

## USDOJ/OIG Special Report

**The FBI Laboratory: An Investigation into Laboratory Practices  
and Alleged Misconduct in Explosives-Related and Other Cases (April,1997)****Table of Contents**

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## EXECUTIVE SUMMARY

This investigation by the Department of Justice Office of the Inspector General (OIG) concerned allegations of wrongdoing and improper practices within certain sections of the Federal Bureau of Investigation (FBI) Laboratory. Those allegations involved some of the most significant prosecutions in the recent history of the Department of Justice, including the World Trade Center bombing, the Oklahoma City bombing, and the mail bomb assassination of U.S. Circuit Judge Robert Vance (which was referred to within the FBI as the VANPAC case). The allegations implicated fundamental aspects of law enforcement: the reliability of the procedures employed by the FBI Laboratory to analyze evidence, the integrity of the persons engaging in that analysis, and the trustworthiness of the testimony by FBI Laboratory examiners. The allegations were brought to the OIG's attention by Supervisory Special Agent Frederic Whitehurst, a Ph.D. scientist employed in the FBI Laboratory. We also investigated problems that we ourselves identified in the course of our investigation, as well as information brought to our attention by other employees in the Laboratory.

The investigation spanned more than eighteen months and addressed a very large number of allegations. Most of Whitehurst's allegations were not substantiated; some important ones were. Our investigation identified policies and practices in need of substantial change. Since the allegations involved incidents that occurred over nearly a decade, some of those policies had already been changed by the FBI or were in the process of being changed before the draft report was completed. In a number of key instances, we found problems that Whitehurst had not raised. We also saw examples of superb work and encountered Laboratory personnel dedicated to the highest traditions of forensic science. But we also found some Laboratory supervisors and examiners whose performance merits critical comment, and raises serious questions about whether they should continue in their current roles within the Laboratory. Accordingly, in addition to general recommendations we made about Laboratory practices and procedures, we recommended that certain supervisors and examiners be reassigned from their current positions.

This investigation and our findings primarily concerned three units of the FBI Laboratory -- the Explosives Unit (EU), the Materials Analysis Unit (MAU), and the Chemistry-Toxicology Unit (CTU), all of which were in the Scientific Analysis Section (SAS), one of five sections of the Laboratory. Our findings and conclusions regarding certain cases in those units should not be imputed to other cases within those units, nor to other units in the SAS or other sections of the Laboratory that we did not investigate.

The next section of this Executive Summary provides an overview of our principal findings and recommendations. The Summary then generally corresponds to the organization of the Report. Section II describes the OIG investigation (Part Two of the Report). Section III summarizes the significant cases that are treated in detail (Part Three, Sections A-G of the Report). Section IV sketches the many other matters investigated (Part Three, Sections H1-H13 of the Report). Section V describes our findings and conclusions on Whitehurst's allegations of retaliation (Part Four of the Report). Section VI describes our findings and recommendations with respect to the conduct and performance of particular individuals (Part Five of the Report). Section VII summarizes our recommendations regarding general Laboratory practices and procedures (Parts Six and Seven of the Report).

## I. Principal Findings and Recommendations

### A. Findings Regarding Alleged Misconduct And Performance Deficiencies

We did not substantiate the vast majority of the hundreds of allegations made by Whitehurst, including the many instances in which he alleged that Laboratory examiners had committed perjury or fabricated evidence. We found, however, significant instances of testimonial errors, substandard analytical work, and deficient practices. Those findings with respect to individual cases appear in Section III of this Executive Summary and are treated in detail in Part Three of the Report. The types of problems we found included:

- Scientifically Flawed Testimony in the Psinakis, World Trade Center, Avianca, and Trepal cases.
  
- Inaccurate Testimony by an EU examiner in the World Trade Center case, ~~by a former Laboratory examiner (who is still an FBI agent) in a hearing conducted by the judicial committee of the Judicial Council of the Eleventh Circuit regarding then-Judge Alcee Hastings, and by the CTU Chief in the Trepal case.~~
  
- Testimony Beyond the Examiner's Expertise in the World Trade Center, Avianca, and Hastings cases.
  
- Improper Preparation of Laboratory Reports by three EU examiners who altered, omitted, or improperly supplemented some of Whitehurst's internal reports (dictations ) as they were being compiled into an official report of the Laboratory. A former EU Chief failed to substantively review all of the reports in his unit, authorized EU examiners to modify Whitehurst's dictations when incorporating them into EU reports, and fostered a permissive attitude toward changes to Whitehurst's dictations.
  
- Insufficient Documentation of Test Results by the examiner who had performed work on hundreds of cases, including Psinakis and the UNABOM investigation, and by the CTU Chief.

- Scientifically Flawed Reports in the VANPAC and Oklahoma City cases, and in numerous cases by the former MAU examiner who worked on Psinakis, and in a few instances by an EU examiner who altered Whitehurst's reports.
- Inadequate Record Management and Retention System by the Laboratory.
- Failures by Management to resolve serious and credible allegations of incompetence lodged against the examiner who worked on the Psinakis case; to review properly the EU report in the Oklahoma City case; to resolve scientific disagreements among Laboratory examiners in three cases, including Avianca; to establish and enforce validated procedures and protocols that might have avoided problems in examiner reports in the Psinakis and VANPAC cases; and to making a commitment to pursuing accreditation by the American Society of Crime Laboratory Directors/Laboratory Accreditation Board before 1994.
- A Flawed Staffing Structure of the Explosives Unit that should be reconfigured so that examiners possess requisite scientific qualifications.

## **B. Findings and Recommendations Concerning Individuals**

The OIG investigation exonerated most of the persons named in Whitehurst's allegations. Regarding some personnel, however, we criticized certain practices and performances in particular cases and recommended reassignments from their current positions and other actions. Our principal recommendations included:

- Because we recommended that the EU be restructured so that its unit chief and examiners have scientific backgrounds, EU Chief J. Thomas Thurman and all non-scientist EU examiners should be reassigned outside the Laboratory when the restructuring is accomplished. In the interim, the FBI should assess whether Thurman should continue to hold a supervisory position.
- CTU Chief Roger Martz should not hold a supervisory position in the Laboratory, and the FBI should assess whether he should continue to serve as a Laboratory examiner.
- EU examiner David Williams, who worked on the World Trade Center and Oklahoma City cases, should be reassigned outside the Laboratory.



