ASCLD/LAB
LIMITED SCOPE
INTERIM INSPECTION REPORT

®

COMMONWEALTH OF VIRGINIA
DIVISION OF FORENSIC SCIENCE
CENTRAL LABORATORY

APRIL 9, 2005

INTRODUCTION

This is the report of the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB) limited scope interim inspection of the Commonwealth of Virginia Division of Forensic Science Central Laboratory Biology/DNA Unit, located in Richmond, Virginia. This inspection was conducted at the request of the Laboratory System Director, Dr. Paul B. Ferrara, by letter dated October 1, 2004.

The ASCLD/LAB inspection team consisted of the following members:

Rodney H. Andrus, Staff Inspector, ASCLD/LAB, Fresno, CA.
Pat W. Wojtkiewicz, North Louisiana Criminalistics Laboratory, Shreveport, LA. (October 24-27, 2004 visit).
James Iverson, Minnesota Bureau of Criminal Apprehension, St. Paul, MN. (December 13-15, 2004 visit).

The ASCLD/LAB Board of Directors liaisons to the inspection team were:

Robin W. Cotton, PhD, Orchid Cellmark, Germantown, Maryland
Kenneth E. Melson, Alexandria, Virginia

The on-site inspection was conducted during the periods of October 24-27, 2004, and December 13-15, 2004, at the Virginia Division of Forensic Science (DFS) Central Laboratory in Richmond, Virginia.

This inspection focused on the review of the examination documentation and reports for the Virginia Division of Forensic Science Case File No. 81N-6691, involving a 1982 sexual assault and homicide, and associated laboratory analytical and operational procedures. After an initial on-site visit, a revisit of the laboratory was conducted for the purposes of evaluating and clarifying issues that had not been resolved during the initial inspection. Other material associated with the case, more fully described later in this report, was also reviewed.

LABORATORY OVERVIEW

The Virginia Division of Forensic Science Central Laboratory provides full services to the central region of the Commonwealth of Virginia as well as specialized services statewide. The Central Laboratory is one of four laboratories in the Virginia Division of Forensic Science Laboratory System, and is located at 700 North 5th Street, Richmond, Virginia. The Laboratory provides services in Controlled Substances, Toxicology, Trace Evidence, Biology, Firearms/Toolmarks, Latent Prints, Questioned Documents and Digital Evidence. The Laboratory has a staff of 88 testifying analysts and 60 support staff. The DFS has been accredited by ASCLD/LAB since January 5, 1989.

BACKGROUND

Rebecca Williams, a 19 year-old mother of three children, was raped and fatally stabbed in her home in Culpepper, Virginia, on June 4, 1982. Before her demise, she told a policeman that her attacker was a black man acting alone and who was a stranger to her. An autopsy was performed by Dr. James Beyer, Deputy Chief Medical Examiner. It disclosed that the victim suffered 38 stab wounds to the neck, chest, and abdomen, 14 of which penetrated internal organs and could, alone,

have caused death if untreated. Vaginal smears obtained during the autopsy were positive for the presence of relatively intact sperm and male prostatic enzyme. (See *Washington v. Commonwealth*, 323 S.E.2nd 577 (Va. 1984)). Evidence collected at the crime scene and elsewhere was submitted to the Virginia Division of Forensic Science (DFS) on June 7, 1982, (then known as the Bureau of Forensic Science) for analysis.

The initial evaluation of the evidence submitted in June 1982 included the identification and characterization of potentially probative biological and other evidence materials. Relevant to the biological evidence, the analysis involved the determination of the presence of semen, bloodstains and hair. In part, three items were found to contain semen with spermatozoa: a blanket (Item 25), two vaginal smears from the victim (Item 45), and two bloodstained vaginal swabs from the victim (Item 58). A smear was subsequently prepared from one of the swabs. No definitive results indicating a possible semen contributor were obtained with the serological typing methods employed. No blood examinations were conducted on the victim's fingernail scrapings, Items 55 and 56. Ten Negroid hairs and hair fragments were recovered from the shirt pockets, Item 72, of a shirt that was found by the victim's husband in a bedroom dresser about a week after the crime, and that did not belong to the residents. The above results, and others, were reported in a Certificate of Analysis dated August 19, 1982, and an Amended Certificate dated August 26, 1983. Three supplemental Certificates of Analysis were issued by the DFS reporting examination results on blood, saliva and hair exemplars from several initial suspects. (See the Certificates dated August 27, 1982, November 10, 1982, and December 9, 1982).

Earl Washington, Jr., an African American who is also known as Earl Junior Washington (Washington), became a suspect in the rape and murder of Rebecca Williams when he was arrested on May 21, 1983, on unrelated charges. A Hair and Saliva Samples Kit from the suspect was delivered to the DFS two days later. Two Certificates of Analysis, dated August 12, 1983 and September 8, 1983, were subsequently issued indicating that Washington's blood type was not consistent with the blood type of the victim or the blood recovered from the crime scene (which was consistent with the victim's).[1] Hair comparisons between the known hair exemplars from Washington submitted to the DFS and the hairs recovered from Item 72 were not conducted because the exemplar hair sample was inadequate for comparison.[2]

Washington's jury trial began on January 18, 1984, and he was convicted of capital murder of Rebecca Williams on January 20, 1984. On March 20, 1984, the trial court entered a final order imposing the death sentence. His conviction was affirmed by the Virginia Supreme Court (*Washington v. Commonwealth*, 323 S.E.2nd 577 (Va. 1984)) and the United States Supreme Court denied the Petition for Writ of Certiorari (*Washington v. Virginia*, 471 U.S. 1111 (1985)). Washington's state and federal habeas corpus petitions were also denied.

With the advent of DNA typing methods, additional analyses were conducted in 1993 and 1994. The remaining portion of the vaginal swab (Item 58) was examined with both the RFLP and HLA DQα DNA typing methods. No DNA profile was obtained by the RFLP analysis. HLA DQα

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[1] Spermatozoa and/or spermatozoa heads were identified in five stains on a royal blue blanket, Item 25. Secretions in four of those stains were a type A, PGM 1, which is inconsistent with Washington, who is a type O, PGM 2-1. In a post-conviction collateral attack, Washington's habeas counsel argued that the trial counsel was ineffective for not arguing at trial that this test result was exculpatory. The Fourth Circuit Court of Appeals discussed this issue and the Commonwealth's rebuttal in the federal habeas corpus in *Washington v. Murray*, 4 F.3d 1285 (4th Cir. 1993).

[2] In a later federal habeas appeal, the court indicated that a request by defense counsel for a comparison between the hairs from the shirt and Washington's facial hair was denied. *Washington v. Murray*, 952 F.2d 1472, 1478 (4th Cir. 1991).

typing results were reported for the sperm fraction of the vaginal swab extract. The possible source was not identified in the Certificate of Analysis dated August 31, 1993, which is summarized in the table below.

DFS CERTIFICATE OF ANALYSIS DATED AUGUST 31, 1993
(DNA Analysis by RFLP and PCR at HLA DQα Locus)

Item #	Description	Results	R. Williams	C. Williams	Washington	Tinsley	Comments
Item 48	R. Williams known blood sample	No RFLP profile					
Item 58	Vaginal swab (DFS)	No RFLP profile					
Item 48	R. Williams known blood sample	PCR DQα Profile= 4, 4					
Item 58	Vaginal swab (DFS) Sperm fraction	PCR DQα profile = 1.1, 1.2, 4	Different profile	Different profile	No sample submitted	No sample submitted	The non sperm fraction was inconclusive
Item 59	C. Williams known blood sample	PCR DQα profile = 4, 4					

In October 1993, the Virginia Attorney General and Washington's attorney, Gerald Zerkin, reached an agreement for further testing, memorialized in a letter dated October 13, 1993. Pursuant to the agreement, additional blood was obtained from Washington and sent to the DFS and to CBR Laboratories, Inc., a forensic laboratory retained by Mr. Zerkin. Two microscopic slides prepared from the vaginal smear, Item 45, were sent by the DFS to CBR Laboratories, Inc., for PCR DNA comparison between the material on the slides and the genetic material extracted from Washington's blood. Mr. Bing of CBR Laboratories, Inc. conducted the analysis. He was unable to obtain a profile from the slides.

