organizations that were part of the TriggerPro project in Marion County. This included several units within the IMPD (East District, Gun Crime Unit in Robbery-Homicide, central administration); the U.S. Attorney's Office, Southern District of Indiana Project Safe Neighborhoods steering committee; the Indianapolis-Marion County Forensic Services Agency; ForensicID; Strand Analytical Laboratories; and the Marion County Prosecutor's Office. In this comparison, gun swab cases and gun fingerprint cases were drawn from the same operating field environment: the IMPD East District (at the time the project began, it was called the Northeast District, but will be referred to herein as the East District) over a two-year period from July 2007 to August 2009.

TriggerPro data

Data used to assess the TriggerPro project came from several different sources. TriggerPro gun swab cases were developed from IMPD East District firearm incidents. Incident dates were from roughly July 14, 2008, to August 31, 2009. Altogether during this period in the East District, there were approximately 831 firearm incidents/cases, and of those 164 became TriggerPro cases. The TriggerPro DNA samples were processed by Strand in 21 batches between July 30, 2008, and February 19, 2010 (Figure 1). IMCFSA either developed or reviewed the technical laboratory reports produced by Strand describing the DNA samples obtained via TriggerPro gun swab cases. Data on 160 of the TriggerPro cases were assembled by IMCFSA staff; as of mid-May 2010, final reports on the remaining four cases were still under development.

Figure 1: Batch submissions of TriggerPro gun swab kits to Strand Laboratories for DNA processing, by date



Source: Adapted from TriggerPro Log, IMPD Gun Unit.
Notes: Numbers at end of lines reflect the number of kits submitted.
TriggerPro incident refers to cases in which TriggerPro kits were used.

Other more limited sets of data were also assembled for the assessment. After the pilot project began, the appearance of mold on TriggerPro gun swabs became a widespread problem. To assess this, an *ad hoc* comparison was developed to determine whether mold has been an issue generally when touch DNA is collected using the traditional sterile swabs and distilled water, or whether it was specific to TriggerPro kits. Data on the incidence of mold on the gun swabs from TriggerPro cases were compared to non-TriggerPro touch DNA gun cases processed by IMCFSA. In addition, a very limited data set on the disposition and circumstances of selected TriggerPro cases (n = 19 cases, as of October 2009) is included as Appendix 1 to show a sample of circumstances and final dispositions of selected cases (no additional analyses of these disposition data are provided outside the appendix). Finally, limited qualitative data on TriggerPro users' perceptions of the approach and training related to implementation of the TriggerPro project were assembled as well. This included observation of East District training session, interviews with other project participants, and training slides used by ForensicID to train East District officers. A summary of this information is included in Appendix 2.

In addition, data were assembled on IMPD arrest and incident reports linked to TriggerPro cases. Reports were examined to detect whether and how the use of gun swabs was depicted in police officer arrest reports; this was thought to be important because it might produce insights into how TriggerPro was deployed in the field. However, there was wide variation in these reports—swabs were sometimes mentioned, sometimes not. Overall there was no systematic pattern to how the use of TriggerPro kits was described within incident reports. Examination of the incident report data in any further detail went beyond the scope of this evaluation.

Firearm fingerprint data

Data on gun fingerprint cases were obtained from the IMCFSA and the IMPD latent fingerprint unit. To establish a set of gun fingerprint cases as a comparison group, IMPD East District firearm cases in the year preceding the TriggerPro project (July 1, 2007 to June 30, 2008) were surveyed to identify cases that had gun-related evidence items and requests to process fingerprints from those items. During this period, there were approximately 705 firearm incidents/cases in the East District, and of those 147 cases had fingerprint-related requests recorded by IMCFSA.

Data on latent fingerprint development and examination requests were extracted from the IMCFSA laboratory information management system (LIMS). The IMCFSA LIMS data provided records of gun cases for which further forensic processing was requested—specifically, requests to develop latent prints or to examine visible prints—and the results of those requests. For cases that produced viable prints, the IMPD fingerprint unit provided additional information regarding the use of those prints in identifying individuals.

Evaluation terms: comparing viable fingerprints to DNA profiles

DNA analysis and fingerprinting are two very different forensic techniques used to collect and interpret evidence. Compared to fingerprinting firearms—which has a limited number of potential outcomes—forensic DNA processing is much more complicated, and has a larger variety of possible outcomes. Therefore, the ways in which they can be compared properly should be explained. In large part, this involves the definition of terms that will be used in the analysis.

General definitions

Firearm or gun: rifles, shotguns, and handguns, where handguns are further subdivided into pistols (i.e., revolvers) and automatics.

Firearm- or gun-related: typically refers to evidence items such as cartridges, casings, magazines, holsters, and ammunition boxes.

Individualization: according to Bell (2004, p. 128), individualization is "the process of linking physical evidence to a common source. . . [it is the] assignment of a unique source for a given piece of physical evidence." For the TriggerPro analysis, individualization of fingerprint evidence would occur when a latent fingerprint image is declared by a fingerprint examiner to be that of a specific person; individualization of touch DNA evidence would occur when the evidentiary DNA profile is linked to the DNA profile of an individual "to a reasonable degree of scientific certainty."

Probative value: an evidence item within this analysis was considered to have probative value if it could be used in court to include or exclude an individual from having contributed the evidentiary crime scene sample. In this context, the highest probative value would be assigned to forensic evidence that links a specific individual to a crime scene sample (e.g., individualization of a DNA profile or a fingerprint image).

Investigative value: an evidence item could have investigative value if, for example, on the basis of the forensic analysis, an individual could not be excluded as a suspect. An identifiable fingerprint that was not linked specifically to an individual, but that could be used to search IAFIS, would be considered to have investigative value.

Fingerprint-related definitions

With fingerprints, images of the visible or latent prints taken from firearm-related surfaces are examined to identify enough points of comparison to make the fingerprint a viable way of including or excluding an individual from having contributed to the crime scene evidence (i.e., fingerprint from an evidence item or obtained from the crime site). Fingerprint analysis is based on comparisons of photographic or digital images of the latent prints.[2] Several forensic outcomes (e.g., creation of probative or investigative evidence) are possible for fingerprints.

In the first place, a *viable fingerprint* must be produced if additional forensic analysis is to occur. For fingerprints (as for DNA), this concerns the question of whether a usable fingerprint image (or a sufficient quantity of DNA) is harvested from firearms. A usable image involves a sufficient quality and quantity of fingerprint ridge detail to permit analysis and possible identification. As shown herein, attempts to develop a latent fingerprint as a viable, identifiable image from much of the gun and gun-related evidence were unsuccessful. In those cases, there might have been nothing collected other than unidentifiable images, ranging from a blurred smudge up to a partial fingerprint that does not exhibit enough ridge detail or minutia to warrant further comparisons. In any case, it is not subject to further forensic processing. In this context—and as opposed to DNA profiles—there are no successful "partial" fingerprints, insofar as LIMS reports generally indicated that a viable fingerprint was either developed or not.[3]

A slightly more successful situation involves developing a viable fingerprint, but no subsequent success in matching that fingerprint image to other known fingerprint samples. In this case, the unknown fingerprint image might or might not be uploaded to a central data repository (e.g., IAFIS). Most successfully, a *suspect identification* would occur when the firearm fingerprint was matched to a known individual. In this case, the fingerprint was individualized to a particular person.