- The FBI should assess what disciplinary action is now appropriate for Michael Malone, the former Laboratory examiner who testified in the Hastings hearing.
- We concluded that Frederic Whitehurst cannot effectively function within the Laboratory and suggested that the FBI consider what role, if any, he can usefully serve in other components of the FBI. In making that determination, the FBI and the Department of Justice must weigh the significant contribution he has made by raising issues that needed to be addressed within the Laboratory against (1) the harm he has caused to innocent persons by making many inflammatory but unsubstantiated allegations, and (2) the doubts that exist about whether he has the requisite common sense and judgment to serve as a forensic examiner.

### **C. Recommendations Concerning Policies and Procedures**

To enhance the quality of the Laboratory's forensic work, we made recommendations in the following areas: (1) accreditation, (2) restructuring the EU, (3) the roles of Laboratory examiners and resolutions of disputes, (4) report preparation, (5) peer review, (6) case documentation, (7) record retention, (8) examiner training and qualification, (9) examiner testimony, (10) protocols, (11) evidence handling, and (12) the role of management. In response to a draft of this Report, the FBI accepted full responsibility for the failings we identified within the Laboratory. The FBI's response concurred with nearly all of the OIG's recommendations and stated that the Laboratory has implemented or is taking steps to implement them. The FBI's response to the draft report is contained in an Appendix, along with our reply to specific points raised in its response.

## **II. The OIG Investigation**

The OIG investigation essentially occurred in two phases. The first phase, lasting from 1994 to the summer of 1995, was limited in scope. As is detailed in the Report, during that period, allegations by Whitehurst were the subject of various reviews by the FBI Office of General Counsel (FBI OGC), the FBI Office of Professional Responsibility (FBI OPR), and the FBI Laboratory itself until mid-1995. The OIG's investigation in that period focused on Whitehurst's contentions that his analytical reports had been substantively altered by an EU examiner.

By the summer of 1995, after other scientists in the Laboratory confirmed certain aspects of Whitehurst's allegations, it became clear that a more global, comprehensive investigation was warranted. With the agreement of FBI Director Louis Freeh, and the full cooperation of the FBI, the OIG undertook such an investigation and retained an international panel of five scientific experts to consult with the OIG. Those experts, whose combined experience exceeds 100 years of work in forensic and national laboratories, have been integrally involved in the process of interviewing witnesses, reviewing documents, and writing this report. Four experienced prosecutors from United States Attorneys' Offices and the Criminal Division were detailed to the OIG to lead the

investigation, and have provided considerable investigative expertise in this matter.

From the autumn of 1995 to the present, the OIG team has conducted hundreds of interviews, including re-interviews of key witnesses, and reviewed more than 60,000 pages of documents and transcripts. Upon completion of a draft report on January 21, 1997, the OIG solicited comments from the FBI and from prosecutors (primarily in the United States Attorneys' Offices) and other lawyers who handled the cases at issue to ensure that no factual errors were inadvertently included. The responses themselves, as well as our replies, are contained in a separate Appendix. In evaluating those responses, the OIG made some revisions to the Report. After careful consideration, in most instances we did not agree with requests to change the language in the draft report or our findings, and have explained our reasoning either in the Report itself or in the Appendix.

One general point about the responses bears highlighting in this summary. As to cases in which we criticize the work of FBI Laboratory personnel, such as in the World Trade Center and Avianca cases, the FBI and U.S. Attorneys have responded by saying, in essence, that nothing in the Report should be read as affecting the outcome of those cases. Our purpose has not been to determine whether a defendant in any given case was improperly convicted of a crime; it was to ascertain whether the performance of the Laboratory personnel met general standards of conduct for forensic scientists and complied with policies in the FBI Laboratory in effect at the time the work was performed. Our findings of deficiencies in the work performed in cases should in no circumstance be read as expressing a view as to whether that case should have reached a different outcome. That role is properly performed by the prosecutors, defense counsel, and judges who can assess the work of the FBI Laboratory in the context of all of the evidence in the case. We, therefore, concluded that it would be inappropriate for us to make any judgments as to whether our findings will or should affect a particular case.

### **III. Significant Cases Treated in Detail**

#### **A. Allegations Concerning Agent Terry Rudolph (Part Three, Section A of the Report)**

From the time Frederic Whitehurst first joined the FBI Laboratory in 1986, he repeatedly complained about the work practices of Agent Terry Rudolph, who preceded Whitehurst as the Laboratory's senior examiner for the analysis of explosives residue. Those complaints reached an apex with work Rudolph performed in connection with the Psinakis case. After that case ended in an acquittal, the Assistant United States Attorney (AUSA) who tried the case wrote a letter to the FBI complaining that Rudolph's performance was deficient, that the judge had nearly excluded his testimony, and that the defense had seriously impeached his scientific work and conclusions relevant to that case. That letter raised serious questions about certain Laboratory practices. For example, it noted the apparent absence within the Laboratory at the time of established protocols to determine when certain tests should be performed and of peer review to confirm the sufficiency of the analysis conducted by the Laboratory examiner.

Laboratory management responded to the AUSA's letter by directing that Rudolph's case files be audited. In August 1989, an internal audit of some of Rudolph's files found numerous shortcomings and recommended that an extensive technical review be undertaken. That review was assigned to Roger Martz, the chief of the Chemistry-Toxicology Unit (CTU). Martz reviewed 95 of Rudolph's files, concluded that Rudolph's analysis supported the results, and reported finding no technical errors. Upon the completion of Martz's review, the Laboratory determined that no further action concerning Rudolph was necessary. That decision proved to be a significant error in judgment. Our investigation showed that Martz's review was seriously deficient, that he failed to engage in the type of technical review that would actually have assessed the competence and sufficiency of the work purportedly performed by Rudolph, and that Martz's written reporting led Laboratory managers to believe that there were no problems with Rudolph's work or his files.

