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DENVER POLICE DEPARTMENT

JOINT NEWS RELEASE

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DENVER'S DNA BURGLARY PROJECT KEY PART OF NATIONAL STUDY

The U.S. Department of Justice released the findings and analysis from a 5-city experiment that looked at the cost-effectiveness of using DNA to investigate and prosecute property crimes.

Denver was one of the 5 cities participating in the grant-funded study and was the only city to include prosecution in its program. Overall the study found that using DNA evidence in property crimes dramatically increased the chances of catching a burglar. Denver's results were astounding:

- More than 95 prolific burglars in the Denver area were caught and convicted
- The home burglary rate in Denver dropped 26%
- The use of DNA evidence in burglary cases results on average 14-year prison term (compared to an average 1.4-year jail sentence for cases without DNA)
- The project showed that in property crimes, the presence of DNA can be paramount to successful prosecution. In cases that include DNA evidence, the prosecution filing rate is approximately 42%, which is more than eight times the rate of prosecution in cases without DNA evidence
- Annual savings to citizens in Denver are estimated at more then $25 million to date!
- For more details and statistics on the project see: Effectiveness and Cost Efficiency of DNA Evidence in Volume Crime, Denver Colorado Site Summary: http://www.denverda.org/DNA_Documents/DNABurgrCostEfficiencyReserch1%20_2_.pdf

The DNA Burglary Project has been a collaborative effort of the Denver Police Department, the Denver Police Crime Laboratory, and the Denver District Attorney's Office. Based on the findings of the project, the Denver Police Department and the Denver DA's Office are committed to expanding the use of DNA in solving and prosecuting property crimes.

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Department of Justice

Office of Justice Programs

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Office of Justice Programs
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JUSTICE DEPARTMENT EVALUATION FINDS DNA TECHNOLOGY INCREASES CHANCES OF ARREST

WASHINGTON – The use of DNA technology results in a higher probability of arrest for all property loss crimes, according to a study released today from the Department of Justice's National Institute of Justice (NIJ).

The study found that obtaining DNA samples in property crimes dramatically increases the chances of a burglar being caught and is more cost –effective in the long run to law enforcement, according to an experimental five city project evaluation.

"The information gained from this study will be valuable to other cities and communities interested in collecting DNA evidence in property crimes," said OJP Acting Assistant Attorney General Jeffrey L. Sedgwick. "It provides valuable information and best practices about collecting DNA at burglary scenes. It could lead to major changes in law enforcement policy and practice."

NIJ, a division of the Office of Justice Programs, funded the study through a competitive grant process, with an independent evaluation being conducted by the Urban Institute. Additional findings include:

- When DNA evidence is analyzed in property crimes, twice as many suspects are identified, twice as many suspects are arrested, and more than twice as many cases are accepted for prosecution compared to traditional investigation (which do not use DNA evidence);

- DNA is at least five times as likely to result in a suspect identification compared with fingerprints;

- Suspects identified by DNA had at least twice as many prior felony arrests and convictions as those identified by traditional investigation.

In 2005, NIJ provided funds to five cities—Denver, Colo; Topeka, Kan; Phoenix, Ariz; Los Angeles, Calif; and Orange County, Calif;—to experiment with DNA evidence collection in property crimes. The experiment was designed to determine if collecting DNA evidence at property crimes scenes could be a cost-effective tool in helping local law enforcement officials identify and apprehend burglary suspects.

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Description of the 5-city experiment is available at:
http://www.ojp.usdoj.gov/nij/topics/forensics/dna/property-crime/evaluating-experiment.htm

Description of forensic DNA analysis is available at the Web site of the President's DNA Initiative: http://www.dna.gov/basics/analysis/

The Office of Justice Programs, headed by Acting Assistant Attorney General Jeffrey L. Sedgwick, provides federal leadership in developing the nation's capacity to prevent and control crime, administer justice, and assist victims. OJP has five component bureaus: the Bureau of Justice Assistance; the Bureau of Justice Statistics; the National Institute of Justice; the Office of Juvenile Justice and Delinquency Prevention; and the Office for Victims of Crime. Additionally, OJP has two program offices: the Community Capacity Development Office, which incorporates the Weed and Seed strategy, and the Office of Sex Offender Sentencing, Monitoring, Apprehending, Registering, and Tracking (SMART). More information can be found at http://www.ojp.gov.