An additional provision of the agreement referred to above was for the DFS to compare Washington's blood with "the material prepared from the vaginal swab itself . . . ." Washington's HLA DQα profile derived from his newly provided reference sample was compared to the profile obtained from the sperm fraction of Item 58, and the examiner determined that Washington, individually or in combination with Rebecca Williams or her husband, could not have contributed the 1.1 allele found in the Item 58 sperm fraction profile. This result was reported in the Certificate of Analysis dated October 25, 1993, illustrated in the following table:

DFS CERTIFICATE OF ANALYSIS DATED OCTOBER 25, 1993
(DNA Analysis by PCR at HLA DQα Locus)

Item #	Description	Results DQα	Washington	R. Williams	C. Williams	Comments
Item 1	Washington's known blood sample	1.2, 4				
Item 58	Vaginal Swabs (DFS) sperm Fraction	1.1, 1.2, 4	Excluded*	Excluded*	Excluded*	See 8/31/93 report
Item 48	R. Williams known blood sample	4, 4				See 8/31/93 report
Item 59	C. Williams known blood sample	4, 4				See 8/31/93 report
* Unless another individual possessing a 1.1 allele is also present.						

In January 1994, negatives of the photographs of the test results of the PCR HLA DQα typing on the vaginal swab (Item 58) and the reference samples for R. Williams, C. Williams and Washington, and the positive and negative control samples, were sent to Roche Molecular Systems in care of Dr. Henry A. Erlich, Director of Human Genetics and one of the developers of the HLA DQα typing technology. At the request of Barry Weinstein and Robert Hall, two of Washington's post-conviction attorneys, Dr. Erlich was asked to evaluate the test results obtained with the AmpliType HLA DQα PCR Amplification and Typing Kit by the DFS. His evaluation concluded that the results cast significant doubt about Washington's contribution to the sample. In his January 13, 1994, report, Dr. Erlich went on to say:

> The presence of the directly demonstrated 1.1 allele cannot have been contributed by Mr. Washington, the victim, or her husband. While the presence of the 1.2 allele can be inferred from the relative dot intensities, the dots do not indicate that the 1.2 allele should be paired in a genotypic combination with the 4 allele. In fact, the data support a genotypic combination of the 1.2 allele with the 1.1 allele.

Results of additional HLA DQα typing on Item 25, the royal blue blanket, were reported in the Certificate of Analysis dated January 14, 1994, indicating that Earl Washington Jr. was not the donor of the HLA DQa type located on the blanket. In addition, the vaginal smears, Item 45, were examined and no profile was obtained. The table below summarizes those findings.

DFS CERTIFICATE OF ANALYSIS DATED JANUARY 14, 1994
(DNA Analysis by PCR at HLA DQα Locus)

Item	Description	Results	Washington	Tinsley	Pendleton	Comments
Item 25, stain A, non-sperm fraction	Royal blue blanket	Mixture 1.1, 4, (2) 1.3*	Eliminated 1.2, 4	Not submitted	Eliminated 4, 4	
Item 25, stain A, sperm fraction	Royal blue blanket	1.1, 4	Eliminated 1.2, 4	Not submitted	Eliminated 4, 4	

Item 25, stain B, non-sperm fraction	Royal blue blanket	Mixture 1.1, 4, (2), 1.3*	Eliminated 1.2, 4	Not submitted	Eliminated 4, 4	
Item 25, stain B, sperm fraction	Royal blue blanket	1.1, 4	Eliminated 1.2, 4	Not submitted	Eliminated 4, 4	
Item 25, stain C, non-sperm fraction	Royal blue blanket	Mixture 1.1, 4, (2) (1.3)	Eliminated 1.2, 4	Not submitted	Eliminated 4, 4	
Item 25, stain C, sperm fraction	Royal blue blanket	Mixture 1.1, 4, (2)	Eliminated 1.2, 4	Not submitted	Eliminated 4, 4	
Item 25, stain D, non-sperm fraction	Royal blue blanket	Mixture 1.1, 1.2, 4, (2)	Eliminated, but not as clearly 1.2, 4	Not submitted	Eliminated 4, 4	Believes genotype of D is 1.1, 1.2
Item 25, stain D, sperm fraction	Royal blue blanket	Mixture 1.1, 1.2, 4*	Eliminated, but not as clearly 1.2, 4	Not submitted	Eliminated 4, 4	Believes genotype of D is 1.1, 1.2
Item 50	Pendleton's standard	4, 4				
Item 45	Vaginal smears (DFS)	Insufficient material				
Numbers in ( ) indicate a weak allele (equal to or more intense than C dot).						
An * indicates a very weak allele (less intense than C dot)						

As a result of the DNA testing, then Governor Wilder commuted Washington's death sentence on January 14, 1994, to life imprisonment with the possibility of parole. Purportedly, the Governor did not offer further relief to Washington because Washington was not absolutely eliminated as a contributor of the sperm fraction in Item 58.

In 2000, newly discovered smears collected by the Medical Examiner's office during the original investigation were submitted to the laboratory for analysis. This evidence consisted of vaginal (two smears, Items 121A and B), labial (two smears, Items 121C and D), anal (two smears, Items 121 E and F), thighs (two smears, Items 121 G and H) and buttocks (two smears, Items 121 I and J) smears collected from the victim. Previously examined evidence was also resubmitted at this time for additional testing. Using the more recently developed Promega PowerPlex 1.1 and 2.1 STR typing methods, which were implemented in the DFS in 1998 and 2000, respectively, STR DNA typing results were reported for stains on the blanket (Item 25), vaginal smear (Item 58) and one of the vaginal smears submitted from the Medical Examiner (Item 121A). Analyses were also performed on fingernail scrapings from the victim, (Items 55 and 56). Conclusions of the testing were presented in a Certificate of Analysis dated September 8, 2000, reflected in the table below.[3] The Director of the DFS informed Governor Gilmore of these results on September 18, 2000, by letter, in addition to providing a copy of the Certificate to his office.

DFS CERTIFICATE OF ANALYSIS DATED SEPTEMBER 8, 2000
(Promega PowerPlex 1.1 and 2.1 STR Typing)

Item #	Description	Results	R. Williams	C. Williams	Washington	Tinsley's Databank Profile	Comments

[3] This Certificate of Analysis was supplemented by a letter dated November 2, 2004, to the Commonwealth's Attorney to correct the Table of PowerPlex 1.1 Typing Results by adding the results of the analyses on Items 55 and 56, fingernail scrapings.

Items 55 & 56	Victim's fingernail scrapings	Mixture	Major Contributor				No minor Contributor was identified
Item 72	Shirt from Dresser	No conclusion					Limited amount of DNA
Item 121A, Non-sperm fraction	Vaginal smear (ME)	Mixture	Cannot be eliminated	No conclusion	Eliminated	**Eliminated**	
Item 121A, sperm fraction	Vaginal smear (ME)	No DNA profile					
Item 58, Non-sperm fraction	Vaginal smear (DFS)	Mixture	Cannot be eliminated	Eliminated	Eliminated	**Eliminated**	
Item 58, sperm fraction	Vaginal smear (DFS)	Mixture	**Eliminated**	Eliminated	Eliminated	**Eliminated**	**This profile was searched against the DNA data bank with no results**
Item 25, stain A (sperm and non-sperm fractions)	Royal blue Blanket	Mixture	Cannot be eliminated	Eliminated	Eliminated	Cannot be eliminated	
Item 25, stain B (sperm and non-sperm fractions)	Royal blue Blanket	Mixture	Cannot be eliminated	Eliminated	Eliminated	Cannot be eliminated	
Item 25, stain 1	Royal blue Blanket	Mixture	Cannot be eliminated	Eliminated	Eliminated		
Item 25, stain D, non-sperm fraction	Royal blue Blanket	Mixture	Cannot be eliminated	Eliminated	Eliminated	Cannot be eliminated	
Item 25, stain D, sperm fraction	Royal blue Blanket	Profile	Eliminated	Eliminated	Eliminated	Consistent with	**DNA data bank search yielded Tinsley**

On September 14, 2000, a blood sample from Kenneth Tinsley was received by the DFS. That sample was analyzed using the Promega PowerPlex 1.1 and 2.1 systems and compared with the profiles obtained and reported in the September 8, 2000 report.[4] Thereafter, the Governor granted Washington an absolute pardon for the rape and murder of Rebecca Williams on October 2, 2000,[5] stating that "[i]n my judgment, a jury afforded the benefit of the DNA evidence and the analysis available to me today would have reached a different conclusion regarding the guilt of Earl

[4] In the September 8, 2000 report, Tinsley's data bank profile had been used as a reference.