Because the Laboratory took no action against Rudolph, Whitehurst continued to complain about Rudolph's sloppy work habits, and added charges that Rudolph had perjured himself in a case, lied to an AUSA, abused annual leave, and made racist remarks. Those allegations led to an FBI OPR investigation in 1991-1992. Although we did not find evidence of a deliberate effort to dismiss or ignore Whitehurst's allegations -- as he has maintained -- we did find significant deficiencies in the OPR investigation of this matter.

The OPR investigators lacked the technical expertise to review Whitehurst's allegations concerning Rudolph's casework, so the Laboratory itself conducted yet another review of Rudolph's case files, this time in 1992. James Corby, the chief of the Materials Analysis Unit (MAU), performed that review. Corby analyzed approximately 200 cases and found significant flaws, such as Rudolph's failing to follow his own explosives residue protocol, to form conclusions with a valid scientific basis, and to conduct necessary tests. Corby recommended that Rudolph be disciplined and removed from doing any further explosives work in the Laboratory. Corby's supervisor, Kenneth Nimmich (chief of the Scientific Analysis Section (SAS) of the Laboratory), then directed that Corby, Martz, and CTU examiner Lynn Lasswell engage in a panel review of Rudolph's files to determine whether any errors needed to be brought to the attention of any prosecutor or defense attorney. Lasswell analyzed 57 of the 200 case files and found serious deficiencies. We found no evidence, however, that Martz conducted any review of Rudolph's files or otherwise assisted in this effort.

Nimmich recommended to John Hicks, the Laboratory Director, that Rudolph be severely reprimanded. Instead, Hicks decided to orally admonish Rudolph. When Hicks delivered that punishment, however, he also gave Rudolph a check for \$500, which represented an incentive payment for recent work. The monetary award meant that a decidedly mixed message was sent to Rudolph, who reported to us that he was quite surprised by how leniently he had been handled.

In 1993, Corby continued to express concern over the condition of Rudolph's files and asked James Kearney (who had replaced Nimmich as the head of the SAS) to raise the issue anew with Hicks. Hicks, however, decided that the Rudolph matter had been adequately reviewed and took no action. In 1994, Whitehurst's attorney complained in a letter to the FBI about Rudolph. The FBI Office of General Counsel (FBI OGC) conducted an investigation, determining that Rudolph's files were sloppy and that his [Rudolph's] conclusions are not supported by appropriate documentation. The FBI OGC recommended a comprehensive review, a recommendation not welcomed by the Laboratory Division.

A year after that recommendation was made, in June 1995, Corby was directed to review all cases in which Rudolph had worked as an examiner. Corby completed his review before the end of that year, and found that nearly one-quarter of Rudolph's files did not meet the administrative or technical guidelines at the time the cases were worked. (Emphasis in original.) Rudolph wrote a 200-page response in which he took issue with many of Corby's conclusions. We did not attempt to replicate Corby's work, but our review convinced us that his findings were generally correct.

Although our investigation did not reveal intentional misrepresentations by Rudolph, we did find serious performance deficiencies in his work. As the foregoing discussion of management efforts reveals, it took FBI management nearly six years to perform the type of comprehensive review of Rudolph's files that should have occurred in 1989 after Rudolph's performance in the Psinakis case was so sharply criticized by the AUSA who handled that case. Former Director Hicks was especially remiss for failing to respond adequately to the mounting concerns about Rudolph's competence. CTU Chief Martz was derelict in his technical review and misleading memorandum in 1989. The 1992 review largely failed as an effort to ascertain fully the true extent of the deficiencies in Rudolph's files. Had Laboratory managers performed responsibly, the Rudolph matter might have been appropriately resolved much earlier than 1995. Instead, the Rudolph problem continued to fester.

### **B. The Mail Bomb Assassination of Judge Robert Vance (Part Three, Section B)**

In 1989, mail bombs killed U.S. Circuit Judge Robert Vance and a civil rights attorney. A massive investigation ensued, ultimately leading to the indictment and conviction in 1991 of Walter Leroy Moody, Jr. Whitehurst complained to the OIG that J. Thomas Thurman of the Explosives Unit (EU) and Martz of the CTU circumvented Laboratory procedures because Thurman arranged for Martz's unit to analyze material in the mail bombs even though Whitehurst's unit, the Materials Analysis Unit (MAU), was responsible for analyzing explosives residue. Whitehurst also contended that, because Martz failed to follow the protocol for residue analysis developed by the MAU, he reached a flawed opinion in concluding that the mail bombs contained a particular smokeless powder. Whitehurst further alleged that Martz and Thurman fabricated evidence, perjured themselves, and obstructed justice in the case. He also suggested that prosecutors Louis J. Freeh and Howard Shapiro, at that time the AUSAs who tried the case, may have committed misconduct by offering the testimony of Martz and Thurman.

We found no evidence to support Whitehurst's charges that Thurman and Martz perjured themselves, fabricated evidence, obstructed justice, or violated any FBI policies or procedures in the case. We did not find any evidence of prosecutorial misconduct. In our investigation of this matter, we also reviewed the analytical work of Robert Webb, an examiner in the MAU who analyzed certain tape, paint, sealant, and glue, and whose conclusions were reported in Thurman's testimony. Although Whitehurst had made no allegations against Webb, we found that Webb stated certain conclusions about his work more strongly than were warranted by the results of his examinations. We found that Webb did not fabricate evidence or intentionally bias his conclusions.

Although we did not find the kinds of misconduct alleged by Whitehurst in this matter, our

investigation of this case found ways in which Laboratory practices and procedures could have been improved. Those included: (1) establishment of clear guidelines stating the respective responsibilities of different units with regard to explosives residue analysis; (2) clearer guidance as to the proper scope of the testimony by examiners other than those who conducted the underlying analytical tests; (3) an improved record retention and retrieval system; (4) written and validated protocols for standardized procedures; and (5) contemporaneous peer review to ensure that conclusions are properly supported by analysis and data.