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Effectiveness and Cost Efficiency of DNA Evidence in Volume Crime Denver Colorado Site Summary

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Key words: DNA Analysis, volume crimes, burglary, crime reduction strategies, cost effectiveness

Property crime has a significant impact on society due to the level of invasiveness of the crime and the effect on the lives of victims. Home and business burglaries drastically reduce personal security, peace of mind, and well-being (1). The societal cost of property crime is often underrepresented by only evaluating the value of damaged and stolen property; however, the psychological and emotional cost to the victims and potential victims may be much higher (2). Thus, it is important to increase suspect detection, apprehension, and prosecution rates in property crimes in order to reduce the number of existing offenders at large and to deter future burglars (1). Additionally, fewer property crimes will ease public anxiety and reduce home insurance premiums, which have risen dramatically during the last decade. These goals can be achieved through the use of DNA testing in property crimes cases at the front end of criminal investigations.

In late 2004, Denver applied along with four other cities (Los Angeles, Phoenix, Topeka, and Orange County) for federal funds to become national demonstration sites to evaluate the effectiveness and cost of DNA technology on high volume crimes, such as burglary, auto theft and theft from motor vehicle cases.

High property crimes rates reflect the low risk of being caught and the relative ease of committing this type of crime as compared with other crimes of convenience. More effective policing coupled with more extensive punishment may have a deterrent effect on habitual offenders and may prevent escalated criminal behavior as well as reduce the number of future property crimes(3)(4).

This study was principally concerned with evaluating the effectiveness of DNA analysis in property crimes in Denver and the resulting cost efficiencies realized. It is possible that the use of advanced forensics, like DNA testing, may offer the greatest impact on reducing the number of property crimes, but it may not necessarily be the most cost effective use of available financial resources (5). The experiences of others, especially in the United Kingdom provide strong support for the effectiveness of applying DNA technology to property crime investigations. This work will combine a study of the effectiveness of DNA testing (how many future burglaries were prevented) with an analysis of the

corresponding costs. Policymakers can use this data when considering expenditures for their respective Police Departments and Crime Laboratories, as well as for Prosecutors Offices and the courts.

Survey Area

Research was conducted with burglaries and other property crimes committed in the city and county of Denver in 2006. Denver has a population of 560,000 contained within 240,000 households and is policed by about 1,500 sworn officers. This is a major U.S. city that provides a variety of business and residential environments from inner-city urban to rural-urban suburbs. It includes populations with varying criminal dispositions, and a varied geographical environment providing the opportunity and ease of access for perpetrators of volume crimes.

Data and Data Sources

Denver Police Department records, Crime Laboratory Bureau statistics, and District Attorney's records and databases were used to populate a Microsoft Access database specially designed to reflect various aspects of the crimes quantitatively, as well as to capture relevant data on their investigation and prosecution.

Analysis of Effectiveness of DNA Testing

During the target period, 6,538 burglaries were committed in the City and County of Denver. Four hundred of these burglaries (or about 7%) contained potential biological evidence and were selected for the study where DNA testing was performed as part of the investigation and prosecution of the cases. All 400 cases with biological samples were analyzed, resulting in 340 DNA profiles obtained and uploaded into the Combined DNA Index System (CODIS). To date, the work has resulted in 199 CODIS hits (155 Offender and 44 Forensic). 172 cases were accepted by the Denver District Attorney's Office for prosecution, from which 77 cases were based on CODIS offender hit identification (of these, 40 were habitual offenders with more than 3 prior felony convictions), and 53 against John Doe offenders identified only by DNA profiles developed from evidence left at the crime scene. Only 24% were filed for prosecution based on detection by traditional investigations and over 76% would never have been filed and prosecuted without DNA analysis. Aggressive use of advanced DNA forensics in investigation and prosecution resulted in a pronounced reversal in property crimes compared to similar metropolitan areas in the United States demonstrating the effectiveness of this approach. [10] (Figure 1)