DNA-related definitions

Complete profile/Partial profile: The FBI's CODIS system defines a complete DNA profile as the detailed allele information at each of the 13 core genetic loci used for purposes of forensic identification (Budowle, Moretti, Baumstark, Defenbaugh, & Keys, 1999). To develop a match, the alleles at each of the 13 core loci in DNA samples collected from the crime scene or evidence item sample are compared to the same locations from a known reference or elimination standard (e.g., profiles obtained from a buccal swab). Accordingly, a complete profile would be composed of all allele information contained at each of the 13 core loci; anything less than that would be considered a partial profile. Related to this, the FBI officially permits CODIS uploads and searches only on the basis of 13 loci profiles. Unofficially, CODIS searches are reportedly permitted occasionally on fewer than 13 loci, but the FBI will not approve running searches on fewer than nine loci. In addition, the Indiana state DNA database permits uploads for cases with as few as eight of the 13 genetic loci. Technically, then, any profile developed from fewer than 13 core loci is, by definition, partial. However, the value of partial DNA profiles for purposes of investigations or trials is controversial, and highly contingent on how many and which of the 13 core loci are involved

[2] This differs from DNA analysis, which is based on biochemical analysis, although the interpretation of DNA profiles does involve visual analyses of line graph images contained in the electropherograms produced by DNA analyzers.

[3] Fingerprint analysis involves multiple steps. Latent print technicians are responsible for processing evidence items in order to develop photographic or digital images of latent prints through use of visual examination, powder, "superglue" fuming, or fluorescent dyes. Latent print examiners than analyze images developed by the technicians and compare those images to other reference or elimination standards. At IMCFSA, technicians note in final lab reports that "viable prints" are either developed or not; however, after analyzing viable prints (as classified by the latent print technician), examiners might determine that the quantity and quality of friction ridge detail in the image were not sufficient for identification purposes.

(Thompson, Ford, Doom, Raymer, & Krane, 2003; Kaye 2009). Matches on as few as six to eight (or less) of the core loci can determine that an individual cannot be excluded (or, in the case of non-matches, can be excluded) as the source of a DNA sample. Thus, partial profiles can have investigative (or perhaps probative) value under certain circumstances.

Finally, a DNA sample might not produce a viable comparative profile. Such a sample yields no useful information—it has no capability to include or exclude an individual as contributor to the crime scene or evidence item.

Single-source: samples of DNA that come from a single source, and which could therefore potentially be individualized to a specific person.

Mixture: this is a mixture of DNA samples from different individuals, in which multiple persons have left biologic material on the evidence item. Analysts have noted that "one of the most common complications in the analysis of DNA evidence is the presence of DNA from multiple sources. . . . by their very nature mixtures are difficult to interpret" (Thompson et al., 2003, p. 21). Mixtures can produce partial and complete DNA profiles, but because they are products of more than one person, additional analyses are required to parse out the individual contributions. Mixtures can include major and minor contributors. There can be cases where mixtures are successfully used to determine an individual's inclusion or exclusion as a contributor to the evidentiary DNA mixture. In other instances, individuals cannot be practically separated into distinct or definitive contributors, and in those instances the DNA mixture would offer inconclusive results of little or no further forensic value.

Inconclusive: the federal government's DNA Initiative (2010) states in its glossary that "inconclusive" refers to "a situation in which no conclusion can be reached regarding testing done due to one of many possible reasons (e.g., no results obtained, uninterpretable results obtained, no exemplar/standard available for testing)."

The technical output that is analyzed to make DNA matching determinations is comprised of a set of images, called *electropherograms*.[4] After processing, the profile(s) depicted in the electropherogram of the evidentiary or crime scene (e.g., firearm) sample is (are) compared to that of the reference sample to determine whether and which alleles located at different loci match. Based on the number of matches among the 13 core loci, subsequent statistical calculations can be made on the likelihood the two samples came from the same source (i.e., they match). The more of the alleles that match among the 13 loci, the higher the probability that a suspect sample contributed the DNA. One such calculation might be that with matches at 13 core loci, the chances anyone other than the person providing the reference sample contributed the DNA sample are extremely small (e.g., one in 300 billion).

Based on this approach, the IMCFSA generally classifies DNA-based identifications in one of three ways: (1) no match between the DNA sample and the reference sample, (2) a match between the two (i.e., "<John Doe> is the source of the DNA profile to a reasonable degree of scientific certainty"), or (3) the DNA sample cannot exclude the reference sample as having been the contributor (i.e., "<John Doe> cannot be excluded as a possible contributor to the DNA in the sample"). For purposes of this analysis, the IMCFSA DNA section referred to identifications as *stats* or *non-stats*.

Stats identification: statistical calculations are provided once a match is established between a DNA profile from the evidence item and the DNA profile from a provided reference standard. An identity to the source statement accompanies a match where calculations render statistical results that are greater than 1 in

[4] Electropherograms are x/y axis line graphics of the presence of alleles at the identified loci (along a horizontal x axis), and the various levels or strengths (often referred to as "peaks"), measured in relative fluorescent units (RFU) (along a vertical y axis) of each sample.

300 billion (i.e., if a large number of loci are typed, the DNA profile can be so rare that it is virtually certain that a suspect with a matching profile is the source of the evidentiary sample).

Non-stats identification: a partial match between the DNA profiles from the evidence item and reference standard does not result in statistical calculations that are more than 1 in 300 billion, or when the suspect is declared as cannot be excluded as a partial contributor of DNA profile. Thus, for non-stats identifications, fewer matches on the core loci reduce the likelihood that the known sample (i.e., the reference or elimination standard) contributed to the DNA profile developed from the firearm. In this context, an individual suspect cannot be linked uniquely to the DNA sample, but also cannot be excluded as a possible contributor.

Analysis of Findings

Fingerprinting is considered the baseline against which the TriggerPro kits are compared. Also, firearm fingerprinting is examined first because even though it can be considered a traditional method of processing guns forensically, little is known about how frequently guns are fingerprinted and what results are produced. Therefore, answering basic questions about gun fingerprints will set the stage for examining a newer touch DNA technology such as TriggerPro. The examination will compare both approaches in terms of (1) creation of potential forensic evidence from firearms and firearm-related items, and (2) use of the results of the forensic analysis to link individuals to the evidence item(s). The comparisons will be examined on the basis of cases and evidence items, and will address the following basic questions about firearm fingerprinting and TriggerPro touch DNA kits:

1. What was the total number of IMPD gun cases in the East District during the one year of gun fingerprinting analyzed and during the TriggerPro project period?
2. How many and which cases resulted in the production of viable fingerprint images or DNA profiles?
3. Out of the cases with assigned IMCFSA case numbers, how many items of evidence were submitted for analysis? Regarding firearms, what types of evidence items (e.g., magazines, cartridges, holsters) were submitted? What are the differences in the production of fingerprints by type of gun-related evidence?
4. What were the identification results of developing and examining latent fingerprints from gun-related evidence? What were the identification results from processing and analyzing touch DNA samples collected from the TriggerPro kits?[5]
5. To what extent are the results of firearm fingerprinting and TriggerPro gun swabs uploadable to state and federal forensic databases (e.g., IAFIS or CODIS)?

Results of gun fingerprinting

There were 705 total firearm cases in the East District from July 1, 2007, to June 29, 2008 (Table 1). Of these, about 42 percent (299) were submitted for further evidence processing by the IMCFSA. Thus, less than half of gun cases during this period had *any* additional forensic examination. There were 117 of these 299 cases that had no gun-related evidence, leaving 182 cases with gun evidence. However, fingerprint-related requests were not always made for an evidence item, so a smaller number of cases generated fingerprint-related requests. Among the 182 cases with gun evidence, there were latent fingerprint development or examination requests submitted for 147 cases. These cases produced requests for processing 503 gun-related evidence items, which included 184 firearms. The results of these evidence requests are examined in terms of both cases and evidence items.