### **C. The World Trade Center Bombing (Part Three, Section C)**

After the bombing of the World Trade Center on February 26, 1993, law enforcement authorities investigated and apprehended several suspects, which led to convictions in two trials: one beginning in 1993, Salameh, which dealt primarily with the bombing, and the other in 1995, Rahman, a broader case that included evidence of the bombing. Prior to the Salameh trial, Whitehurst complained within the Laboratory about the scientific work in several respects, all of which were ultimately resolved to his satisfaction prior to the first trial. In January 1996, however, Whitehurst submitted to the OIG an 80-page critique of the Salameh testimony of David Williams, an examiner in the Explosives Unit (EU). Among the many allegations framed by Whitehurst, he specifically accused Williams of misrepresenting the truth, testifying outside his area of expertise, and presenting testimony that was biased in favor of the prosecution. We concluded that Williams gave inaccurate and incomplete testimony and testified to invalid opinions that appeared tailored to the most incriminating result. We did not substantiate Whitehurst's many other allegations.

Williams testified in the Salameh trial as an explosives expert, and his testimony was potentially significant. He opined (1) that the defendants had the capacity to manufacture about 1200 pounds of the explosive urea nitrate, an explosive rarely used for criminal purposes, and (2) that the main explosive (main charge) used in the World Trade Center bomb consisted of about the same amount (1200 pounds) of the same explosive (urea nitrate). Normally, the way a crime laboratory determines the main charge of an exploded bomb is by finding unconsumed particles or distinctive byproducts of the explosive among the debris. The search for such residues is made by a forensic chemist. The FBI chemists specializing in the examination of explosives residue, however, did not find any residue identifying the explosive at the World Trade Center. Thus, the normal way of scientifically determining the main charge was unavailable. Williams' testimony filled that scientific void.

Williams' opinions that the defendants had the capacity to manufacture about 1200 pounds of urea nitrate and that about 1200 pounds of urea nitrate was used in the bombing were deeply flawed. As explained in detail in the Report, his testimony about the defendants' capacity exceeded his expertise, was unscientific and speculative, was based on improper non-scientific grounds, and appeared to be tailored to correspond with his estimate of the amount of explosive used in the bombing. His opinions about the explosive used in the bombing were based on an invalid inference concerning the velocity of detonation (VOD) of the main charge, an incomplete statement of the VOD of urea nitrate, invalid and misleading statements about the type of explosives that could have been used, and speculation beyond his scientific expertise that appeared to be tailored to the most incriminating result.

Ultimately, Williams conceded during our investigation that he had no basis from the crime scene for

determining the type of explosive used, acknowledging that based on the crime scene the main charge could have been anything. That opinion differs substantially from the opinions he rendered in the Salameh trial that narrowed the category of possible explosives and ultimately identified the main charge as urea nitrate. During the Salameh trial, Williams testified that he was a scientist; the prosecutors referred to him as an explosive expert witness. In contrast, Williams' identification of urea nitrate was based not on science but on speculation based on evidence linking the defendants to that explosive.

Additionally, we concluded that Williams gave inaccurate testimony regarding his role -- and the formulas used -- in the FBI's manufacture of urea nitrate, and that his testimony concerning his attempt to modify one of Whitehurst's dictations was misleading.

The Report also details many other allegations made by Whitehurst, which we found to be unsubstantiated. We also concluded that the World Trade Center case exemplifies the need for persons within the EU to have scientific expertise, examiners to understand the distinctions between their role as forensic science experts and the role of a criminal investigator, clear guidelines about matters within the expertise of an EU examiner when testifying, and proper documentation of case work.

#### **D. The Avianca Case (Part Three, Section E)**

The Avianca case involved the midair explosion aboard Avianca Airlines Flight 203 shortly after its takeoff from Bogota, Colombia, on November 27, 1989. Everyone onboard, including two Americans, were killed in the crash. Agent Richard Hahn, at that time an examiner in the EU, was assigned to the team of Americans sent to Colombia to assist with the investigation. Hahn collected evidence at the crime scene, examined evidence, and prepared a final report. He also testified both in the first trial in New York, which ended in a mistrial, and the second trial, which resulted in the 1994 conviction of Dandeny Munoz-Mosquera (Munoz).

In 1990 Whitehurst conducted chemical analysis of evidence found at the scene, and his findings were part of Hahn's final report for the Laboratory. After the Munoz trials, Whitehurst alleged that Hahn fabricated evidence, committed perjury, and testified outside his area of expertise in those trials.

Whitehurst's first disagreement with Hahn's testimony concerned the type of explosive used in the blast. Hahn testified in both trials that a high velocity explosive was used in the bombing, based on his observation of indentations on the fuselage known as pitting and cratering, a phenomenon in which an explosion causes small indentations on metal surfaces. We concluded that Hahn's correlation of the pitting and cratering to a high velocity explosive within a narrow range of velocity of detonation was scientifically unsound and not justified by his experience. Moreover, in light of scientific literature Whitehurst submitted to Hahn before the second trial, Hahn erred by not inquiring about the validity of the theory upon which he based his testimony concerning pitting and cratering.

Next, Whitehurst alleged that Hahn gave inappropriate testimony regarding Whitehurst's 1990 findings of two explosives (RDX and PETN) in the evidence from the aircraft, because Hahn failed to mention the conclusions set forth in a memorandum written by Whitehurst in 1994. That memorandum, written on the same day Hahn testified in the first trial, addressed whether the FBI could scientifically disprove a story advanced by someone in Colombia (the Confessor) who confessed to the Avianca bombing and claimed that the defendant was not involved. We found that Hahn's testimony in the first trial was unobjectionable in that respect (since he was unaware of the memorandum) but that his testimony in the second was incomplete for having failed to take into account certain aspects of the analysis advanced by Whitehurst in the memorandum. We further concluded that SAS Chief Kearney contributed to Hahn's incomplete testimony by not properly resolving the issues raised in Whitehurst's memorandum.

Whitehurst's memorandum was a deeply flawed document, however, because it: (1) reached an invalid conclusion (from Whitehurst's failure properly to review his own laboratory work) about whether he could scientifically exclude the explosive the Confessor said was used; (2) misstated a conversation he had had with Hahn on a material point; (3) rendered a misleading and overstated opinion suggesting that the data was consistent with a potential defense; and (4) improperly raised questions about whether contamination may have accounted for Whitehurst's original scientific findings.