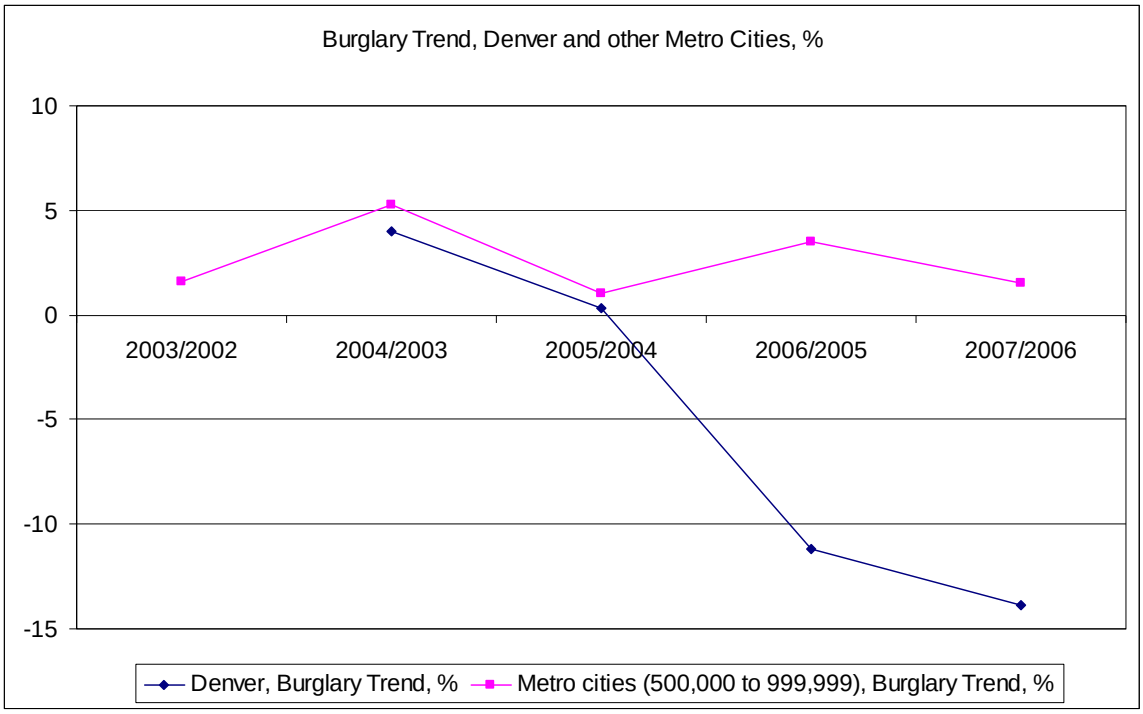

Figure 1 Burglary Trend Denver and other Metropolitan Cities 2002 to 2007

The type of forensic evidence recovered and its effect on sentencing after conviction is another important variable to be considered in this analysis. The average incarceration time for a residential burglar identified through traditional investigative means is approximately 1.4 years; while defendants identified through DNA evidence receive an average sentence of 13.9 years in the Colorado State Department of Corrections. For commercial burglaries the corresponding figures are less than 2 months in traditional cases compared with 4.6 years in DNA based cases (Figure 2). It should be emphasized that much harsher sentences in DNA CODIS hit burglary cases are the result of targeting a specific type of high volume, habitual offender that has a higher impact on society.