[5] The court in *Washington v. Buraker*, 322 F.Supp.2d 692 (W.D.Va. 2004) indicates that the pardon occurred on September 7, 2000.

Washington."[6] However, the Governor did not exonerate Washington on the basis of factual innocence.

A Certificate of Analysis dated October 18, 2000, was then issued reporting that the findings of the analyses using Tinsley's known standards were consistent with the results from the September 8, 2000 Certificate of Analysis, that had used Tinsley's DNA profile obtained from the DNA databank. That report is summarized in the following table:

DFS CERTIFICATE OF ANALYSIS DATED OCTOBER 18, 2000
(Promega PowerPlex 1.1 and 2.1 STR Typing)

Item #	Description	Results	R. Williams	Tinsley	Comments
Item 121A, non-sperm Fraction	Vaginal smear (ME)	Mixture (9/8/00 Report)	Cannot be eliminated	Eliminated	Other suspects eliminated
Item 121A, sperm fraction	Vaginal smear (ME)	No DNA profile (9/8/00 Report)			
Item 58, non-sperm fraction	Vaginal smear (DFS)	Mixture (9/8/00 Report)	Cannot be Eliminated	Eliminated	Other suspects eliminated
Item 58, sperm fraction	Vaginal smear (DFS)	Mixture (9/8/00 Report)	Eliminated	Eliminated	
Item 25, stain D, non-sperm fraction	Royal blue blanket	Mixture (9/8/00 Report)	Cannot be eliminated	Cannot be Eliminated	Other suspects Eliminated
Item 25, stain D, sperm fraction	Royal blue blanket	Profile (9/8/00 Report)	Eliminated	Consistent With	1 in 6.0 billion. Other suspects eliminated

In September 2002, Washington filed a civil suit in federal court against state law enforcement officers and prosecutor who participated in his arrest, detention and prosecution.[7] The DFS is not a named defendant in that suit, which is still continuing.

Pursuant to a discovery request in Washington's federal civil suit, evidence from the victim was sought from the Virginia State Police and the Virginia Medical Examiner's Office. The Medical Examiner's Office provided duplicate body orifice slides collected during the Williams autopsy to Forensic Science Associates (FSA) of Richmond, California, and Dr. Edward T. Blake. Washington's attorney requested that PCR based DNA typing be conducted on the relevant body orifice slides to determine whether Washington, Tinsley and/or Clifford Williams could be eliminated as the source of spermatozoa from Rebecca Williams' vagina.[8] Profiles used as standard reference samples for Rebecca Williams, Clifford Williams, Washington and Tinsley were obtained from previous DFS Certificates of Analysis and FSA Item 2, as illustrated in the summary table below which represents a synopsis of the findings described in Dr. Blake's report.

[6] Statement of Governor Jim Gilmore Regarding the Pardon of Earl Washington, October 2, 2000, http://www.thedigitaldominion.com.
[7] *See Washington v. Buraker*, 322 F.Supp.2d 692 (W.D.Va. 2004) and *Washington v. Buraker*, 322 F.Supp.2d 702 (W.D.Va. 2004).
[8] See the April 1, 2004, redacted report by Forensic Science Associates.

FORENSIC SCIENCE ASSOCIATES REPORT DATED APRIL 1, 2004
(STR DNA Typing using Profiler Plus)

Item #	Description	Microscopic Examination	Further Exam-ination	R. Williams	C. Williams	Washington	Tinsley	Comments
ME#361 [Item #1] (DFS #2004D)	Lips Slide	No sperm	No					
ME#361 [Item #2] (DFS #2004B)	Oral Slide	Numerous epithelial cells	Yes, used as reference sample					
ME#361 [Item 3] (DFS #121B)	Vaginal slide B	Numerous spermatozoa	Yes		Eliminated	Eliminated	Cannot be eliminated	Sperm combined with Item 4 for DNA extraction
ME#361 [Item 4} (DFS #121D)	Labia Slide D	Moderate number of spermatozoa	Yes		Eliminated	Eliminated	Cannot be eliminated	Sperm combined with Item 3 for DNA extraction
ME#361 [Item 5] (DFS #121E)	Anal Slide E	A few spermatozoa	No					
ME#361 [Item 6] (DFS #121 H)	Thigh Slide H	No spermatozoa	No					
ME#361 [Item 7] (DFS #121 I)	Buttocks slide I	No spermatozoa	No					

Dr. Blake's report indicated that his "analysis demonstrates that Kenneth Tinsley not only shares the same genetic profile as the source of the spermatozoa from the Williams royal blue blanket #25 in area D described in the VBFS report dated October 18, 2000, he also shares the same genetic profile as the source of the spermatozoa from the Rebecca Williams vagina."

On April 28, 2004, Washington's counsel sent Governor Warner a letter requesting the appointment of "an independent auditor to conduct an audit and re-examination of a portion of the casework generated by the Commonwealth's Division of Forensic Science (DFS)," and attaching a copy of Dr. Blake's report. At the Governor's request, the DFS reviewed the matters related in the counsel's letter and initiated an internal audit of case number 81N-6691.

A Certificate of Analysis was issued dated September 30, 2004, by DFS Forensic Scientist George Li. He conducted further testing on some of the samples using a different DNA typing system. The results are summarized in the following table:[9]

DFS CERTIFICATE OF ANALYSIS DATED SEPTEMBER 30, 2004
(DNA Typing using the PowerPlex 16 BIO system)

Item #	Description	Results	R. Williams	Comments
Sperm fraction extraction tube of Item 121A was combined with sperm fraction extraction tube of Item 121C	Item 121A = vaginal smear Item 121C = labia smear	No amplified product was obtained		
Non sperm fraction extraction tube of Item 121A was combined with the non sperm fraction extraction tube of Item 121C	Item 121A = vaginal smear Item 121C = labia smear	No amplified product was obtained		
Item 121A and Item 121C slides were evaluated for further testing	Item 121A = vaginal smear Item 121C = labia smear	Not suitable for further testing		
Item 121B and Item 121D slides were evaluated for further testing	Item 121B = vaginal smear Item 121D = labia smear	Not suitable for further testing		
Item 121E and Item 121F were combined for testing	Item 121E = anal smear Item 121F = anal smear	No results for sperm fraction Partial profile obtained from the non sperm Fraction	Partial profile consistent with victim	No types foreign to victim were found
Item 121G and Item 121H were combined for testing	Item 121G = thighs smear Item 121H = thighs smear	No results for sperm Fraction Inconclusive results for the non sperm fraction		
Items 121 I and Item 121J were combined for testing	Item 121 I = buttocks smear Item 121J = buttocks smear	Inconclusive results for the sperm fraction No results for non sperm fraction		
SUBSEQUENT TESTING				
Sperm fraction extract of Items 121E and 121F, Items 121G and 121H, and Items 121 I and 121J were combined	Items 121E and F = anal smears Items 121G and H = thighs smears Items 121 I and J = buttocks smears	No typing results were obtained		
Non sperm fraction extract of Items 121E and 121F, Items 121G and 121H, and Items 121 I and 121J were combined	Items 121E and F = anal smears Items 121G and H = thighs smears Items 121 I and J = buttocks smears	Partial profile obtained	Consistent with victim	No types foreign to victim were obtained

[9] As in all tables, the language used is taken from the actual laboratory reports.

Items 2004A, 2004B, 2004C and 2004D	Items 2004A and B = oral smears Items 2004C and D = lips smears	No analysis conducted		

On December 6, 2004, a memorandum was generated as a result of the internal audit conducted by two supervisory personnel from other laboratories in the Virginia system. Among the findings were:

A. Item 58, vaginal smear, Certificate of Analysis dated September 8, 2000.

1. Rebecca Williams should not have been excluded as a possible contributor to the sperm fraction of the vaginal smear, Item 58, in the September 8, 2000 Certificate of Analysis. The internal auditors feel that the major DNA profile is consistent with the victim and is the likely source of the DNA profile from the sperm fraction of the vaginal smear.

2. Kenneth Tinsley, the victim's husband and all other suspects were properly eliminated as possible donors by the examiner.