Finally, Hahn testified to a theory that a fuel-air explosion followed the initial blast and that certain of the passengers' injuries were indicative of such an explosion. That testimony was flawed and exceeded Hahn's expertise.

The Avianca case was an unfortunate instance in which communication broke down between examiners and supervisors in the Laboratory, and in which the EU examiner testified to opinions that were not justified by his experience or the applicable science or that exceeded his expertise. It was not, as Whitehurst alleges, an illustration of a Laboratory examiner committing perjury or fabricating evidence. And indeed, Whitehurst's own conduct in this matter, especially his 1994 memorandum, was seriously flawed.

#### **E. Testimony by Agent Martz in the O.J. Simpson Case (Part Three, Section F)**

To address the defense's contention that the police had planted blood at the crime scene and on socks found in the defendant's residence, the prosecutors in the O.J. Simpson case asked the FBI Laboratory to determine whether the blood preservative EDTA was present in those blood stains. CTU Chief Roger Martz and several research chemists at the FBI Forensic Science Research Unit (FSRU) at Quantico worked to develop a method for identifying EDTA in blood. After Martz testified in the Simpson trial, Whitehurst alleged that scientists at the FSRU had commented that Martz had committed perjury, misled the jury concerning the validation studies conducted by the FSRU scientists, misled the defense by stating that all digital data from the analysis of the evidence had been erased, and generally testified in an arrogant manner.

We found no basis to conclude that Martz committed perjury or any corroboration that FSRU scientists had made such allegations. Nor did we find that Martz improperly erased digital data. Martz was unfairly criticized by the defense for not conducting certain tests. We did not criticize Martz for the substance of the analytical work performed by him and the FSRU chemists, but rather for his deficient record-keeping and note-taking and for the manner in which Martz testified. That testimony ill served the FBI because it conveyed a lack of preparation, an inadequate level of training in toxicological issues, and deficient knowledge about other scientific matters that should be within the expertise of a chief of a unit handling chemical and toxicological analyses in the Laboratory.

#### **F. The Oklahoma City Bombing (Part Three, Section G)**

Not long after the EU completed its report on the Oklahoma City bombing, Whitehurst wrote a 30-page letter to the OIG criticizing David Williams, the EU examiner responsible for the report. We concluded that many of the same errors committed by Williams in the World Trade Center case were repeated in the Oklahoma City case -- principally, that Williams based some of his conclusions not on a valid scientific analysis but on speculation from the evidence associated with the defendants.

Williams' September 5, 1995, report contained several serious flaws. Just as he had done in the World Trade Center case, he offered an opinion about the velocity of detonation (VOD) of the main charge that was unjustified. His statement about the VOD of an ammonium nitrate fuel oil (ANFO) explosive -- the explosive allegedly used in the bombing -- was incomplete. His categorical identification of the main charge as ANFO was inappropriate based on the scientific evidence available to him. Here, Williams did not draw a valid scientific conclusion but rather speculated from the fact that one of the defendants purchased ANFO components. His estimate of the weight of the main charge was too specific, and again was based in part on the improper, non-scientific ground of what a defendant had allegedly purchased. In other respects as well, his work was flawed and lacked a scientific foundation. The errors he made were all tilted in such a way as to incriminate the defendants. We concluded that Williams failed to present an objective, unbiased, and competent report.

Williams' supervisor, J. Thomas Thurman, did not properly review Williams' report. Thurman left too much discretion to Williams to include certain opinions, and Thurman allowed certain conclusions to stand even though he told us that he now does not agree with them and cannot justify them, and the conclusions are unsupported in the body of the report.

All cases handled by the Laboratory deserve professional, diligent treatment. Williams' and Thurman's performances in the Oklahoma City case -- a prosecution of enormous national significance -- merit special censure.

#### **IV. General Summary of Other Matters (Part Three, Sections H1-H13)**



In the course of providing more than 1000 pages of written allegations to the OIG, Whitehurst has also alleged wrongdoing in a range of other cases also addressed in our Report. In none of those cases did we find Whitehurst's allegations of intentional misconduct to be borne out by facts, even when those allegations concerned Laboratory personnel who are sharply criticized in the Report. In investigating those allegations, however, we found instances in which general practices and procedures could be improved. Those more general recommendations are set forth later in this Summary.

In the following cases, our findings and conclusions are set out in detail in the report and we will not repeat the conclusions in this Summary:

- Yu Kikumura, a 1988 prosecution of a member of the Japanese Red Army terrorist faction;
- a Laboratory report analyzing two pipe bombs found in fuel storage tanks at a marine terminal in Norfolk, Virginia, in 1991;
- analytical work conducted in connection with the disappearance of a young girl named Melissa Brannen in 1989;
- testimony and analytical work in the Italian prosecution of the murderers of Paolo Borsellino, who was killed in a car bombing in Sicily in 1992; the 1994 prosecution of the person charged with the attempted murder of Miami criminal defense attorney Gino Negretti;
- work conducted by the Laboratory after James Conlon, a hydraulic crane operator, died in an explosion while working at a scrap metal yard in New Jersey in 1992;
- the analysis of smokeless powder found in a pipe bomb sent to U.S. District Judge John Shaw in 1995;
- a Laboratory report in which David Williams offered an expert opinion about the main charge in an improvised explosive device in connection with an investigation of the Ghost Shadow Gang of New York; and
- a 1994 article describing fourteen explosive devices thought to be associated with the

so-called Unabomber.

Four other matters are also addressed in this section of the Report:

1) Whitehurst alleged that Thurman committed willful misconduct by changing Whitehurst's Laboratory reports. This, and a similar allegation regarding other examiners, arose because one of the supervisors in the Laboratory who has since retired did not strictly adhere to an unwritten policy that auxiliary examiner reports were to be included verbatim in final reports unless the person preparing the final report and the person who had prepared the auxiliary report agreed on the changes. We found numerous instances in which Whitehurst's reports were changed by Thurman. Some of those changes resulted in inaccuracies and unsubstantiated conclusions. Other modifications did not concern matters of substance but were stylistic changes.