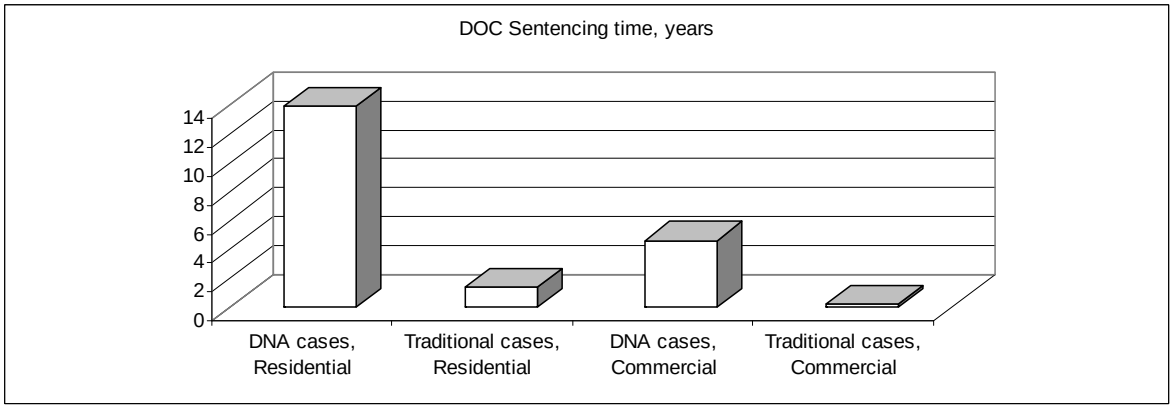

Figure 2 Department of Corrections Sentencing Times in years for study cases

The case prosecution rate, measured as a percentage of burglary cases filed with the Denver District Attorney's Office and accepted for prosecution is an important parameter when evaluating the effectiveness of DNA analysis. A total of 491 burglaries committed in 2006 were filed with and accepted for prosecution by the District Attorney's Office (both traditional based investigations and DNA based investigations). 130 of these cases were based exclusively on the results of DNA analysis of evidence. The prosecution rates for the traditional and DNA based burglary cases in 2006 are derived as follows:

- 491 burglary cases were accepted by the Denver DA for prosecution.
- Of those, 130 cases had a DNA component, either: 1) DNA identified the suspect or 2) DNA was instrumental in confirming that the suspect was connected to the crime scene.
- The rate of prosecution for cases with traditional investigation is: 491 cases minus 130 cases with DNA that were prosecuted divided by the total number of burglaries that only used traditional investigative method: that is 6538 total burglaries minus 400 cases with some sort of biological evidence collected. This represents a prosecution rate of 5.9% for burglaries without biological evidence.
- Approximately 7% of property crimes in Denver have biological evidence recovered that is suitable for DNA testing. In 2006, 6538 burglaries occurred and an estimated 400 had potential biological evidence. Out of these 400 cases, 130 DNA based cases were accepted for prosecution. This represents a prosecution rate of 32.5% for burglaries where some type of biological evidence was collected.
- DNA evidence therefore results in approximately 5.5 times the rate of prosecution as compared to traditional investigations. (Figure 3)

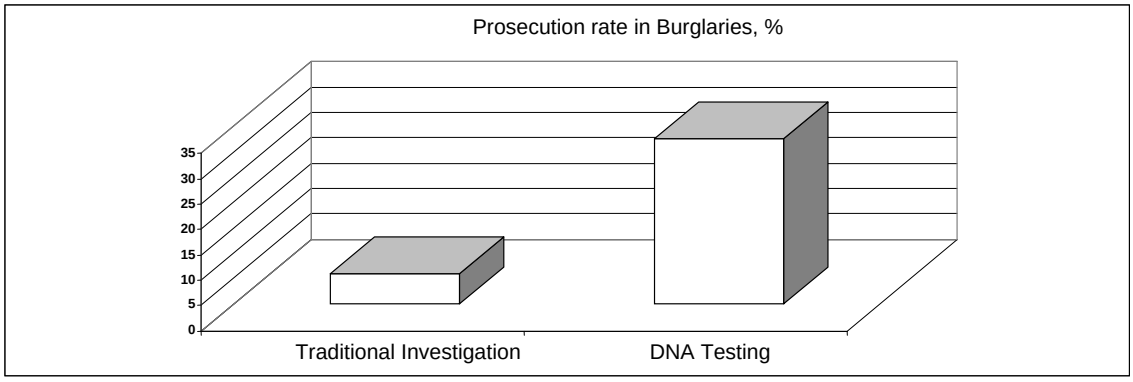

Figure 3 Prosecution rate in burglaries for both DNA based and non-DNA based or traditional investigations

Research is continuing to quantify the time savings during the prosecution steps; however, preliminary data from interviews with the Denver Prosecutors primarily responsible for bringing criminal charges in DNA CODIS Hit burglary cases have revealed that more Public Defenders are recommending that defendants plea to

charges than take the case to trial if DNA evidence links the defendant to the crime scene. This eliminates lengthy and costly trials and the City realizes a major cost savings by not committing the resources and the time that would have been required to prosecute these individuals.

Analysis of Cost Efficiency of DNA Testing

The police response to property crime consists of three major components:

- Initial dispatch of a patrol police unit based on a burglary call from dispatch and investigation at the scene. In general, two police officers are dispatched, taking an average of 22 minutes to arrive and spending 95 minutes at the scene.
- Attendance of crime scenes by the crime scene unit (CSU) which averages 1.5 detectives spending 90 minutes on the crime scene to identify, document, collect and preserve evidence both fingerprint and biological.
- Case screening by the property crime detective (PCD), including visits to the burglary scenes where appropriate, neighborhood canvassing, surveillance, targeting known offenders, tracing stolen property, following up evidence provided by initial investigations, and arresting and interviewing suspects. This requires an average of six hours of the detective's time per case.