3. There was insufficient information from the other minor alleles foreign to the victim that are present in the sample to suggest another contributor.

B. Earl Washington is not the contributor of any of the DNA profiles generated in the case, and that conclusion is scientifically supported by the data in the case file.

C. Kenneth Tinsley cannot be eliminated as to the contributor of the DNA profile from the royal blue blanket (Item 25, stain D). There is no indication of the DNA profile from Kenneth Tinsley on the remaining items of evidence. These findings are scientifically supported by the data in the case file.

D. The DFS Forensic Biology protocols are sufficient for forensic casework and for this case in particular. Deviations from the DFS Forensic Biology protocol were justified in this case in the attempt to answer the question regarding the presence of Washington's DNA profile. Those deviations were:

1. Using a 33-cycle program for PowerPlex 1.1 amplification.

2. Typing samples with no DNA product as demonstrated on a product gel.

3. Reporting alleles below the HLA DQα C dot.

4. Modifying the PowerPlex amplification master mix.

E. There is no evidence of contamination in the testing of the samples in this case.

F. Factors external to the laboratory appear to have influenced the direction of the case.

1. The restriction imposed on initially consuming only half of the probative samples may have prevented the DFS from obtaining a result, or a meaningful result, for the vaginal samples.

2. There was external pressure to conduct the testing rapidly. Had more time been allotted for writing and reviewing the report, a better-suited report format might have been used that would have precluded the misinterpretation of the findings and subsequent allegations.

The DFS internal auditors concluded that the deficiencies identified in the review can be addressed through the corrective action process in accordance with DFS Quality Manual 8.2.[10] The auditors did not identify any major deficiencies as defined by DFS Quality Manual 8.3.[11] Their recommendation was that "validation testing be conducted on the best method by which to recover DNA from mounted slides."

SCOPE OF THE ASCLD/LAB INTERIM INSPECTION

Washington's attorneys suggested in their April 28, 2004 letter to Governor Warner that the ultimate finding triggering the need for an independent inspection is the test results in the September 8, 2000 Certificate of Analysis pertaining to the sperm fraction of the DFS vaginal smear, Item 58, in that the examiner erroneously reported the presence of a DNA profile for a nonexistent male. The ASCLD/LAB inspection focused on that analysis and the analysis of Item 121A, the Medical Examiner vaginal smear.

However, the inspectors also reviewed the other examination results obtained in the DNA PCR HLA DQα and STR analyses of the evidence in order to have a complete picture of the events and analyses in this case and the analyst's technical competence. The ASCLD/LAB inspectors, in addition to making two site visits to examine the case materials, reviewed all the laboratory reports represented to exist in the case, the bench notes, the written protocols, the pertinent validation studies, the pertinent instrumentation standard operating procedures, and certain correspondence between the Governor's Office and the laboratory, counsel for Washington and the laboratory, and counsel for Washington and the Governor's Office pertaining to the examinations in this case.

Furthermore, the ASCLD/LAB inspectors reviewed related reports, and bench notes to the extent they were provided, prepared by Dr. Bing of CBR Laboratories, Inc., Dr. Erlich of Roche Molecular Systems, and Dr. Blake of Forensic Science Associates. The internal DFS audit report was also reviewed, as were Mr. Ban's comments to Dr. Blake's report and the ASCLD/LAB inspection site visits. In addition, the inspectors reviewed other collateral material, such as the Medical Examiner's testimony in the original criminal trial of Earl Washington, material in the federal civil case, and the reported court decisions in both the criminal and civil cases.

The scope of the ASCLD/LAB interim inspection was defined by seven questions posed by the ASCLD/LAB Board of Directors. Those questions, and the answers developed by the inspection team are as follows:

1. Were the procedures used in the analyses in case number 81N-6691 generally accepted in the scientific community?

The Virginia DFS adequately documented the protocols and procedures employed within the Central Laboratory, and based on the validation documents available to the inspection team, the methods employed in accordance with those protocols and procedures are accepted in the scientific

[10] Section 8.2 refers to the process of corrective action for minor discrepancies, which are defined, in part, as ones that "have not and will not in any way compromise the quality of work if properly addressed."
[11] Section 8.3 defines a major discrepancy, in part, as one that has "compromised the quality of the work."

community. However, the inspectors found instances of analytical deviation from stated procedures that gave rise to questionable data. In the analysis of the vaginal smear in Item 58, one of the two amplifications was performed using 33 cycles for amplification, rather than 30, the number of cycles prescribed in the DFS protocol. This deviation from protocol was not clearly noted in the case file; it was, however, noted by the internal auditors (perhaps because of their familiarity with the DFS system). When asked whether the increased cycle number was documented in their protocol, the laboratory stated it was not in their protocol and not a validated procedure. The laboratory's approved procedure, dated June 1, 1998, noted that 30 cycles was the prescribed number. A review of the PowerPlex 1.1 Technical Manual also revealed that 30 cycles was recommended. It should be noted that the erroneous elimination of the victim from the sperm cell fraction of the vaginal smear in Item 58, and the spurious profile searched in the databank, were both based on data obtained from this 33-cycle amplification. Additionally, a significant increase in the number of alleles was observed in the non-sperm fraction of the vaginal smear Item 58 following the 33-cycle set as compared to the 30-cycle set.

2. Were the conclusions reached scientifically supported by the data in the laboratory's case file?

The exclusion of the victim as a potential source of DNA in the sperm cell fraction of the vaginal smear from Item 58 was not supported by the data. Because of a lack of reproducibility between duplicate analyses of both the non-sperm cell and sperm cell fractions, it is unclear why the laboratory chose to rely on one set of results over the other in advancing conclusions that led to unsupported eliminations of various named suspects, including Earl Washington and Kenneth Tinsley. It should be noted that the internal DFS auditors agreed with the reported results in the September 8, 2000 Certificate of Analysis as they pertained to the exclusion of listed suspects, saying the results were scientifically supported by the data in the case file. ASCLD/LAB disagrees. The poor quality of the STR typing results and the diverse array of alleles detected for repeat analyses do not support the conclusion that the reported findings are scientifically supported by the data. In part, it is likely that poor data results were due to the quality or limited nature of the sample in conjunction with deviations from the standard protocol. Additionally, the conclusions stated in the Certificate of Analysis dated September 8, 2000 eliminating the contributor of the DNA profile from the sperm fraction of the blue blanket (Item 25, stain D) as a possible source of the genetic material in the sperm and non-sperm fractions of the vaginal smear (Item 58) are questioned since this review revealed similarities between the alleles represented in the profiles on the blanket when compared to the profiles of the vaginal smear.

3. If there were laboratory deficiencies in this case, were they a result of a failure to follow the laboratory's protocols, or a weakness in the protocols themselves? More particularly, were there contamination issues involved in the analyses, and if so, is it possible to determine when the contamination occurred?

As stated in the response to question 1, above, the laboratory protocols, as written, are scientifically acceptable. Although the case examiner did deviate from the laboratory's accepted amplification procedure in one amplification of Item 58, there is insufficient information to determine if the protocol deviations negatively impacted the analytical results. The obvious difference between the results of the 33-cycle amplification and the accepted 30-cycle amplification were the increase in the number of apparent alleles detected and a greater amount of background activity. Since there were no validation studies conducted on the use of 33 cycles, it is difficult to evaluate the potential ramifications of using this procedure. However, in light of the lack of reproducibility of the results obtained from Item 58, it is the ASCLD/LAB inspectors' opinion that it would have been more scientifically justified to call these results un-interpretable or inconclusive.

With regard to contamination issues, the inspectors were shown documentation of the results obtained from comparing the test results in this case with the laboratory staff DNA profile index. It does not appear that the evidence samples were contaminated by DFS personnel. Documentation of this comparison was provided to the inspectors.

There were no data in the case file examination documentation that would indicate that Deanne Dabbs had compromised the integrity of the samples she handled.

Wipe Tests were routinely used by the laboratory to monitor contamination. Files from these tests for the period from January 2000 to July 2002 were reviewed. These tests were performed on various items of equipment in the DNA analysis areas. DNA was detected in the wipe tests on several occasions, usually involving the hoods. Once detected, the units were taken out of service until cleaned and a subsequent wipe test proved negative. There is no indication that the positive wipe test results could have influenced the STR typing findings in this case.