2) Whitehurst also contended that EU examiner Wallace Higgins had significantly changed a number of Whitehurst's dictations without his authorization. We substantiated that charge. Both the Thurman and Higgins alterations underscore the need for Laboratory personnel to follow Laboratory policy to ensure that the reports of analytical work prepared by Laboratory scientists are not substantively altered unless agreement is reached on the changes. Our views on the preparation of Laboratory reports are detailed in a later section stating general recommendations.

3) William Tobin, a metallurgist now working in the Materials Analysis Unit (MAU), brought several matters to the OIG's attention. These included cases in which he believed that other examiners (principally in the EU) had incorrectly conducted or reported metals-related examinations. He also contended that Michael Malone, who was formerly in the Hairs and Fibers Unit, testified inaccurately and outside his area of expertise in a 1985 hearing by a judicial committee of the Judicial Council of the Eleventh Circuit relating to then-U.S. District Judge Alcee Hastings, who was subsequently impeached. ~~With respect to the Hastings matter, we concluded that Malone falsely testified that he had performed a tensile test and that he testified outside his area of expertise and inaccurately with respect to the test results. Tobin himself acknowledged that Malone's misstatements did not affect the assessment they both shared that a particular purse strap had been cut. The judicial committee appeared not to place any significance on Malone's testimony with respect to the purse, since there is no mention of it in the specific findings articulated by the committee to support its conclusion that Hastings had committed misconduct. Nonetheless, we found Malone's testimony inexcusable and criticized the Laboratory's failure properly to deal with Tobin's complaint about it.~~

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4) Late in our investigation, Whitehurst wrote a letter to the OIG expressing concerns about testimony given by CTU Chief Roger Martz in Florida v. George Trepal, a case that resulted in the conviction and death sentence of Trepal for having added the poison thallium nitrate to bottles of Coca-Cola. We found that Martz could have properly opined that certain samples were consistent with thallium nitrate having been added to

them. Martz, however, did not limit his conclusions that way, but instead offered an opinion stronger than his analytical results would support. He also failed to conduct certain tests that were appropriate under the circumstances, failed to document adequately his work, and testified inaccurately on various points. Martz's work in this case was seriously deficient.

#### **V. Whitehurst's Allegations of Retaliation (Part Four)**

A recurring theme in Whitehurst's complaints and allegations to the OIG has been that the FBI retaliated against him for raising concerns about the FBI Laboratory to the FBI and others. Retaliation is a difficult issue to investigate, because it rests on the motivations of persons taking actions with respect to the complainant. Neutral explanations may sometimes mask an unstated intent to take harmful actions. Some of the allegations in lawsuits filed by Whitehurst against the FBI and the Department of Justice involve actions taken after the OIG launched this investigation. We did not attempt to assess whether recent actions taken by the FBI -- such as placing Whitehurst on administrative leave with pay after the OIG draft report was issued -- constituted acts of retaliation. Rather, our focus was on retaliatory conduct Whitehurst alleged was directed at him before November 1995. With respect to all but one of Whitehurst's contentions, we concluded that the evidence did not substantiate his allegations of retaliation because we discerned no retaliatory purpose behind the FBI's decisions that he questioned. As for the remaining contention, we were unable to complete our investigation due to Whitehurst's decision not to provide a release form that would have permitted key personnel to speak to us about medically sensitive information regarding Whitehurst.

Whitehurst claimed that he was retaliated against for accusing Terry Rudolph of misconduct in the Psinakis case. After he criticized Rudolph, Whitehurst was suspended without pay for seven days and placed on probation for six months. We did not substantiate Whitehurst's claim. FBI management had reason to criticize Whitehurst's actions in the Psinakis case because he erred in making his concerns known only to the defense attorneys, without first discussing them with the prosecutor, case agent, or his supervisors. The evidence further showed that the FBI's internal discipline unit imposed the suspension despite opposition from Laboratory managers, who recommended the least severe form of discipline possible for Whitehurst. The disparity in treatment between Whitehurst and Rudolph appeared to reflect a failure by management adequately to appreciate the seriousness of Rudolph's conduct rather than an attempt to retaliate against Whitehurst.

Whitehurst also contended that FBI OPR ignored and covered up his allegations that personnel in the Criminal Investigative Division were unlawfully using computer software and that an agent assaulted Whitehurst's wife, who also works at the FBI. Although the evidence showed that the OPR investigation was not as thorough as it should have been, we did not substantiate charges of a coverup. Indeed, Mrs. Whitehurst herself told the OPR investigator that she did not suffer any retribution or continuing harm, although she did feel threatened by the agent at the time of the incident.

Whitehurst next maintained that FBI OPR improperly initiated an investigation into his disclosure of information to the Senate Judiciary Committee. FBI OPR investigated the disclosures, which were

admitted by Whitehurst, because of concerns that confidential FBI records had been disclosed to unauthorized persons. When the Judiciary Committee refused to disclose Whitehurst's letters on the ground of protecting confidentiality, FBI OPR closed its investigation and no administrative action was taken against Whitehurst. We found no retaliatory purpose in the actions taken by FBI OPR with respect to this allegation.

In addition, Whitehurst alleged that FBI OPR improperly disclosed derogatory information about him to prosecutors in the World Trade Center and O.J. Simpson cases. After reviewing the disclosures of materials made by the FBI in those cases and interviewing the relevant FBI and U.S. Attorney personnel, we concluded that the FBI did not improperly disclose derogatory information about Whitehurst in those cases, but rather attempted to provide appropriate material regarding witness credibility.

In May 1994, the FBI reassigned Whitehurst from the explosives residue program to be an analyst of paints and polymers. Whitehurst alleged that this reassignment was in retaliation for reporting misconduct in the Laboratory and especially in the Explosives Unit. The Chief of the Scientific Analysis Section, James Kearney, made the decision to transfer the explosives residue program from the Materials Analysis Unit (MAU) to the Chemistry-Toxicology Unit (CTU). He gave two reasons for that move. One was to more closely balance the responsibilities and staffing of the CTU and MAU after a reorganization. A second was to place the explosives residue analysis program under a single unit chief; before that time responsibilities had been divided between the CTU and MAU. Although there was internal opposition to the transfer in responsibilities on the ground that CTU Chief Martz lacked the expertise to supervise the program, we found no evidence of a retaliatory purpose in the transfer of the explosives residue program from the MAU to the CTU.