In terms of firearm cases, given that a latent fingerprint examination was requested for gun-related evidence, what kind of potential forensic evidence (e.g., viable prints) was produced? Eighteen cases reported successful development of viable prints, and three additional cases produced print examination requests. This reflects 14.3 percent (21/147) of the cases for which print-related requests were made. When prints were developed, to what extent were they useful for purposes of suspect identification? From the 21 cases that reported viable prints for examination, four (2.7 percent of 147 gun fingerprint cases) produced identifiable prints individualized to a specific person. Another seven cases (4.8 percent) produced identifiable prints that could be used for investigative purposes or uploaded to IAFIS. The

[5]This only includes results defined as identifying or including individuals as being sample contributors, not results defined as judicial or prosecutorial outcomes.

remaining seven cases produced unidentifiable prints.[6] Altogether, given that a gun-related fingerprint request is made for a case, the likelihood of positive results (fingerprint images of probative or investigative value) was 7.5 percent (11/147).

Table 1: Summary of fingerprint requests and results, by cases

CASES	N	NOTES
Total gun cases in East District	705	Included in gun tracking files for East District, 7-1-07 to 6-29-2008.
Gun cases with LIMS case number	299	Cases with IMCFSA LIMS number assigned.
% total gun cases	42.4%	Percent of gun cases resulting in a IMCFSA case number (any evidence request).
Number with non-gun-related evidence	117	These cases had other non-gun-related evidence (excluded from this analysis).
LIMS cases with gun-related evidence items	182	Net number of cases with gun-related evidence requests.
% total gun cases	25.8%	Percent total gun cases with gun-related evidence items (182 / 705).
Cases with latent print (LP) requests	147	Cases with gun-related evidence for which one or more LP requests were made.
Cases reporting "viable prints developed"	18	Cases for which latent prints were found in response to an evidence request.
Cases with LP examination requests	3	Cases with requests for latent fingerprint exams only.
% cases with LP requests	14.3%	Percent cases with LP requests that produced viable prints (21 / 147).
Cases with viable prints producing positive ID	4	Fingerprint images linked to an identified individual (individualized).
% cases with LP requests	2.7%	Percent cases in which fingerprints were individualized (4 / 147).
Cases with viable prints producing identifiable prints	7	Identifiable fingerprint images, not linked to individual (IAFIS-uploadable).
% cases with LP requests	4.8%	Percent cases in which fingerprints could be (but were not) individualized (7 / 147).
% LP cases with probative/investigative value	7.5%	Percent cases with actual or potentially individualized fingerprints (11 / 147).

Sources: Review of Indianapolis-Marion County Forensic Services Agency (IMCFSA) laboratory information management system (LIMS), conducted May-June 2009. IMPD firearm tracking files.

In terms of evidence items, among the 182 cases for which gun-related evidence items were submitted, there were a total of 583 evidence items (e.g., cartridges, magazines, rifles, pistols, etc.) (Table 2). Again, fingerprint requests were not submitted for all items—there were 503 evidence items with latent print development or examination requests reported in the IMCFSA LIMS data. From these 503 items, a total of 23 items (4.6 percent) produced viable prints. However, only some of these items resulted in latent prints of value for comparison: 4 items (less than 1 percent) produced prints that could be and were individualized, and another 11 items (2.2 percent) produced prints that were of value for comparison but that were not individualized. After examination, the remaining 8 evidence items were determined to have had no prints of value for comparison. In total, then, 3 percent (15/503) of gun-related evidence items for which latent print requests were submitted actually produced fingerprint images of probative or investigative value.

[6]Fingerprint images could be classified as "unidentifiable" if, even though a latent print technician reported the development of "viable prints," the latent print examiner determines after analyzing the image that there is insufficient quality and quantity of friction ridge detail to support further identification. Viable prints that were found to be unidentifiable by print examiners were considered to be similar to DNA profiles that proved of no use for criminal identification.

Table 2: Summary of fingerprint requests and results, by evidence items

EVIDENCE ITEMS	N	NOTES
Total gun-related evidence items	583	These were items submitted from the 182 LIMS cases with gun-related evidence.
Gun-related evidence items with LP requests	503	Latent print development requests were made for these items.
Gun-related evidence items with viable prints developed	23	Items that produced "viable prints."
Percent gun-related items with LP requests	4.6%	Percent of gun-related evidence items producing viable prints (23 / 503).
Identifiable and individualized	4	Fingerprints from evidence item were linked to a specific, identified individual.
% of evidence items with LP requests	0.8%	
Identifiable, not individualized	11	Fingerprints could be identified, but were not linked to an individual (IAFIS-uploadable).
% of evidence items with LP requests	2.2%	
Not identifiable or no examination request	8	No latent prints of value for comparison.
% of evidence items with LP requests	1.6%	
% LP evidence items with probative/investigative value	3.0%	Percent evidence items with actual or potentially individualized fingerprints (15 / 503).

Source: Review of Indianapolis-Marion County Forensic Services Agency (IMCFSA) laboratory information management system (LIMS), conducted May-June 2009.

Considering the composition of gun-related evidence items, some items were more likely to produce viable fingerprints than others (Table 3). For example, while cartridges or bullet casings represented the largest number of evidence items submitted for latent fingerprint analysis, less than one percent of the 201 items resulted in viable prints. In contrast, other gun-related evidence (e.g., holsters, ammunition cases) resulted in viable prints 25 percent of the time. Long guns (rifles and shotguns) and firearm magazines were more likely to produce viable prints (13.6 percent and 10 percent of evidence items, respectively). Handguns (automatic pistols and revolvers) produced viable prints about 4 to 5 percent of the time.

Table 3: Summary of latent fingerprint development, by type of evidence items

	Viable prints developed?			
Type of gun-related evidence	No	Yes	Total	Yes rate
Cartridge or casing	200	1	201	0.5%
Pistol	115	4	119	3.4%
Magazine	99	11	110	10.0%
Revolver	41	2	43	4.7%
Rifle or shotgun	19	3	22	13.6%
Other gun related	6	2	8	25.0%
Grand total	**480**	**23**	**503**	**4.6%**

Source: Review of Indianapolis-Marion County Forensic Services Agency (IMCFSA) laboratory information management system (LIMS), conducted May-June 2009.

Results of TriggerPro gun cases

TriggerPro gun swab kits were introduced in the IMPD East District in July 2008, and implemented in the field from July 14, 2008, through August 31, 2009 (see Figure 1). Based on IMCFSA summary reports, there were 164 separate cases developed that used one or more TriggerPro kits. As of April 30, 2010, Strand reported processing 186 TriggerPro kits. As of mid-May 2010, the IMCFSA reported that 160 cases had been completed, with four still pending.

The 160 TriggerPro cases—which involved 182 firearms—comprised approximately 20 percent of all 831 firearm cases occurring in the IMPD East District during the pilot period[7] (Table 4). Out of the 160 cases, the most frequent result (42 percent of the cases) was the collection of DNA mixtures from more than one individual. Given the nature of the touch DNA approach, this is not particularly surprising. About 36 percent of the cases (57) resulted in the creation of partial profiles from a single source. A complete DNA profile from a single source was the rarest type of outcome—this occurred in 8 (5 percent) of the 160 cases. Thirty-five percent of the TriggerPro cases (56) did not produce enough DNA samples for further processing, and thus did not generate profiles usable for identification. Therefore, 65 percent of the TriggerPro cases resulted in one or more profiles, although the types of profiles varied from partial mixtures through complete single source profiles.