In regard to the STR analyses, there was no indication in the case file documentation that contamination had occurred during the evaluation process. Proper controls to monitor contamination during the STR analyses were used in this case. From the data available to the inspectors, these controls did not show any evidence of contamination.

4. Were there factors external to the laboratory that influenced the direction or results of the analyses?

In June 2000, upon the resubmission of the vaginal smear from Item 58 and the submission of the newly found Medical Examiner smears, Item 121, Dr. Ferrara advised the analyst that he was to use only half of the sample available on Item 58 and only half of the sample available on one of the two duplicate slides of Item 121 (slides A and C, vaginal and labia smears). The DFS internal auditors cite this as a possible reason for the failure to obtain a meaningful result. The ASCLD/LAB inspectors agree with the internal DFS auditors that this decision could have impacted the test results.

In interviews with Mr. Ban, he stated that there were many personal communications taking place between himself and Dr. Ferrara. It was the analyst's recollection that they had these conversations "probably daily." The case file reflects seventeen documented conversations from June through September 2000 that indicate Dr. Ferrara was instrumental in the direction of the technical analyses. Mr. Ban indicated that the deviations from protocol were performed because of the pressure placed on him to obtain results. "Inconclusive results were not an option" according to the analyst. He went on to state that the Virginia Governor's office wanted to know whether or not Earl Washington's DNA was present in the tested samples, and he felt it important to provide them with an answer.

The suggestion that inconclusive results were not an option could have produced significant pressure on the laboratory staff to provide more definitive results than warranted. In fact the laboratory did deviate from their protocol with regard to Item 58, clearly with the intent of enhancing the prospect of obtaining a useable result.

The analyst also indicated to the inspectors that there was a great deal of pressure to issue the Certificates of Analysis in this case. This pressure may also have deprived the technical reviewer of the necessary opportunity to carefully consider the difficult analyses represented in some of the Certificates of Analysis. In an interview with Dr. Ferrara, he indicated that he was under a great

deal of pressure to provide updates to the Governor's office. Furthermore, Dr. Ferrara indicated that he provided analytical results to the Governor's office prior to those findings being published in a Certificate of Analysis.

Both Dr. Ferrara and Mr. Ban agreed that there were no outside influences suggesting that they alter their results or provide less than a complete conclusion with regard to their technical analyses.

5. If there were laboratory deficiencies in this case, what corrective or other actions should be taken?

As of the December 2004 ASCLD/LAB inspection, the Certificate of Analysis dated September 8, 2000, incorrectly eliminating the victim as a potential source of DNA in the sperm fraction of the vaginal smear (Item 58) had not been remediated. Dr. Ferrara and Mr. Ban stated that they were exploring mechanisms to do this, and along with the special prosecutor, had not yet formulated a plan. Other suggested corrective actions are detailed in the next section of this report.

6. Absent erroneous applications of processes or interpretations, is it possible to reconcile the laboratory's conclusions and Dr. Edward Blake's results of the analyses on the Medical Examiner's slides?

It is documented in the DFS case file that Mr. Ban had microscopically examined all of the slides from the Medical Examiner. On the vaginal smears, Item 121 (slides A and B), he noted the presence of "2 intact sperm & 3 heads per slide (A)" and "2 intact sperm & 2 heads per slide (B)" as well as "a lot of cellular material" on both slides. He also prepared photomicrographs of the slides. These were available for inspection by the inspectors. A low level of sperm cells was also observed on the labial smears, Item 121 (slides C and D).

The analyst performed two separate examinations on these slides; he first tested half of slide A and achieved no result from the sperm cell fraction. Next he combined the second half of slide A with all of slide C, again with no result.

When Dr. Blake performed his testing, he recorded by photograph the appearance of each slide upon receipt. The photographs record the oral smear slide of Victim Williams (Blake item 2); the vaginal smear slide (item 121B, Blake item 3); the labial smear slides (item 121D, Blake item 4); anal smear slide (item 121E, Blake item 5); thigh slide (item 121H, Blake item 6); and buttocks slide (item 121I, Blake item 7). These photographs, each containing a scale, illustrate the relative amounts of smear present on each slide. Accompanying the overview photographs were several photomicrographs recording the appearance of the smears before and after differential extraction.

For the vaginal smear slide (item 121B) the photographs revealed the relative amount of smear to be appreciable for this sample indicating varying density of the material over a relatively large area of the slide surface. The three photomicrographs taken prior to differential extraction record three separate areas on the smear, each with at least three sperm heads. The sperm are visible among much higher concentrations of nucleated cells. The post-digest slide represented by three photomicrographs reveal that the nucleated cells were digested revealing sperm heads ranging in number from three to five per area recorded. Similar observations were possible from the photographs of the labia smear slide (item 121D). Since the areas recorded by Dr. Blake represent only small portions of the smears present, it is expected that spermatozoa would have been present in other areas on the slides. These findings are not consistent with Mr. Ban's observations of 2 intact sperm and 2 or 3 heads per slide.

In conjunction with this review, copies of the Profiler Plus STR typing data for the analyses conducted by Dr. Blake were also reviewed. The electropherograms represented the Genotyper data for various smear extracts and the combined vaginal/labial slide sperm fraction (the vaginal and labial differential extract fractions were combined for the STR typing). The profiles indicate a good differential extraction of the sperm cell DNA from the nucleated cell material illustrated by a single source male profile in the sperm fraction. Consequently Dr. Blake was able to obtain clear and definitive results. Dr. Blake's quantitation data indicate that sufficient DNA was obtained from the combined sperm fraction of the two slides for several amplification reactions. The DNA obtained may be degraded as evidenced in the resulting profile. Even though the DFS worked with two different slides, the discrepancy in the amount of DNA obtained indicates that the sample should not have been divided and that the DNA extraction procedure used by DFS was not effective.

7. Are there any other factors relevant to this case that should be considered?

During the inspection process, one statement was repeated a number of times by Mr. Ban, Mr. Sigel and Dr. Ferrara: this case was being worked at the direction of the Governor and was not a normal law enforcement type of case. The Certificates of Analysis were issued as "Governor's Working Papers" and were not intended for general dissemination. Many of the apparent shortcomings were explained as a result of this not being a "normal" case. There were no written policies or procedures that identified the differences between this case and a "normal" case.

ASCLD/LAB LIMITED SCOPE INTERIM INSPECTION FINDINGS

The ASCLD/LAB inspectors agree in part and disagree in part with the observations by both the DFS internal auditors and Dr. Blake. The ASCLD/LAB inspectors conclude that:

1. With regard to the STR typing, there appear to have been deviations in protocol in conjunction with marginal sample quality that led to examination data that, in the ASCLD/LAB inspectors' opinion, should not have been relied upon by the DFS. The poor quality of the DNA typing results and the diverse array of alleles detected which lacked reproducibility, by repeat analysis, do not support the conclusion that the reported findings are scientifically supported by the data.

2. The analyst's reported conclusions in the September 8, 2000 Certificate of Analysis with regard to the sperm fraction of Item 58 vaginal smear are incorrect. The victim should not have been excluded, and no opinion should have been rendered as to the possible contributions of the husband, Tinsley or the other suspects, for the same reasons expressed in item 1 above.

3. There is no data indicating that contamination was introduced during the PCR testing.

4. It appears that the process used to recover the biological material in the smear from the slide identified as Item 121A may not have allowed the genetic material to be released for differential extraction.

5. At the time of the analysis, the PowerPlex amplification system did not type the amelogenin locus, which would have provided DFS examiners with significant information

about the relative contributions of male and female DNA in the evidence samples against which to evaluate typing results.

6. Pressures from outside the laboratory and excessive managerial influence from within the laboratory during the STR analyses phase had a detrimental affect on the analyst's decisions, examinations and reports in this case.[12]

7. In addition to the failures noted with respect to the examiner in regard to policy and procedure, the technical reviewer did not observe the errors in the processes and the reported results.

In light of deviations in protocol transcending a number of the examinations in this case, several recommendations are made to ensure that faulty results have not occurred in other cases handled by this examiner, that the root causes of the failures in this case are not systemic, and that all causes of the failures will be corrected.

The recommended corrective actions and protective measures are as follows:

1. Conduct validation studies on the extraction procedures of DNA from mounted slides.

2. Define a process to insulate the examiners from pressures that may be applied from inside and outside of the laboratory in situations similar to this case.