Similarly, Kearney explained that the reason he moved Whitehurst out of the explosives residue program was because of Whitehurst's poor working relationship with EU and other personnel. Whitehurst acknowledged tension between himself and the EU examiners. MAU Chief Corby also noted that transferring Whitehurst to the CTU with the explosives residue program would have been problematic because of friction between Whitehurst and Martz. Thus, substantial credible evidence showed that the decision to move Whitehurst out of the explosives residue program was not made for a retaliatory purpose.

We also investigated other information proffered by Whitehurst in support of his retaliation claim, but we did not find the anecdotes he supplied to be sufficient to support his claim that an atmosphere of retaliation existed in the Laboratory.

Finally, Whitehurst alleged that in 1993, the FBI ordered him to undergo psychiatric evaluation and therapy in retaliation for his raising various complaints against the FBI Laboratory. We concluded that the Laboratory personnel did not act with a retaliatory purpose in referring the matter to the FBI Health Care Program Unit (HCPU) and the FBI Employee Assistance Program (EAP). However, because Whitehurst did not provide the necessary medical release forms to allow us to interview key personnel with the HCPU, EAP, and Personnel Section, we could not reach any definite conclusions concerning the motives of any such personnel in referring Whitehurst to psychotherapy.

## VI. Findings and Recommendations Concerning Individuals (Part Five)

Because Whitehurst made allegations of misconduct against a large number of persons in a large number of cases, we detailed in a separate part of the Report our findings and conclusions about each person against whom allegations were made or when our findings led us to conclude that the conduct of a person merited critical comment. In some instances, we made recommendations that persons be transferred from the positions they held prior to completion of our draft report, they be given special supervision, and/or their Laboratory reports be reviewed because of concerns we identified in their work.

CTU Chief Roger Martz lacks the judgment and credibility to perform in a supervisory role within the Laboratory. If Martz continues to work as an examiner, we suggest that he be supervised by a scientist qualified to review his work substantively and that he be counseled on the appropriate manner for testifying about forensic work. We further recommended that another qualified examiner review any analytical work by Martz that is to be used as a basis for future testimony.

EU Chief J. Thomas Thurman deserves special censure for his inadequate supervisory review of Williams' report in the Oklahoma City bombing case. Because we concluded that all examiners in the EU, including the Chief, should have a scientific background, we recommended that he be reassigned outside the Laboratory when that restructuring occurs.

EU examiner David Williams should be reassigned outside the Laboratory. Although we did not find that Williams had perjured himself in the World Trade Center case, his work in that case and in the Oklahoma City investigation demonstrate that he lacks the objectivity, judgment, and scientific knowledge that should be possessed by a Laboratory examiner.

EU examiner Wallace Higgins should be reassigned outside the FBI Laboratory when the restructuring of the EU occurs. In the interim, while Higgins remains in the EU, the SAS Chief should counsel Higgins on the proper preparation of reports and monitor his work. A qualified explosives examiner also should review any reports prepared by Higgins.

Richard Hahn no longer works in the Laboratory. If in the future he is called upon to testify about his work as an examiner, we recommended that he be specially counseled about the importance of not testifying on matters beyond his expertise and that his testimony should be reviewed by qualified examiners to ensure that it is appropriately limited.

Michael Malone no longer works in the Laboratory, having been transferred from the Hairs and Fibers Unit in 1994. We concluded that Malone testified falsely and outside his expertise in the Hastings matter. We recommended that the FBI assess what discipline is appropriate and monitor future expert testimony to assure that it is accurate and limited to matters within his knowledge and competence.

Robert Webb also has been transferred out of the Laboratory. We found that Webb's report in the VANPAC case stated conclusions more strongly than were justified by the results of his examinations and the background data. We recommended that another qualified examiner review Webb's analytical work in the event it is to be used as the basis for future testimony.

J. Christopher Ronay was the EU Chief from 1987 through October 1994, when many of the problems raised by Whitehurst first surfaced. We found that he exhibited poor judgment as a manager in approving EU reports. Because he is retired, we did not recommend any action concerning Ronay.

Terry Rudolph is now retired from the FBI. Although we were told that he worked as a consultant for a period of time after his retirement, we recommended that he not be employed in any capacity by the FBI in the future. We further recommended that a notation referring the findings of this Report be placed in each of his case files.

With respect to managers in the FBI Laboratory, we found important instances of deficiencies and failures to handle situations in an expeditious, thorough, and effective manner. A significant example of that finding occurred at the very outset of Whitehurst's criticisms and the weak response of Laboratory management to AUSA Burch's letter to the Laboratory Director regarding deficiencies in Rudolph's performance in Psinakis in 1989. More recent examples involved significant problems in explosives-related cases. Management lapses included failures to supervise appropriately the drafting of Laboratory reports in the EU, to evaluate the competence of examiners, and to establish a climate in which meaningful peer reviews and the professional resolution of scientific disagreements were the norm. The Report singles out for criticism Charles Calfee, Kenneth Nimmich, James Kearney, and John Hicks, all of whom are now retired from the FBI. We did not, however, substantiate criticisms of Alan Robillard, who transferred out of the Laboratory in 1994.

Our investigation exonerated a number of persons against whom allegations of misconduct were made. Those persons included: Roger Asbury, Edward Bender, Louis J. Freeh, Donald Haldiman, Ronald Kelly, Lynn Lasswell, Richard Laycock, Thomas Mohnal, Bruce McCord, Mark Olson, and Howard Shapiro. Furthermore, we did not substantiate Whitehurst's allegations against Alan Jordan, and although we did not substantiate allegations against Robert Heckman in the Borsellino matter, we did find reason to criticize Heckman for his work in the Conlon case.