Table 4: Summary of TriggerPro findings by case

CASES	N	NOTES
Total gun cases in East District	831	Firearm incident/cases in East District, 7-1-08 to 8-31-09.
TriggerPro (TP) cases completed	160	Processed as of 5-1-10; four additional cases still underway.
% total gun cases	19.3%	
TP cases providing:		
Complete single source profile	8	Complete profiles developed from a single-source.
% total TP cases	5.0%	
Partial single source profile	57	Partial profiles developed from a single-source.
% total TP cases	35.6%	
DNA mixtures (not single source)	67	TriggerPro cases producing DNA mixtures from 2 or more persons.
% total TP cases	41.9%	
No usable DNA profiles	56	TriggerPro cases that produced no profiles.
% total TP cases	35.0%	
Stats-ID	4	Profiles that can be individualized to a specific person.
% total TP cases	2.5%	
Non-stats ID	15	Profiles that cannot exclude a person as the sample contributor.
% total TP cases	9.4%	

Source: Data adapted from IMCFSA summaries.
Notes: A single case can produce different numbers of profiles. Therefore, *% of no profiles, complete, partial,* and *mixtures* will not sum to 100%.
There were 13 TriggerPro cases that originated in other IMPD districts.

The types of DNA profiles produced by the TriggerPro kits can be seen more clearly if the cases are examined in terms of the evidence items (i.e., gun swabs) (Table 5). The IMCFSA reported that among all 160 cases, there were a total of 529 TriggerPro gun swabs. Out of these swabs, nearly 70 percent (367) were processed for DNA samples. Based on the IMCFSA summary data, the following different types of DNA profiles were developed from the swabs: complete profiles from a single source, partial profiles from a single source, complete profiles from a mixture, partial profiles from a mixture, and partial profiles from a mixture with major/minor contributors.[8] Nearly one-half of the 367 processed TriggerPro swabs were either a single source partial profile (24.3 percent) or a partial profile from a mixture (23.2 percent). Complete profiles from a single source were obtained from 13 swabs (3.5 percent), while complete profiles from a mixture were obtained 11 times (3 percent). Partial profiles from mixtures with major and minor contributors were produced from 12 swabs (3.3 percent). The remaining 157 swabs (42.8 percent)

[7] According to the IMPD firearm tracking data, 13 of the 160 TriggerPro cases (8 percent) originated in other IMPD districts: 4 in the Northwest, 3 in the North, 3 in the Southeast, 1 in the Southwest, and 2 Downtown. Taking these into account, the East District TriggerPro cases were closer to 18 percent of the district's total gun cases.

[8] According to the DNA Initiative (2010), the major/minor mixture is "a DNA profile where multiple individuals have contributed biologic material and one individual's DNA profile is more apparent" and can therefore prove useful in excluding or including individuals as having contributed the evidentiary sample. Major/minor mixtures would, for example, be common in sexual assault cases.

produced no results and were characterized in various ways (e.g., inconclusive, zero results, not enough DNA, etc.).

Table 5: Summary of TriggerPro findings by evidence items (swabs)

EVIDENCE ITEMS	N	NOTES
Total gun swabs used in 160 cases	529	Sum of gun swabs reported in all TP cases.
TriggerPro (TP) gun swabs processed	367	Sum of gun swabs processed.
% total gun swabs used	69.4%	
Gun swabs providing:		
Complete single source profile	13	Complete profiles developed from a single-source.
% total swabs processed	3.5%	
Partial single source profile	89	Partial profiles developed from a single-source.
% total swabs processed	24.3%	
Complete mixtures	11	Complete profiles developed from mixtures.
% total swabs processed	3.0%	
Partial mixtures	85	Partial profiles developed from a mixture.
% total swabs processed	23.2%	
Partial mixtures (maj/min)	12	Partial profiles developed from a mixture (w/major + minor).
% total swabs processed	3.3%	
Other results	157	Inconclusive results, zero results, not enough DNA, etc.
% total swabs processed	42.8%	

Source: Data adapted from IMCFSA summaries, March 11, 2010.
Notes: *Maj/Min* refers to major and minor contributors.
% total swabs processed might not add to 100% due to rounding.

Going back to consideration of TriggerPro on the basis of cases (Table 4), some of these DNA profiles obtained from processing TriggerPro kits did result in useful identification outcomes. As explained above, the IMCFSA review of the TriggerPro cases reported on whether a DNA profile (if one was produced) resulted in any type of suspect identification—a stats-ID in which the chances that anyone else contributed to the crime scene sample are miniscule, or a non-stats-ID in which an individual cannot be excluded as a potential contributor.[9] To those ends, 4 cases (2.5 percent) produced stats-IDs and 15 cases (9.4 percent) produced non-stats-IDs. Thus, nearly 12 percent of the TriggerPro cases provided profiles that had probative and investigative value.[10]

Table 6 links the different types of DNA profiles developed from TriggerPro cases with the basic suspect identification outcomes that are reported for the completed cases. The table suggests that cases with various mixture combinations had a higher likelihood of producing stats or non-stats identifications than the cases that had various types of single source profiles. For example, among the 42 cases from which gun swabs produced only mixtures, 8 of the 15 non-stats identifications and 3 of the 4 stats-identifications were developed (these mixtures generally had major/minor contributors). This seems important because touch DNA methods like TriggerPro—especially if applied to firearm-related evidence items—will produce a lot of DNA mixtures that, based on the pilot project data, can offer potentially useful identification information.

[9] In IMCFSA lab reports, language describing a "stats-ID" will note that "<John Doe> is the source of the DNA profile to a reasonable degree of scientific certainty." Language describing a "non-stats-ID" will note that "<John Doe> cannot be excluded as a possible contributor to the DNA in the sample." It should be noted that any stat or non-stat ID is dependent upon the quality of the DNA profile and the availability of reference standards.

[10] Incidentally, IMCFSA reported that one of the cases (DP08-164885) in which a stats-ID was obtained involved TriggerPro gun swabs that were not "broken open"—that is, the swabs were not moistened with the anti-microbial fluid in the self-contained kits. The swabs were apparently used dry, but nonetheless gathered a biological sample that proved adequate to produce a stats-ID.

Table 6: Types of DNA profiles produced by TriggerPro cases and suspect identification outcomes

Profiles produced in TriggerPro cases	Suspect identification			Total	% total = Stats or Non-stats ID
	No ID information	Non-stats ID	Stats ID		
Single source complete + single source partial	3	–	–	3	0%
Single source partial	28	3	–	31	9.7%
Single source complete	3	–	–	3	0%
No profiles	56			56	0%
Mixture + single source partial	19	4	–	23	17.4%
Mixture + single source complete	1	–	1	2	50.0%
Mixture only	31	8	3	42	26.2%
Totals	**141**	**15**	**4**	**160**	**11.9%**

Source: IMCFSA summary reports, March 11, 2010.
Note: A single case can produce multiple profiles. Table cells indicate the number of cases that produced one or more profiles of the types described in the first column on the left. For example, the first line shows that three cases produced at least one single source complete profile and one single source partial profile, but none of the three cases resulted in a stats- or non-stats-ID.