3. Refine the technical review process to ensure that policies and protocols are followed and that conclusions are scientifically supported by the data in the case.

4. Institute a policy by which deviations from standard operating procedures are approved in advance and documented in the case file.

5. Formulate a process to be used to develop an analytical approach when working with DNA samples having a low level of genetic material and for evaluating allelic dropout.

6. Ensure that the laboratory's Quality Manager determines whether the deficiencies revealed in this report are endemic to the DNA operations throughout the laboratory system in Virginia. This should be accomplished in part by a thorough examination of a minimum of 50 cases in the Virginia system dealing with low level DNA and/or slides prepared in a manner similar to Item 121A to determine whether process errors occurred and whether conclusions are scientifically supported.

   The Quality Manager should convene a suitable number of qualified DNA analysts, supervisors or technical leaders, internal and external to the laboratory or laboratory system, to determine whether the selected cases have deficiencies that substantially affect the integrity of the results in those cases. For purposes of this review, low level DNA casework is defined as recovering amounts of DNA near the detection limitations of the analysis system in use. ASCLD/LAB further recommends that the DFS prepare a report at the conclusion of this review to be provided to ASCLD/LAB for further recommendations as appropriate.

[12] It is clear that the pressures on the examiner were to obtain a result and conclude the case, not to obtain a specific result.

7. Implement appropriate corrective actions with respect to the analyst in this case. Among the corrective actions the laboratory should consider are the following:

a. Discontinue the analyst's casework involving low level DNA samples and/or mounted slides until the corrective actions are completed.

b. Conduct a review of the analyst's casework, using internal and external reviewers, from cases in and around 2000 and forward, particularly in cases in which there were low level DNA and/or mounted slides, to determine if the conclusions are scientifically supported by the data.

c. Discontinue the analyst's responsibilities as a Technical Leader until the corrective actions are completed.

8. Encourage participation by the analyst in this case in the corrective actions described in paragraphs one through five, above.

CONCLUSION

The inspection team reviewed numerous pages of case file documentation, supporting materials, and other pertinent information. It was not possible to adequately review each of the allele calls for the typing gels. A complete and thorough review of the STR typing gels would be necessary to determine which of the allele assignments are correct, especially when one considers the variation in the alleles noted for repeat analyses. However, there were sufficient data available to conclude that the DNA typing results offered in this case should have, at best, been reported as inconclusive, rather than attempting to make an interpretation from poor quality information. The added daily pressures to produce a result during the STR typing analyses laid the groundwork for mistakes to be made and procedures to be modified in attempts to gather some useful information.

Ralph M. Keaton — Date: April 18, 2005

Ralph Keaton, Director, ASCLD/LAB

APPENDIX I

ANALYTICAL OBSERVATIONS OF THE ASCLD/LAB INSPECTORS

The following analytical observations by the inspection team are based on the review of the case file documentation and Certificates of Analysis, supplemented by other relevant material, beginning with the initial evidence assessment in 1982 through 2004.

Initial Evidence Evaluations:

The original evidence assessment in 1982 by Forensic Scientist Deanne Dabbs provided the most informative evaluation of the items that would be subsequently tested with DNA technology. This included the documentation and preliminary testing of the stains, identification of spermatozoa and the numbers observed

HLA DQ-α Testing:

1. In the Certificate of Analysis dated August 31, 1993, Forensic Scientist Jeffrey D. Ban reported the DQ-α DNA types as follows:

		HLA DQ-α Type
Item 48 Known blood sample from Rebecca Williams		4,4
Item 58 Vaginal swab		
	Non-sperm fraction	Inconclusive
	Sperm fraction	1.1,1.2,4
Item 59 Known blood sample from Clifford Williams		4,4

A. Upon review of the PCR-DQα worksheet dated 8/11/93 it was observed that for this typing set the extraction/reagent blanks were not included. Although the blanks were used from the extraction phase of the analysis, they were not examined in the actual typing. This is inconsistent with the laboratory's HLA DQ-α Protocol, 13.1.1 Extraction Controls, which states that the Reagent Blanks are to be taken through the entire extraction, amplification and typing procedures.

B. In comparing the typing strip dot intensities to the noted and reported conclusions, the inspectors find the reporting of the 1.2 allele in the mixture depicted on the strips to be questionable. For the *sperm* fraction there were two typing results, since this fraction was typed using 8μl and 4μl of DNA extract. The allele dot profiles for the two samples were in agreement and represented a 1.1,4 pattern with the 1 and 1.1 dots greater in intensity than the control dot (C dot) and the 1 dot greater than the 4 allele dot. At issue is the reporting of the 1.2 as a discrete allele. Although the presence of the 1.2 cannot be eliminated, the design of the dot blot strips did not include a separate dot designation for the 1.2 allele, which made a conclusive statement of its presence difficult in mixture combinations with certain other alleles.

C. The *non-sperm* fraction for the vaginal swab Item 58 was also typed using the 8μl and 4μl of extracted DNA. The results for these samples were reported as "inconclusive." The dot patterns represented on the two strips depicted a mixture of alleles in varying amounts with the C dot clearly visible on both. There was no explanation as to why these findings were considered inconclusive when the C dot was present, even though the mixture of alleles was complex.

D. An evaluation of the differences observed between the alleles detected in the *sperm* and *non-sperm* fractions of Item 58 was not possible since there was no documentation that an assessment of the relative concentration of the expected cellular components, nucleated epithelial cells and spermatozoa, was performed. The 1982 observations by Ms. Dabbs that spermatozoa were present were the only comments available. A review of the laboratory's extraction protocol "Organic Procedures for Other Body Fluid Stains" does not specifically call for a microscopic evaluation of the cellular components during the various stages of the differential extraction procedure. However, in section 4.2.6.9, it states "repeat wash step an additional 1 to 2 times. Note: Additional wash steps are

recommended when the ratio of sperm to epithelial cells may be low." It would be very difficult to determine this ratio without a microscopic evaluation of the extracted material's cellular composition.

2. In the Certificate of Analysis dated January 14, 1994, Mr. Ban reported the DQ-α DNA types as follows:

		HLA DQ-α Type
Item 25 Blue blanket, Stain A		
	Non-sperm fraction	1.1,4, (2) 1.3*
	Sperm fraction	1.1,4
Item 25 Blue blanket, Stain B		
	Non-sperm fraction	1.1,4, (2) 1.3*
	Sperm fraction	1.1,4
Item 25 Blue blanket, Stain C		
	Non-sperm fraction	1.1,4, (2) (1.3)
	Sperm fraction	1.1,4, (2)
Item 25 Blue blanket, Stain D		
	Non-sperm fraction	1.1,1.2,4, (2)
	Sperm fraction	1.1,1.2,4*
Item 50 James Pendleton's standard		4,4

Number in ( ) indicates a weak allele (equal to or more intense than C dot)
* indicates a very weak allele (less intense than C dot) included for informational purposes only.

A. The HLA DQ-α results reported in the Certificate of Analysis identify the genotype for James Pendleton as a 4,4. The table of typing results for the analysis set noted the presence of a weak 1.1 allele. This observation is recorded as 4,4 1.1* which is consistent with the explanation in the clarification to the report above. Upon review of the typing strip photographs, the 1 and 1.1 dots are visible and less intense than the C dot and much less intense than the 4 allele. There is no explanation for not including the presence of this minor component in the final report when similar weak allele findings were reported for the stained samples.

B. A Product Gel Data Worksheet dated 1/13/94, listed the above reported samples in the order of sampling on the electrophoresis gel. An accompanying photograph depicted the relative fluorescence of the various samples and controls. There were no analyst observations noted next to each sample, however, a review of the photograph revealed amplified product in the question samples and the reference sample Item #50. At issue is the negative amplification control that was observed to have distinct fluorescent activity. The negative amplification control is intended as a means of evaluating potential contamination of the amplification materials as it is incorporated at the amplification setup stage. In addition, both the BB (blood blank) and BM (blank mix) reagent blank controls appeared to have very weak fluorescent activity. There were no notes by the analyst of having observed this incidence or explanation of its significance or corrective actions. The HLA DQ-α

typing strips for these samples did not reveal any visible dot activity. Of concern is whether the weak additional dots observed for the reference sample Item 50 represented contamination.