Hourly costs of the Patrol, CSU and PCD, provide the means to estimate the total cost of the police response as follows:

Two patrol officers spend an average of 22 minutes getting to crime scene and stay there for 1.5 hours at $35/hour	$131
1.5 crime scene detectives spend an average of 1.5 hours at $40/hour	$90
1 District Detective investigates case for 6 hours at $40/hour	$240
Total	$461

Table 1

This Denver police cost corresponds well to the British police property crime cost of $470 (adjusted to US dollars from UK Pound Sterling) (8).

Another important figure is the average number of crimes committed by each burglar, including those defined as the top 10% of burglars. This was estimated

to be more than 232 burglaries per year (6). Denver's crime data from 2006 indicates that a burglar in the top 10% of all burglars commits an average of 17 crimes with biological evidence left at the crime scene per year. This can be used to calculate the total number of property crimes committed in one year based on the observed number of cases with biological evidence from the total of all property crimes reported. The monthly average of burglary cases reported in 2006 in Denver was 545, from which 40 cases were identified with some type of biological evidence or 7%. This is consistent with the range of property crime DNA recovery rates in Britain of 4% to 9% (7). Based on the remaining 93% of cases where no biological evidence is recovered, we estimate the average number of cases committed per year for a prolific burglar to be about 242, which is very close to the estimate of 232 burglaries in the Chaiken *et al* study (6). Denver's data supports the conclusion that a habitual burglar is an opportunistic criminal and commits not only burglaries, but all other types of property crimes (like theft of motor vehicle and larcenies).

To estimate a conservative property crime cost for the city of Denver, we determined an average property crime loss from burglaries, motor vehicle thefts and larceny cases, based on their weighted presence in Denver in 2006 and corresponding costs from FBI 2006 Uniform Crime Report (9). Thus:

$$(24.88\% \times \$1834) + (51.48\% \times \$855) + (23.64\% \times \$6649) = \$2468$$

where 24.88%, 51.48% and 23.64% are the weighted occurrence of burglaries, larcenies and motor-vehicle thefts respectively in 2006 property crimes in Denver, and $1834, $855 and $6649 are their respective costs. Therefore the average property crime loss for Denver in 2006 was about $2468. (Figure 4)