Buccal swabs and collection of reference standards

An important component of the overall effectiveness of a touch DNA approach such as TriggerPro is the collection of reference or elimination standards from suspects and arrestees involved in firearm incidents. These reference samples—typically obtained from individuals, using buccal swabs—can then be used to seek matches with any DNA profiles that are developed from the gun swabs. If no reference or elimination standards are collected, it will be more difficult to connect individuals to any DNA profiles that are developed. With respect to the pilot project, roughly 40 percent of the TriggerPro cases included buccal swabs from individuals involved (Table 7). A total of 88 buccal swabs were obtained, which represented about 56 percent of individuals arrested in the TriggerPro cases. Involved individuals must consent to give police officers a buccal sample, so the smaller number of TriggerPro cases with buccal swabs is not especially surprising.

Table 7: Buccal swabs taken and arrests reported in TriggerPro cases

Buccal swab taken	Number of buccal swabs taken					Total	% cases
	0	1	2	3	4		
No	98	–	–	–	–	98	61.2%
Yes	–	44	11	6	1	62	38.8%
Total cases	98	44	11	6	1	160	100%
Total buccal swabs	–	44	22	18	4	88	
	Persons arrested in TriggerPro cases					**158**	
	% arrestees, buccal swabs taken					**55.7%**	

Sources: For buccals, IMCFSA summary reports; for arrests, IMPD firearm tracking data.

Identification outcomes: firearm fingerprinting versus TriggerPro

Comparing gun-related fingerprint cases and evidence items to TriggerPro cases and evidence items suggests that touch DNA gun swab methods such as TriggerPro generate a more sizeable quantity of *potentially usable* forensic evidence (Table 8), but this potential does not translate directly into an equally larger number of valued identification outcomes. Nearly two-thirds (104/160) of TriggerPro cases

produced some type of DNA profile.[11] Yet the much larger number of TriggerPro cases with profiles did not result in a similarly larger number of the highest value individualized identifications (2.5 percent of gun swab cases versus 2.7 percent of fingerprint cases). The TriggerPro cases produced non-stats identifications (i.e., could not exclude an individual as the contributor) at about twice the rate fingerprint cases produced identifiable (but not individualized) fingerprint images (9.4 percent versus 4.8 percent, respectively). Further, as suggested in Table 7, more suspect reference standards could also produce better identification results.

Table 8: Comparison of fingerprint and TriggerPro findings

	Fingerprint cases	TriggerPro cases
Total cases with forensic requests	**147**	**160**
Cases producing:		
Viable fingerprint images or DNA profiles	21	104
% total cases	14.3%	65.0%
Positive ID or stats-ID	4	4
% total cases	2.7%	2.5%
Identifiable prints or non-stats ID	7	15
% total cases	4.8%	9.4%
Total evidence items processed	**503**	**367**
Evidence items producing:		
Viable fingerprint images or DNA profiles	23	210
% total evidence items	4.6%	57.2%
Positive ID or stats-ID	4	4
% total evidence items	0.8%	1.1%
Identifiable prints or non-stats ID	11	15
% total evidence items	2.2%	4.1%

Notes: *DNA profiles* include cases resulting in single source or mixture-based profiles of any type.
Positive ID refers to fingerprint images that are individualized.

The comparisons of evidence items are similar. About 5 percent of gun-related evidence items produced viable fingerprint images, while 57 percent of the TriggerPro evidence items (gun swabs) resulted in DNA profiles. Again, however, although gun swabs produce more potential evidence in the form of DNA profiles, the vast majority of those profiles ultimately had no identification value. As a proportion of total evidence items, the most valued identification outcomes were produced by 3 percent of gun-related fingerprint evidence and 5.2 percent of TriggerPro evidence.

Uploading to national forensic databases

The final comparison between firearm fingerprinting and the TriggerPro kits involved the extent to which either method generated evidence that could be uploaded to regional or national forensic databases, which in this case would be IAFIS or CODIS. The number of fingerprint images uploadable to IAFIS was potentially 11 sets of latent prints (7.5 percent of cases). In comparison, less than two percent of TriggerPro cases were uploadable to CODIS. There were three TriggerPro cases eligible for CODIS upload, and among those three there was one CODIS hit reported. As discussed in the conclusions, the low rate of TriggerPro uploads is likely due to the nature of the pilot project, which did not focus on criminal incidents that qualify for uploads to and searches of the Indiana state DNA database or CODIS.

[11] IMCFSA staff report that by avoiding DNA amplification failure or other technical difficulties, more DNA profiles could have resulted.

The TriggerPro mold problem

One other aspect of the pilot project that should be reported concerns the incidence of mold on many of the TriggerPro gun swabs. The IMCFSA case summaries reported approximately 85 to 90 percent of the TriggerPro cases had one or more swabs with visible mold. The widespread presence and frequency of mold were linked to the configuration of the TriggerPro kit and the procedures used to gather samples, store the used gun swabs, and deliver the sealed plastic TriggerPro evidence bags to the IMPD property room. In summary, after using swabs on firearm evidence, the wet swabs (moistened by the microbial fluid in the TriggerPro swab containers) were re-capped and sealed in airtight plastic bags supplied with each TriggerPro kit, and then sent to the IMPD property room. As with any evidence item submitted to a police property room, there will be a period of time during which the item is stored until processing can begin. Thus, the TriggerPro evidence kits would sit for varying periods, ranging from days to weeks, before being delivered to Strand. As noted, most of the TriggerPro gun swabs developed mold to varying degrees. Wet swabs in an airless environment (sealed plastic bag) are more likely to produce mold and sample degradation (Bell, 2004; Saferstein, 2007).[12] The traditional method of touch DNA uses sterile swabs and distilled water, but the wet swabs are allowed to dry when stored with an aerated cap in a paper evidence bag.

A comparison of the TriggerPro cases to other touch (non-TriggerPro) DNA cases analyzed by the IMCFSA suggests that the mold problem was largely restricted to the TriggerPro swabs, and not a characteristic of the generic touch DNA approach. IMCFSA had conducted touch DNA swabs of firearms in other cases before the TriggerPro project began; these other cases were examined to determine the incidence of mold in the pre-existing method of collecting touch DNA (swab + sterile water). CCJR reviewed available IMCFSA case files for 87 cases in 2008 and 2009 involving the use of the touch DNA technique to gather human skin cells from firearms and firearm-related items. The presence of mold on DNA swabs was rare (i.e., fewer than five of those cases).

The mold problem was ultimately addressed to some degree, but not in time to have a material impact on the kits used in the TriggerPro pilot project. In early 2010, ForensicID re-designed the TriggerPro kits by aerating the capped plastic containers in which individual swabs were placed. In addition, the plastic evidence bags in the TriggerPro kits were replaced with paper bags. The reconfigured TriggerPro kits are undergoing a one-year validation study at Sorenson Genomics in Salt Lake City, Utah; as of late-May 2010, a 90-day preliminary report had been released, but it makes no mention of whether the mold problem has been eliminated.

[12] One of these analysts noted that "microbes generally favor warm, moist conditions," and that for proper storage the biologic materials collected via touch DNA should be dried and ultimately frozen (Bell, 2004).

Summary of Findings and Conclusions

The TriggerPro pilot project is an early example of touch DNA evidence collection used by law enforcement officers in the field. It is probably the first time a touch DNA approach has been deployed for use by patrol officers within a targeted police service district.[13] As a result, the pilot project offered an early opportunity to evaluate a touch DNA method of evidence collection (such as TriggerPro) intended to be broadly used by police patrol officers.[14] This evaluation might be the first time the basic outcomes of a gun swab approach to processing firearms have been examined, as well as the first comparison between a touch DNA and fingerprinting as alternative approaches to processing gun evidence. Because it was necessary to create a comparative fingerprint group, this analysis is also one of the first times that firearm cases have been examined to uncover how frequently fingerprint development and examination is requested for gun cases, and their identification-related results. The evaluation of TriggerPro focused on two basic questions: how much potential forensic evidence could be generated, and how useful was that information for purposes of suspect identification? Findings are discussed below.