Short Tandem Repeat Analysis:

1. In the Certificate of Analysis dated September 8, 2000, Mr. Ban reported the following STR PowerPlex typing results:

> The evidence items from which DNA was recovered were the vaginal and labial smears from the Medical Examiner's Office (Item 121A and C), vaginal smear (Item 58), blanket (Item 25 stains A, B, D and 1-5), fingernail scrapings from victim Rebecca Williams (Items 55 and 56), a shirt (Item 72) and the reference blood samples from Rebecca Williams (Item 48), Clifford Williams (Item 59C) and Earl Washington (Item 120). The DNA recovered from the labial smear (Item 121C) was reported as insufficient in quantity.
>
> The vaginal smear (Item 121A), blanket (Item 25 stains A, B and 1-5), fingernail scrapings from the victim (Items 55 and 56) and the shirt (Item 72) were amplified and typed in the PowerPlex 1.1 STR system.
>
> The vaginal smear (Item 58), the blanket (Item 25 stain D), and the three reference blood samples were amplified and typed in the PowerPlex 1.1 and 2.1 STR systems.

A. The results of the STR DNA typing of the fingernail scrapings (Item 55 and 56) concluded that a mixture was present with Rebecca Williams being the major contributor. No conclusion relevant to the minor contributor was offered due to the limited DNA profile.

(1.) Upon review of the Certificate of Analysis relative to the fingernail scraping evidence, it was observed that the STR DNA typing results were absent from the STR findings listed in the Table of PowerPlex Typing Results. The "Results" section of the report refers to the table for the typing results of these as well as other items. When Mr. Ban was queried about this omission and why a corrected report was not issued upon its discovery, his response was that the report was not intended for the usual law enforcement agencies and therefore it was not considered necessary.

The DFS Policy and Procedure Guide 2-3, dated October 17, 1997, addresses Certificate of Analysis preparation, including reissuing of reports needing change (Section 4.10).

Corrective Action:

Upon the return of the inspection team to Virginia Division of Forensic Science in December 2004, additional documentation was provided which included a Memorandum of Record dated 10/5/04 noting a request from Rick Moore, Deputy Commonwealth Attorney, that a supplemental

Certificate of Analysis with the results for the fingernails (Items 55 and 56) be issued. A letter on Virginia Division of Forensic Science letterhead signed by Jeffrey D. Ban to Richard E. Moore, Deputy Commonwealth's Attorney, dated November 2, 2004, was included. This letter clarified the omission and included the Table of PowerPlex 1.1 Typing Results.

(2.) The Slot Blot DNA Quantitation worksheet dated 7/20/00 depicts the sample and control layout on the membrane and the results obtained. It was noted that for column 4 the word "empty" was written above a bracket which spanned from well A at the top of the worksheet to well H at the bottom. This indicated that for this analysis there were no samples applied to this column of wells. Upon inspection of the actual slot blot film, a clearly visible band was present in well 4A, which had no notations indicating that a sample had been applied. There were no notes on the worksheet reflecting that the analyst had observed this band.

(3.) With regard to the STR typing of the fingernail scrapings, there are alleles in the table of typing results for 8 loci. Three loci had ( ) around the listed alleles indicating weaker or questionable results. A note at the bottom of this page stated "not second sized." There is no indication in the analytical notes for this specific analysis that an independent calling of the alleles for each sample had been conducted by a second qualified individual, as required in section 9.2.7A of the Biology Section Procedure Manual, Section III, memorandum Number 17.

(4.) The fourth paragraph of the conclusion section of the Certificate of Analysis (9/08/00), page 6 of 8, states that "No DNA profile was obtained for the sperm fraction of the vaginal smear from the Medical Examiner's Office (ME) (item 121A). Therefore, no conclusion can be made about the sperm fraction for this sample."

The reasons for not recovering sufficient DNA to determine a profile for this sample may be the result of a lack of sufficient original smear or possibly problems with the recovery of biological material from the slide. This could include, but is not limited to, problems with the differential extraction itself. There are lots of steps in the sequence of analysis where the work could have gone off track, starting with getting the material off the slide itself in an efficient way. A review of the case notes related to the handling and extraction of the Medical Examiner's smears revealed that there were photographs taken by the analyst prior to extraction of the vaginal smear Item 121A. The photomicrographs were labeled Vaginal Slide "A" (5 black and whites of the same area on the slide), Vaginal Slide "B" (1 color), Labia Slide "C" (1 color), and Labia Slide "D" (2 black and white) relating to the vaginal and labial smears. The photomicrographs were apparently documentation of the gross smear slide content since each photograph represented areas containing several nucleated cells with one or two likely spermatozoa visible in the open areas of the slides. There also appeared to be a few more spermatozoa among the nucleated cells.

Mr. Ban's case notes dated 6/5/00 reflected the following observations relative to the microscopic examination of the smear slides; all smear slides had been previously stained and contained cover slips:

121A – Vaginal Smear: "A lot of cellular material observed, 2 intact sperm & 3 heads per slide."

121B – Vaginal Smear: "A lot of cellular material observed, 2 intact sperm & 2 heads per slide."

121C – Labia Smear: "Same cellular material observed on slide, 2 heads & 1 intact sperm per slide."

121D – Labia Smear: "Some cellular material observed 2 intact sperm & 2 heads/sweep."

121E – Anal Smear: "A small amount of cellular material, 1 possible intact sperm mixed w/ cellular material??"

121F – Anal Smear: "A small amount of cellular material, 2 heads, and no intact sperm observed."

Examination date 6/6/00.

121G – Thighs smear: "Very little cellular material observed, poss. 2 heads per slide, not well defined."

121H – Thighs smear: "Very little cellular material observed, 1 possible sperm observed on top of epith. Cell ?? not well defined in order to take a photo."

121I – Buttocks smear: "Very little cellular material observed, no sperm head were found."

121J – Buttocks smear: "Very little cellular material observed, 1 poss. Sperm head observed, not well defined."

There were no other notes available to help in determining a reason for the failure to obtain a DNA profile from the *sperm* fraction of Item 121A in the first differential extraction dated 6/14/00. The product gel revealed no product bands for the *sperm* fraction extract. No STR profile was reported for the *sperm* fraction. The case file documentation relevant to this sample was evaluated to assist in identifying possible reasons for not achieving a reportable STR DNA profile. From the initial microscopic examinations, there were spermatozoa observed on the smear slide, 2 intact sperm & 3 heads per slide. However, there was no other information present that could provide an explanation for the lack of sperm DNA recovery. Possible reasons for this lack of recovery are a small amount of smear material to begin with (no notes were located describing the size or amount of the smears on each slide); difficulty in physically removing the cellular material from the slides for extraction; problems with the extraction

procedure; or sample handling during analysis. Another possibility, that could have affected the recovery, was the requirement on the analyst to consume only half of the available smear; a decision made in consultation with DFS Director Paul Ferrara. After the initial lack of sufficient recovery, permission was given to consume the remaining smear in an attempt to recover enough DNA for STR typing.

A second differential extraction was performed on 6/20/00. This extraction combined the remaining half of the ME vaginal slide (Item 121A) and the entire ME labia slide (Item 121C). Slot blot results reflected no DNA product for the sperm fraction of this combined sample extract. The product gel revealed a very weak banding pattern for both the non-sperm and sperm fractions. The typing gel was not sized as the following note recorded "image not sized carryover of ladder." Samples were reamplified on 6/24/00/ with the product gel revealing no product. The samples were typed but a note explained "image not sized no useable information could be obtained." As with the first extraction set, it was not possible to determine a reason for the lack of detectable DNA as there were no notes available for review that could provide information on the effectiveness of the analysis.

Information acquired during this investigation from DFS staff indicates that the type of smear slides prepared by the Medical Examiner's Office was not common. Each of the slides was stained and had a cover slip. Mr. Ban explained his difficulty in removing the sample from the slides as swabbing was not effective and he had to resort to scraping to affect a recovery.

B. The sixth paragraph of the conclusion section in the Certificate of Analysis (9/8/00), page 6 of 8, states that "The DNA profile obtained from the *sperm* fraction of the vaginal smear (item 58) at," various noted loci, "is consistent with a mixture. Rebecca Williams (item 48), Clifford Williams (item 59C), and Earl Washington (item 120) are eliminated as possible contributors of genetic material to this mixture."