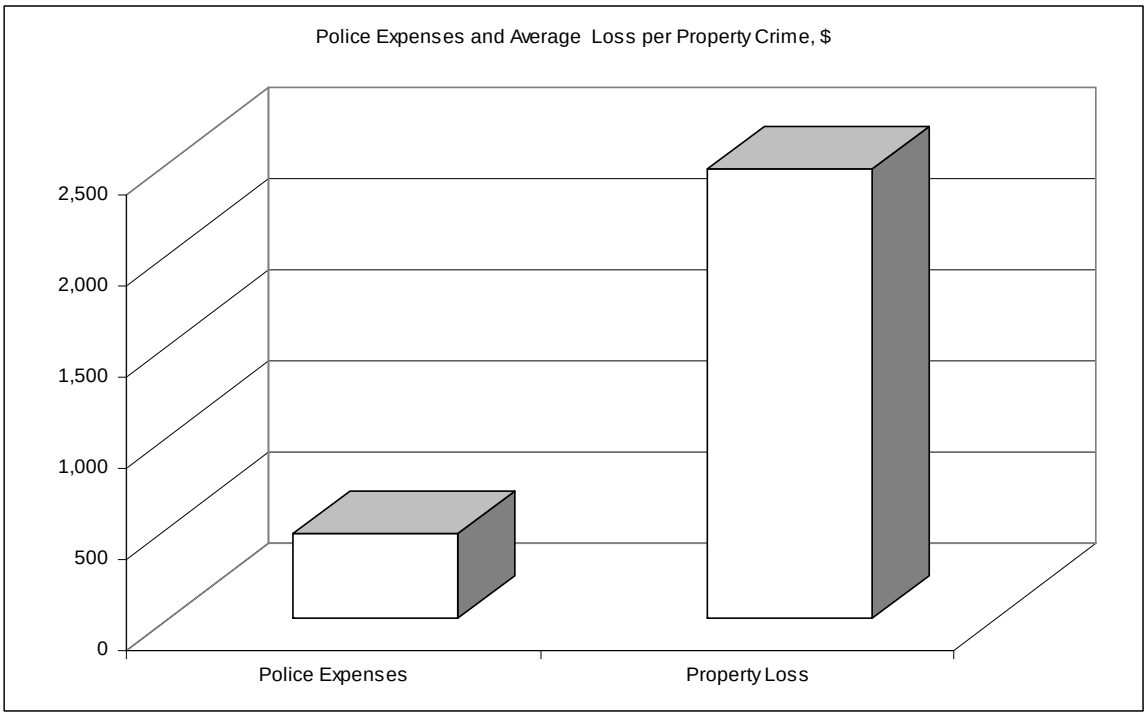

Figure 4 Average Costs associated with property loss and police response in Denver, Colorado 2006

In 2006, DNA testing and CODIS hit identification were the only reason for the arrest and prosecution of 40 habitual burglars (top 10%) that otherwise would have been responsible for an estimated average of 242 crimes per year. Application of DNA forensics resulted in an average sentence of 13.9 years in the Colorado State Department of Corrections compared to 1.4 years for traditionally investigated burglaries over the same time period.

The most conservative estimate of cost savings realized by the utilization of DNA in high volume crime during 2006 and 2007 is calculated as follows: (considering that at least one year of crime activity has been prevented for each arrested and prosecuted habitual criminal in 2006.) (Figure 5)

40 prolific burglars identified with DNA in 2006 * 242 potential crimes	9680 cases
9680 cases * $2468 average loss due to property crime cases	$23.9 million
9680 cases * $461 average police response cost	$4.5 million
Total savings	$28.4 million

Table 2

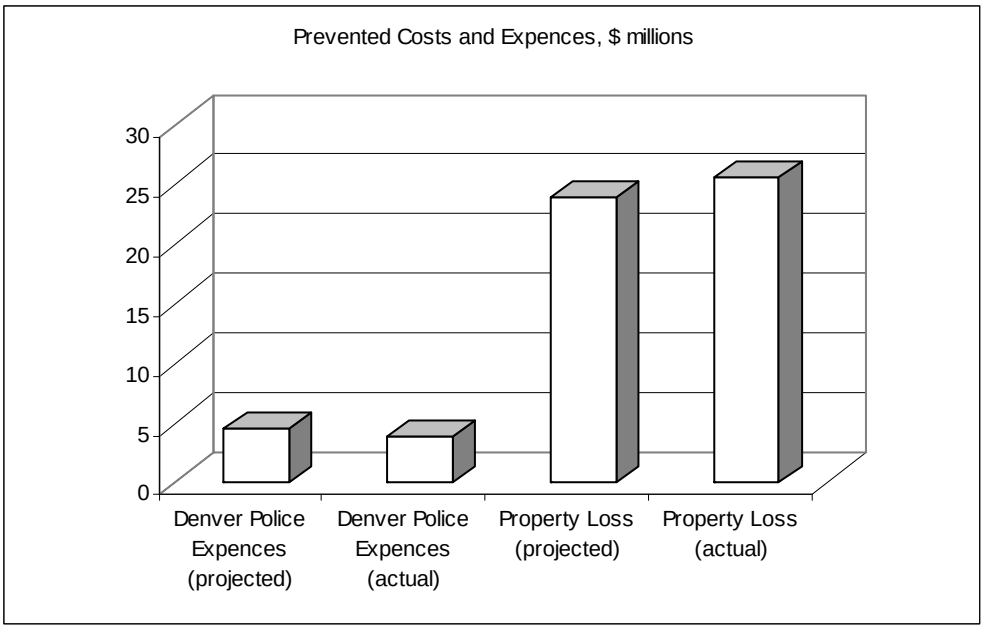

Figure 5

Since only 33% of all burglaries and other property crimes are reported, this estimate will tend to be very conservative as outlined in the Bowles *et al*. study (5). Comparison of projected results with the actual numbers achieved at the end of the DNA burglary project serves as a way to validate the results. (Figure 5)

The actual figure for Denver police expenses saved is calculated as the total number of property crimes prevented during 2006 and 2007 multiplied by the cost of police investigation for each case:

8417cases x $461 = $3.9 million

and calculations of the actual crime costs prevented during 2006 and 2007 are shown in Table 3.