Summarizing the quantity and use of forensic evidence produced

The touch DNA approach examined here, TriggerPro, produced comparatively more *potentially* probative evidence than firearm fingerprinting, although just because a DNA profile was developed did not automatically mean it had any value for identification purposes. Depending on the circumstances, various types of DNA profiles obtained from crime scenes samples can *possibly* have probative value—that is, depending on the nature of the DNA sample and the availability of reference samples (e.g., from suspects), the profiles could be used to include or exclude an individual as a contributor. In this sense, the TriggerPro kits produced a substantial number of DNA profiles, measured as the sum of single source DNA samples and DNA mixtures. About 57 percent of gun swabs (210 of 367 evidence items), or nearly two-thirds (104/160) of TriggerPro cases, generated DNA profiles of various types—but it should be emphasized that the actual usefulness of those profiles for identification was much lower and only about five percent of the TriggerPro firearm evidence items had any value for identification or exclusion of an individual. This was in comparison to gun fingerprinting, in which 4.6 percent of evidence items (23/503), or 14.3 percent of cases (21/147), produced viable fingerprints.

Despite the larger quantity of potential evidence in the TriggerPro cases, criminal identification outcomes between the two methods of firearm evidence collection were similar. In other words, the higher volume of forensic evidence collected by TriggerPro kits did not translate into a substantially larger number of identifications than gun fingerprinting. The TriggerPro touch DNA cases only fared somewhat better than fingerprint cases when considering identification results. On one hand, the incidence of positive identifications in the two groups was roughly equivalent—both sets of cases produced four individualized identifications. Considering the probability that a given evidence item would produce a positive identification, fingerprinted items yielded a 0.8 percent rate (4/503 items), compared to a 1.1 percent rate for gun swabs (4/367 items)—not a big difference. On the other hand, the sample of gun fingerprint cases produced an additional 11 identifiable (though not individualized) fingerprints, while the TriggerPro gun swab cases produced 15 additional DNA profiles capable of including or excluding the suspect's reference sample (i.e., non-stats IDs). If the most valuable identification outcomes for the two methods are compared (i.e., positive fingerprint IDs combined with identifiable prints, versus stats-IDs plus non-stats IDs), the rate of success among fingerprint evidence items was 3 percent, while the rate among DNA evidence items (swabs) was 5.2 percent, a slightly bigger difference. Nonetheless, considering the larger

[13] In Marion County, and prior to TriggerPro, the US Alcohol, Tobacco, and Firearms-sponsored Project Achilles used gun swabs to process firearms seized in the field.

[14] By looking more closely at the incident reports of the TriggerPro cases, analysts could identify the number of different patrol officers and investigators who used TriggerPro kits, which could in turn provide police administrators with useful information concerning how new technologies are deployed by field personnel.

quantity of potential forensic evidence generated by gun swabs compared to firearm fingerprinting, the identification outcome differences between the two were small.

Evidence items uploadable to federal databases were generally minimal for both approaches, although fingerprint cases were more likely to be eligible for IAFIS. Only three TriggerPro cases were eligible for uploading to CODIS. The FBI officially permits only complete profiles (or partial profiles with nine or more loci) from qualifying crimes to be used to search within or upload to CODIS; and, as noted, the Indiana state database permits uploads involving as few as eight genetic loci. However, the nature of the pilot project, with its focus on swabbing guns without regard for specific crimes or infractions involved, meant that TriggerPro samples from the pilot project would be unlikely to meet the FBI CODIS criteria. Conversely, gun fingerprints could be uploaded to federal forensic databases more frequently than the sample of TriggerPro DNA profiles. All 15 of the identifiable prints from evidence items could potentially have been uploaded to the federal IAFIS database, or used to search IAFIS.[15] The upload rate of touch DNA samples might increase if the focus was on other qualifying crimes such as burglary or vehicle theft. That few TriggerPro samples were uploadable to CODIS was not a problem with the gun swab approach; it was an artifact of largely targeting firearm possession incidents.

Conclusions and recommendations

Fingerprinting firearms has perhaps a higher rate of viable print production than originally suspected. Prior anecdotal accounts suggested few guns were printed, and even then a very small number of guns actually produced prints. As it turned out, about one in five gun cases (147/705 = 20.9 percent) resulted in requests for latent print development. If investigators asked for prints, viable prints were generated in 14.3 percent of the 147 cases.

In contrast, if investigators used a touch DNA method such as TriggerPro, some type of DNA profile was generated from 57 percent of the evidence items (or, alternatively, in 65 percent of the cases). Yet this overstates the actual value of these profiles in criminal identification. As such, any recommendations to broadly use touch DNA methods of evidence collection such as TriggerPro must be qualified in several ways. Decisions to continue use of pre-packaged touch DNA kits such as TriggerPro should be based on several considerations, some of which could not be analyzed closely with this evaluation.

First, any new forensic tool should undergo appropriate validation studies. In this case, a serious problem with mold appeared in the early stages of the TriggerPro pilot project. Approximately 80 to 90 percent of TriggerPro gun swabs developed some amount of mold. Although ForensicID has modified the kits to reduce the likelihood of mold (after the pilot project was mostly completed), the new kits are currently undergoing a validation study to determine if the mold problems have been eliminated. An interim report was submitted (by Sorenson Genomics), but it recounted only 90 days of a one-year study and it did not mention mold, so its results are inconclusive. Thus, the re-designed TriggerPro product is still undergoing validation, and any widespread adoption should await the final results of the ongoing study.

Second, the actual use of touch DNA evidence, whether produced by TriggerPro or traditional swab/sterile water approaches, in Marion County prosecutions was not systematically examined in this evaluation. Appendix 1 provides summary information of the disposition or circumstances of 19 cases; a few of these cases suggest the TriggerPro results proved useful, but more systematic analysis is needed to determine the ultimate value of touch DNA results in criminal prosecutions.

Third, the costs of a touch DNA approach versus a fingerprint approach were not addressed directly in this analysis. However, the total costs of processing touch DNA samples requires much closer analysis before concluding that the larger quantities of potential DNA evidence collectable using touch DNA methods

[15] CCJR made no determination of whether the viable identifiable fingerprints from firearm evidence were or were not uploaded to IAFIS.

make it far superior to fingerprinting. If there is little difference in outcomes between two methods, cost should be a more important deciding factor in the choice of forensic technologies. Considered in a different way, if the cost of processing touch DNA samples is substantially higher than the costs of processing fingerprint development and examination, any comparative efficiency of touch DNA methods would be less obvious.

It seems clear now that the true costs of fully processing 400 DNA (gun kit) samples (as proposed in the 2008 grant applications) were substantially underestimated in the CAGI and PSN grant amounts. For purposes of PSN grant management, the TriggerPro pilot project was funded by $160,000 of PSN and CAGI grants. Changes in the quantity of TriggerPro kits ultimately used in the pilot had a big impact on the kit-based grant costs for PSN and CAGI. The proposed initial cost of the project, distributed among the proposed number of kits, was $160,000/400 = $400 per kit. In comparison, the actual grant-related cost of the project was $160,000/186 = $860/kit.