(1.) At issue is the statement that the victim is eliminated as a possible contributor of the genetic material for the *sperm* fraction of the vaginal smear (Item 58). A review of the STR typing data revealed that there were results from two typing gels compiled in tables. In the first set of results, which were not reported, a profile for several loci were noted. For the eight PowerPlex 1.1 loci tested, five were represented by two alleles, both of which agreed with the victim's profile. The other three loci were noted as providing no results. The PowerPlex 2.1 findings revealed the same allelic combinations for the *sperm* fraction and the victim's profile for the three loci reported.

The second set of typing results, which were reported, revealed a slightly different profile for some of the loci when compared to the first analysis. Some of the loci were represented by one allele where two had been observed in the first analysis. There were a couple of additional alleles, foreign to the victim's profile, also detected.

Rather than attempt to reinterpret all of the typing gel data, the inspectors focused on the laboratory's reported findings and also those noted in the case file documentation.

The data recorded for the two typing sets revealed that they lacked reproducibility. Based on this review, and the lack of reproducibility between duplicate analyses of this *sperm* fraction, it would not be possible to conclusively exclude the victim as a probable contributor to at least some of the DNA detected in this sample. The lack of sample assessment information makes any further evaluations difficult, since it cannot be concluded with certainty that spermatozoa were present in the *sperm* fraction after the initial smear slide microscopic observations, sample removal, and differential extraction. Having information about the relative concentration of epithelial cells to sperm cells could provide one more bit of data that would aid in interpreting whether the DNA profile detected was consistent with residual DNA from the female contribution, because of a high epithelia cell concentration, or more representative of the male sperm contributor. It would not be uncommon for there to be carryover of female DNA from the epithelial cells into the male or *sperm* fraction with the relative amounts of each expressed in the typing results dependent on such factors as the condition and amount of the original sample, the relative cell component concentrations, as well as the effectiveness of the differential extraction procedure.

The STR typing profiles for the two analysis sets are not reproducible; however, the information represented by the alleles detected for the various loci does indicate a consistency with the victim's profile to some extent. The inspectors believe that this consistency is sufficient to conclude that the victim cannot be eliminated as a possible contributor to the genetic material in the mixture.

When duplicate analyses of a sample produces results that are not reproducible, a conclusion more consistent with "no interpretable results obtained" or one that simply states the findings were "inconclusive" would be more appropriate.

During the December 2004 revisit, a discussion was had with Mr. Ban regarding reporting an inconclusive result that lacked reproducibility. His reply was that reporting an "inconclusive was not an option" in this case. The Governor's office, according to Mr. Ban, wanted to know if suspect Washington was cleared of the charges.

An internal audit report was provided during the December 2004 interim inspection. The review of the case file was conducted by two supervisory personnel from two other Virginia DFS laboratories. A memorandum dated December 6, 2004, was issued by the internal auditors and is discussed at the end of this report. In this memorandum, the internal auditors conclude that the victim should not have been eliminated as a potential source of DNA in this sample. Through oral communication with Mr. Ban, Virginia DFS Deputy Director Steve Sigel and Dr. Ferrara, the

inspectors have been informed that an effort will be made to correct the reported elimination. As of the conclusion of the December 2004 on-site interim inspection, the mechanism they will use to make this correction had not been decided.

2. In the Certificate of Analysis dated 10/18/00, Mr. Ban reported the STR PowerPlex typing results.

   A. The first issue noted from the report is in regards to the conclusions that Kenneth Tinsley and seven other male subjects were eliminated as possible contributors of genetic material to the mixture of DNA obtained for the *non-sperm* fraction of the vaginal smear (Item 58). See page 4 of 5 of the Certificate of Analysis. A similar issue of elimination is apparent in the conclusions offered on page 7 of 8, C of A 9/8/00, for the DNA profile of the contributor of the sperm and non-sperm fractions of the royal blue blanket (Item 25, stain D). In part the last sentence of the sixth paragraph states that "this individual (the contributor of the DNA profile for the sperm fraction of Item 25, stain D) is eliminated as a possible contributor of the genetic material found in the non-sperm fraction of the vaginal smear from the Medical Examiner's Office (Item 121A), and the sperm and non-sperm fraction of the vaginal smear (Item 58)."

   A review of the case file documentation revealed that, as with the *sperm* fraction, there were two analyses resulting in STR typing information; one was reported and the other was not. The first conclusion upon evaluation of the data was that the two results were not reproducible. The profiles noted in the data tables indicated a complex DNA mixture. There were a number of alleles noted; some conclusively, and some with ( ) around them to indicate alleles detected were of lesser intensity. Not all of the seven reference DNA profiles from the other subjects were compared extensively by the inspectors to the reported *non-sperm* fraction profile obtained from Item 58. However, suspect Kenneth Tinsley was compared to the reported profile as well as the unreported data. The STR profile of Tinsley revealed overlapping of alleles for several loci with the profile of Rebecca Williams. Taking into consideration the lack of reproducibility between the two analysis sets, it was decided to look at all detected or noted alleles for each locus. Furthermore, the age and condition of the evidence sample indicated that some of the sperm contributors' DNA would be expected in the *non sperm* fraction. With this in mind, the review concluded that the alleles detected in one or both of the two *non sperm* fractions were shared by Kenneth Tinsley in all but two loci for which data was reflected. In the D8S1179 locus, Kenneth Tinsley is reported to be a 13,16 genotype, while there was no 16 allele detected in the *non sperm* fraction. For D18S51, Tinsley is reported to be a 12,18 and there was no 18 allele represented in the question sample profile.

   Excluding a subject based on the absence of an allele at one or more loci is a common conclusion offered in this type of analysis. Consideration should be given when making these interpretations to the quality and quantity of the evidence being evaluated and the reproducibility of the test results. In light of the low amount of DNA recovered and the difficulty in achieving a profile, let alone a reproducible profile, making a conclusive determination of exclusion based on the data represented would be unjustified.

Based on the lack of reproducibility of the two test results and the spectrum of alleles detected, eliminating Kenneth Tinsley conclusively as a possible contributor is not supportable based on the data obtained in this case even considering that his profile contained two alleles that were not observed in the non-sperm fraction.

The poor quality of the DNA STR typing results achieved for the *sperm* and *non sperm* fractions of the vaginal smear, Item 58, makes a definitive statement about the inclusion or exclusion of a subject questionable.

APPENDIX II

Virginia Division of Forensic Science Internal Audit Memorandum:

The laboratory is to be commended on initiating the internal audit conducted by Karen C. Ambrozy and R. Elizabeth Bush reported in a Memorandum dated December 6, 2004. Some of the issues identified by the auditors were useful in giving direction to evaluating the deviations from the accepted protocols. The four deviations noted were for the most part discussed in the preceding pages with the exception of the last, which referred to "modifying the amplification master mix." This situation was identified in the analysis conducted and reported by Forensic Scientist George Li on items listed in the Certificate of Analysis dated 9/30/04. The analyst replaced the volume of water in the master mix for the "case samples". The modification was approved by Mr. Ban in his role as Technical Leader of the DFS Laboratory. There was no amplified product obtained and no typing conducted.

The deviation noted in regards to "typing samples with no DNA product as demonstrated on a product gel," relates to policy that was revised in memorandum to "All Forensic Biology Staff" on December 3, 1999, which changed portions of the DFS Forensic Biology Section Procedure Manual, Section III, 6.5.9.2. The revision reads "If NO amplified DNA is observed on the product gel and no DNA was observed on the lumigraph/x-ray film, no further analysis will be conducted on this sample." The first incident was observed on a product gel worksheet dated 6/17/00 where two samples, Rebecca Williams and the sperm fraction for the vaginal slide 'A' 121A were present. The second occurrence was for sperm and non sperm fractions for vaginal/labia smear Items 121 A&C on a product gel worksheet dated 6/25/00. Both samples were noted as having NO product.

The ASCLD/LAB inspectors disagree with the statement made by the DFS internal auditors that "We find that the conclusions reached in this case regarding Earl Washington and Kenneth Tinsley are scientifically supported by the data in the case file." The poor quality of the DNA typing results and the diverse array of alleles detected by repeat analyses, that are not reproducible, do not sustain the conclusion that the reported findings are scientifically supported by the data.