	2005	2007 (projected)	Number of property crimes prevented	Cost of Crime from FBI for year 2006, $	Total crime costs prevented, $
Burglaries	7436	5613	-1823	1834	-3343382
TMV	7835	4968	-2867	6649	-19062683
TFMV	9363	6902	-2461	855	-2104155
Other Larcenies	6490	5224	-1266	855	-1082430
Grand Total			- 8417		-$25592650

Table 3

The best quantitative estimate of cost efficiency -'C' is the following ratio:

C = Prevention loss / Forensic investment

- Where C is a cost efficiency ratio (return on each $1 invested)
- Forensic investment – total cost of the DNA burglary project

- Prevention – the actual costs prevented from occurring, and expenses that would have been incurred by the City. We have the actual Prevention loss of $29.4 million and the forensic investment cost of $462,000 (cost of the burglary project, which includes federal grant funds for the Crime Laboratory, DA's office and Denver Police DNA training).

- Therefore the cost efficiency is equal to $29.4 million/$462,000 = 63.6, or each $1 invested in DNA forensics and related fields (police training, prosecution, etc.) resulted in more than $63.60 of prevented police expenses and property loss. (Figure 6)

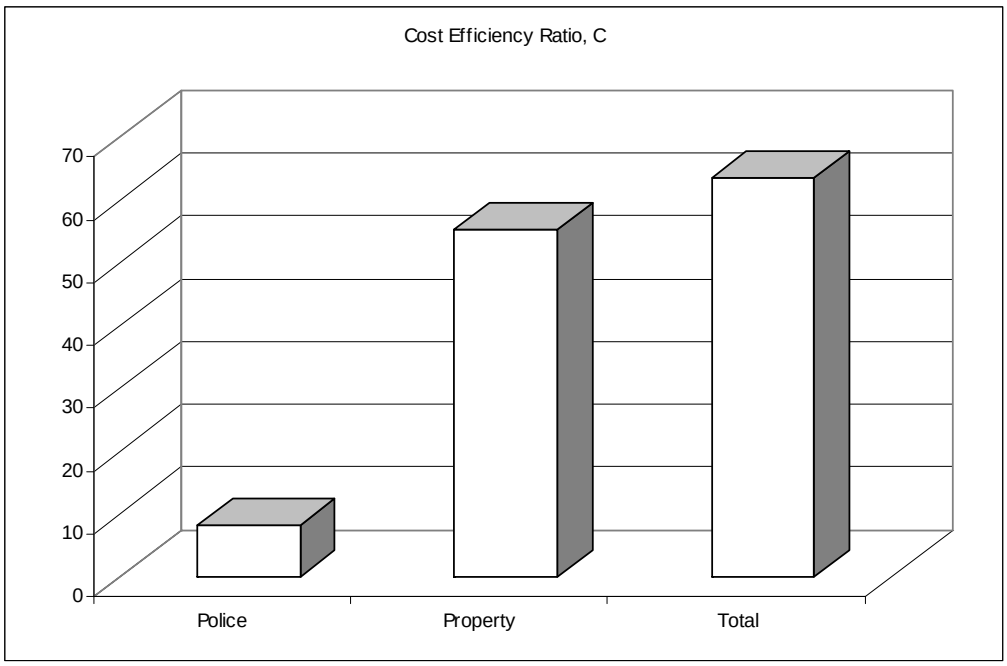

Figure 6 Cost Efficiency Ratio calculations for Denver, Colorado Volume Crime Project 2006-2007

Conclusions

The research reported here is a study of quantitative and qualitative data relating to the effectiveness and efficiency of DNA forensics in the investigation and prosecution of property crimes. The success achieved provides a strong argument for the continued use and expansion of DNA science in high volume crimes mainly due to the following reasons:

- DNA evidence targets predominantly prolific habitual criminals that have the highest criminal impact on society.
- DNA based evidence is very effective and results in a pronounced reduction in burglaries and other property crimes.
- The presence of DNA evidence results in a 10-fold increase in the average sentence time for residential burglars and a 27-fold increase for commercial burglars. (13.9 years with DNA compared to 1.4 years in traditionally investigated cases in residential burglaries, and accordingly 4.6 years to 2 months in commercial burglaries)
- The use of DNA evidence results in an almost 5.5-fold increase in the rate of case prosecution.
- Actual two year savings to the citizens and the city of Denver of is more than $3.9 million in police costs and $25.6 million in property loss prevented with this approach.
- The return on investment on every dollar spent with this system is estimated to be $63.

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