The sources of and reasons for the cost underestimate are not completely clear, although aspects of the increased costs can be identified. One of the reasons the TriggerPro sample ending up at less than half its projected sample of 400 guns was that costs of processing buccal swabs (from suspects in TriggerPro incidents) and the costs of final technical reviews and reports were evidently not included in TriggerPro kit pricing.[16] The need to obtain reference and elimination samples meant that there were extra costs associated with processing buccal swabs obtained from suspects or other persons involved in TriggerPro incidents. There were also additional costs linked to development of full technical reports on DNA profiles obtained from the gun swab samples. Although these costs were transferred in part to IMCFSA (and possibly Strand), the reduced sample size in the pilot project ultimately absorbed these added costs. Neither category of costs appeared to be included in proposed budgets for the PSN and CAGI grants. However, without other price and cost data from ForensicID and more information about the cost impacts on IMCFSA, it is hard to estimate true costs of the TriggerPro project. In the context of the TriggerPro pilot project, the total costs of processing the TriggerPro gun swab kits turned out to be substantially in excess of the grant amount used to fund the IMPD East District pilot. Accordingly, the costs of using a focused touch DNA approach should be considered carefully in future projects involving touch DNA generally or TriggerPro specifically.[17]

In terms of the smaller sample size of the pilot project, ultimately only 186 kits were used. CCJR did not determine what happened to the other 214 TriggerPro gun swab kits that were not used during the project period. Based on the CAGI and PSN grant, the TriggerPro kits were, in effect, purchased by IMPD, and were evidently delivered to IMPD. The department should have possession of them. However, because the early TriggerPro kits had not been re-designed to eliminate the mold problem, the remaining pilot project kits—if they are available and usable—would need to be stored and processed differently to minimize the possible incidence of mold.

A fourth related issue regarding the comparative usefulness of TriggerPro gun swabs versus fingerprint approaches to firearm evidence is the time required to complete full forensic processing. Although this evaluation did not systematically compare the time periods required from initial evidence submission through the release of the IMCFSA lab report on the item(s), the more complex scientific processing

[16] Pricing per kit means that the true cost of a three-swab kit would be (somewhat obviously) three times the cost associated with processing a single swab. IMCFSA staff reported that, for non-TriggerPro DNA samples, Strand's 2008-2009 contract charged $438 per extraction (i.e., pulling or trying to pull DNA samples from a single evidence item). In this context, an "extraction" is a single swab from a kit, so the minimum costs of processing each kit alone would be $438 x 3=$1,314. Presumably, Strand was charging TriggerPro a discounted rate, but to make ForensicID's grant arithmetic work, the discounted price would have had to be something less than $400 per kit. This is probably a key reason why in the first several months of the pilot project Strand produced only the processing results, but not the full review and technical report. Most of these costs were shifted to the IMCFSA.

[17] In the end stages of the TriggerPro pilot project, ForensicID was awarded a $1.2 million grant from the Indiana Criminal Justice Institute (from federal economic stimulus money) in January 2010 to continue supplying TriggerPro to IMPD officers and to expand its pre-packaged touch DNA evidence collection kits to burglaries in the IMPD service area and the Fort Wayne Police Department, using a similar kit-based approach called "1st Responder ID."

associated with developing and analyzing DNA samples—in comparison to developing or examining latent fingerprints—means DNA-related evidence requests are likely to take longer to complete than fingerprint-related requests. For example, in calendar year 2009, the IMCFSA turnaround time for latent fingerprint processing was 43.2 days, compared to 72 days for DNA processing (IMCFSA, 2010). Thus, both the time element and the total costs associated with touch DNA evidence processing deserve more detailed analysis.

Fifth, issues regarding use of touch DNA kits such as TriggerPro in the field deserve some attention. Because TriggerPro was considered a pilot project, there was probably less discretion used in the application of gun swabs to crime guns confiscated in the field. This is because one objective of the TriggerPro pilot project was to swab as many guns as possible in as short a time as possible. While this was an objective, it was clear that many firearms recovered in the East District during the pilot period were *not* swabbed—TriggerPro cases were only about 20 percent of all East District firearm incidents during the time period of the pilot project. This suggests that all East District patrol officers were not equally engaged in the implementation of TriggerPro, and that future initiatives should emphasize the importance of actually using as broadly as possible any new and available forensic identification tools after such tools are deployed. Additionally, firearms might have been swabbed during the pilot project that would not have been swabbed under normal circumstances (e.g., the gun was taken directly from an individual's pocket, or an involved individual stipulated it was his firearm). With more officer discretion and careful targeting of particular crimes, better reference and elimination standard collection rates, and the use of police officer reference standards, the DNA profiles produced by gun swab kits might become more useful in actual suspect identification and criminal prosecutions. Related to this, use of touch DNA tools for crimes such as burglary, vehicular theft, assault, and other violent crimes should increase the number of Indianapolis-Marion County DNA samples capable of uploading to or searching the Indiana state DNA database or the federal CODIS data. Expanding the number of profiles contained in these systems can help future criminal investigations.

Finally, and with respect to application of touch DNA methods by police patrol officers, users in the field should seek higher collection rates of reference and elimination standards from suspects or other involved individuals. However, because suspects must give informed consent, getting buccal samples is partly a function of how individuals in the field respond. Nonetheless, proper ways of obtaining buccal swabs should be part of training law enforcement officers to use touch DNA methods of evidence collection. In addition, wider use of law enforcement officer reference standards could reduce the number of unknown profiles developed using touch DNA methods.

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Appendix 1: Prosecutor and IMCFSA comments on selected TriggerPro cases

There were two efforts to qualitatively examine the circumstances and outcomes of a selected number of TriggerPro cases. In October 2009, several of the TriggerPro gun swab cases were examined by a member of the Marion County Prosecutor's Office (MCPO). The purpose of the examination was to determine what role if any the use of touch DNA gun swabs had played in the disposition of cases up to that point (October 11, 2009). In addition, in December 2009, staff of the IMCFSA examined a limited number of TriggerPro cases to identify the circumstances surrounding use of touch DNA. This appendix offers a summary overview of their findings regarding 19 of the TriggerPro cases.

Table A1: Summary of selected TriggerPro case circumstances or disposition

Count	Case number	Case circumstances or disposition	Source
1	CP08-000626	DNA matched juvenile suspect <name redacted>. No adult charges filed. Juvenile plea agreement to Handgun MA	MCPO
2	DP08-109477	Armed robbery with injury where suspect was later identified from a photo line-up. His vehicle was also searched at a later point. No data regarding where the weapon was found.	IMCFSA
3	DP08-113611	Weapons charge where the gun was found under the suspect's driver's seat in his presence. He claimed ignorance regarding the weapon.	IMCFSA
		DNA matched suspect <name redacted>. Charges filed after receiving DNA results.	MCPO
4	DP08-116865	Attempted strong arm robbery where there were two suspects in the vehicle. The weapon was found in the trunk of the vehicle, although there was a witness who said he saw a gun between the legs of the driver. Charges were not filed.	IMCFSA
		DNA matched suspect <name redacted>. Victim could not ID suspect, gun was found unloaded and secured in trunk. No charges filed.	MCPO
5	DP08-118565	Shots fired case where officers observed the suspect drop the weapon before he was arrested.	IMCFSA
		DNA matched suspect <name redacted>. Suspect plead guilty *after* DNA results received.	MCPO
6	DP08-119033	Traffic stop where the suspect did not have a valid license and had a passenger in the vehicle. The car was towed and during inventory a weapon was found under the driver's seat. When the buccal swab was collected, the suspect admitted it was his weapon and he put it under the seat.	IMCFSA
		DNA matched suspect <name redacted>. Suspect plead guilty prior to receiving DNA results.	MCPO
7	DP08-134777	Armed robbery with injury. The weapon was recovered from the suspect's pocket by officers.	IMCFSA
		DNA matched <name redacted> (who had the gun in his pocket). <Name redacted> was a bystander and not a suspect in the robbery.	MCPO
8	DP08-134779	DNA matches robbery suspect <name redacted> (& excludes <name redacted>). Results will enable filing of charges. Sgt <name redacted> to follow-up with warrant.	MCPO
9	DP08-137572	Shots fired case where the firearm was found under a rug in an apartment building after an officer observed a suspect with an object in his hand. The suspect entered the building and exited without the object.	IMCFSA
		DNA matched juvenile suspect <name redacted>. No adult charges filed. Juvenile Plea agreement to Handgun and Fleeing MA.	MCPO
10	DP08-141920	Shots fired case where two firearms were recovered in the suspect's residence. Both firearms belong to the suspect.	IMCFSA
		2 guns involved. DNA matched suspect <name redacted>. Suspect pled guilty prior to receiving DNA results.	MCPO
11	DP08-160010	Car-jacking case where three suspects were stopped in the stolen vehicle and ran. The weapon was found in the vehicle. The case was a CODIS hit.	IMCFSA
		DNA matched suspect <name redacted>. Suspect pled guilty prior to receiving DNA results.	MCPO
12	DP08-162234	Traffic stop where the weapon was taken from the suspect's pocket.	IMCFSA

Table A1: Summary of selected TriggerPro case circumstances or disposition

Count	Case number	Case circumstances or disposition	Source
13	DP08-164885	Narcotics case where a felon's residence was being searched and a handgun was found. The suspect admitted to officers that the stolen weapon was his.	IMCFSA
		DNA matched suspect <name redacted>–however, because gun was found in his home, there was no violation of state law.	MCPO
14	DP08-165066	DNA matched suspect <name redacted>. DNA results will enable filing of charges. LT <name redacted> to follow up with warrant.	MCPO
15	DP09-000444	Traffic stop where there were three people in the vehicle. The firearm was discovered on the back seat when the passenger there was removed from the vehicle.	IMCFSA
16	DP09-008411	Shots fired case where a weapon was discovered when responding and finding two suspects. Little information available.	IMCFSA
17	DP09-044880	Shots fired followed by a traffic stop where two suspects were in the vehicle. Weapons were found on the back seat and under the driver's seat.	IMCFSA
18	DP09-047899	Traffic stop with three vehicle occupants, and the driver had no license. Narcotics were discovered and a handgun under the driver's seat.	IMCFSA
19	DP09-058837	Traffic stop of three vehicles with multiple passengers. Weapons were found in the trunk of two vehicles.	IMCFSA

Notes: MCPO = Marion County Prosecutor's Office; IMCFSA = Indianapolis-Marion County Forensic Services Agency

Appendix 2: Process-oriented assessments of TriggerPro usage by IMPD

On February 17, 2010, CCJR staff interviewed IMPD police officer and evidence technician (ET) Andrew Lamle and IMPD Captain Craig Converse. Officer Lamle had been involved in a substantial number of the TriggerPro cases, and Capt. Converse was actively involved in the implementation of the TriggerPro pilot project within the East District. This appendix summarizes the results of the interview.

1. Officer Lamle reported that he had done a large number of TriggerPro cases. Another patrol officer was supposed to be at this interview, but Capt. Converse reported she was out sick.
2. Prior to the TriggerPro project, there were no attempts by patrol officers or IMPD evidence technicians (ET) to collect DNA evidence from firearms. Only fingerprinting was used.
3. Officer Lamle and Capt. Converse reported that the TriggerPro (TP) concept/idea is "great" and spoke positively about the usability of the TP kits. He preferred the kits to the sterile swab/distilled water technique. He noted, for example, that the distilled water bottles would freeze in the trunk of his patrol car during winter. He liked the packaged nature of the gun swab kits, with everything needed included within one packet.
4. There were effectively two sources of training for East District officers who used the kits: one from TriggerPro (Vince Perez and a Powerpoint presentation) and one from IMCFSA staff. The general perception of the TriggerPro training was that it relied too much on talk and watching Powerpoint slides, and not enough on hands-on use of the kits. In addition, the East District received training from IMCFSA, which used a different TriggerPro product to focus on collection of touch DNA from burglary scenes. In that training, unlike the TP training, they were given kits to handle, and allowed to actually use kits.
5. Officer Lamle questioned whether three swabs—as opposed to one—was the proper approach. Based on the IMCFSA training they received for the burglary DNA initiative, Officer Lamle reported that the IMCFSA typically used one swab on a gun. The concern was that the use of multiple wet swabs "might dilute" the DNA/biological materials, if any, on the gun.
6. Officer Lamle had questions about whether both swabbing and fingerprinting could/should be done; he recounted a case where a visible print on a magazine was lifted first, followed by swabbing afterwards.
7. Both Officer Lamle and Capt. Converse reported questions about inventory control of the TP kits; they indicated some dissatisfaction with the way they had been distributed initially, then recalled and redistributed again. In the process, kits were lost. Available kits were frequently scarce. There would be times when calls would go out over the radio for kits and there would be no response.
8. Both indicated several times and in various ways that the pilot project would have been better and more effective with better communications and better training. Officer Lamle indicated that patrol officers and other users of TriggerPro needed to be better educated about the capabilities of the gun swab technique. This was linked to better feedback about results.
9. Using the kits effectively was partly a function of how frequently an officer would use them. They noted that, in general, patrol officers rarely filled out evidence request cards because before the pilot project, only detectives filled out evidence request forms. To the extent officers only used kits rarely, they would forget how to properly fill out the TriggerPro forms and the evidence requests.
10. They noted that there was little or no feedback to officers about the results of the gun swabbing. Officer Lamle contrasted this with the regular letters that go out from the IMPD Identification Unit

that lists and commends officers and ETs who successfully lifted visible or latent fingerprints; a similar letter goes out to examiners who make positive identifications with fingerprints. These letters further detailed what the results of having obtained the prints were (e.g., a positive identification of a suspect, etc.). With regard to the gun swab kits, they had no idea what happened after the TP evidence kits were sent to the IMPD property room.[18]

11. Related to the lack of feedback, Officer Lamle and Capt. Converse wondered whether there could or should be barcodes or some other type of tracking mechanism on the TP kits that would link them to the officers that used them, so that the officer could be informed subsequently of the results of the gun swabs they performed.
12. Officer Lamle related "a couple of cases" in which suspects, upon seeing the swabbing procedure and being informed it was to collect DNA, did report that that they had in fact touched the gun or that it was theirs. This was not systematically tracked or recorded.[19]
13. In Officer Lamle's experience, suspects rarely agreed to provide a buccal swab; he reported only a few cases where the individual, after having been read the form that explains the suspect's right to refuse to give a sample, agreed to provide a buccal swab.

[18] It should be noted that as of May 2010, similar letters now go out to officers, ETs, and forensic staff regarding their role in developing successful DNA-based identifications.

[19] A review of incident/arrest reports linked to TriggerPro cases by CCJR found no systematic mention of how the use of TriggerPro kits influenced voluntary statements of individuals involved or suspects arrested.