Finally, the Report discusses Frederic Whitehurst, the complex person whose expression of concern about problems in the Laboratory sparked this investigation. He is an experienced scientist who identified significant problems in certain cases and in certain practices within the Laboratory. He also accused many of his colleagues of perjury, fabrication of evidence, and conspiracy. Those allegations were not supported by the facts uncovered in the investigation. Any decisions about Whitehurst must involve a careful weighing of the substantial contribution he made in bringing to light issues in the Laboratory that needed to be addressed against the considerable harm he has caused to the reputations of innocent persons and the fact that his frequently overstated and incendiary way of criticizing Laboratory personnel will make it extremely difficult if not impossible for him to work effectively within the Laboratory. Our own view is that Whitehurst lacks the judgment and common sense necessary for a forensic examiner, notwithstanding his own stated

commitment to objective and valid scientific analysis.

## **VII. Summary of Recommendations Regarding Laboratory Policies and Practices (Parts Six and Seven)**

Although we made recommendations with respect to individuals, we perceived our principal mission to be to make systemic recommendations on Laboratory practices and procedures, the full implementation of which would help the FBI Laboratory avoid in the future the problems we encountered in the matters we investigated. The recommendations as to individuals are, however, a necessary concomitant to achieving the type of organizational and cultural changes that should be undertaken by the FBI. The FBI has recognized in the immediate past that some aspects of its policies and procedures demand change, and upper management has taken steps to put new policies into effect. It is not clear from those policy changes that Laboratory top management has acknowledged that appropriate assessments of personnel are also required. Steps must be taken to provide personnel with the appropriate training, background, and commitment to quality that is required in a first-class forensic laboratory.

In its response to our draft report, the FBI concurred with nearly all of the OIG's systemic recommendations, even though it frequently disagreed with how we applied those general principles in assessing individual performances. Our emphasis in the previous section on individuals, therefore, should also be read in light of the importance

of investing personnel in the Laboratory with the appropriate skills and motivations to change old practices, as well as of underscoring the need for personal accountability as those changes are made. Thus, although virtually all of the following general recommendations are recognized within the FBI as appropriate and have been accepted as valid, the best proof of acceptance will not be in the articulation of new practices, but in their complete implementation in the coming years.

Our first recommendation was one already accepted by the FBI -- that the Laboratory should pursue accreditation by the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB). In 1994, Director Freeh announced that the Laboratory would pursue accreditation at the earliest possible time, and the FBI's response to the OIG draft report acknowledged that the Laboratory could and should have sought ASCLD/LAB accreditation a decade ago. We commend the FBI for now making such accreditation a top priority for the Laboratory. The criteria imposed in the accreditation process should promote valuable and productive interchanges with other laboratories to change some of the insular and parochial views we encountered in the EU, CTU, and MAU, as well as to assist the Laboratory in modernizing policies and practices. Accreditation is not a panacea, nor is the absence of accreditation an indictment of all tests performed in the Laboratory. But the process of undergoing accreditation should enhance quality performance.

Second, we recommended that the Explosives Unit be restructured and its mission clarified. One existing problem in the EU is that its personnel are not forensic scientists. We recommended (and the FBI agreed) that examiners in the EU have scientific background in pertinent disciplines such as chemistry, metallurgy, or engineering, as well as technical training in the assembly, deactivation, and use of explosive devices. Although EU examiners should be available to consult at crime scenes,

primary responsibility for conducting investigations and directing crime scene management functions should rest with components of the FBI outside the Scientific Analysis Section. (The recommendation concerning the proper role of EU examiners at the crime scene was the only recommendation discussed in this Section with which the FBI disagreed.)

Third, the Laboratory should abolish its current distinction between principal and auxiliary examiners, in which the auxiliary examiners' reports are combined into

a single report by a principal examiner. In cases in which more than one examiner is called upon to evaluate evidence, we suggested that a coordinating examiner assume the role of ensuring that the correct units of the Laboratory have been enlisted to work on the case and that the reports generated by those units are accurately included in the final set of reports. Although we were told that an unwritten policy (prior to a formal written directive in September 1994) had long been that auxiliary examiner reports were incorporated verbatim, we found numerous instances in which that policy was not followed.

Fourth, we recommended that, instead of one report emanating from the Laboratory with analytical results reflected in the body of that report without attribution to individual examiners, each examiner who performs work should prepare and sign a separate report, even if such individual reports are ultimately collected together as the unified report of the Laboratory as a whole.

Fifth, analytical reports should also be substantively reviewed by the unit chief or another examiner (if the unit chief lacks the requisite expertise or has performed the analysis) before they are released in final reports. Forensic science is sufficiently complex that such substantive review need not always follow hierarchical lines within the Laboratory management structure. A junior examiner who is qualified in the area should be capable of substantively reviewing a unit chief's analysis. Our central point is that peer review by qualified personnel is an essential aspect of a high-performing forensic science laboratory. The Rudolph matter, certain conclusions in the Oklahoma City report, and other cases demonstrate the importance of vigorous, substantive peer review.

Sixth, reports must be supported by adequate case files. The Rudolph files and some of Martz's work underscore the importance of case files containing all of the documentation necessary for another appropriately qualified examiner to be able to understand and replicate the examiner's data and analysis. We encountered the problem of incomplete or missing documentation in many case files. Accreditation will require the Laboratory to maintain a rigorous system of case filing, which has not existed in the past.

Seventh, not only must the files contain all relevant documentation of results, but the records themselves must be maintained so as to facilitate ready retrieval. We suggested that the Laboratory keep its own files rather than integrating Laboratory files with the Bureau's general case filing system.

Eighth, we recommended that the Scientific Analysis Section of the Laboratory Division develop and implement a coordinated training program for examiners. Training has been conducted at the



unit level, and has developed in an ad hoc manner. As suggested in the ASCLD/LAB accreditation process, a unified curriculum for common issues and moot courts for testimony would be helpful. At the unit level, managers should clearly articulate training criteria and document completion of curricula.

Ninth, the FBI should develop a uniform program for training examiners with respect to court testimony and monitoring such testimony. We found the problem of examiners testifying to matters beyond their expertise or in ways that were unprofessional in Hahn's testimony in the Avianca case, Williams' testimony in the World Trade Center case, and Martz' testimony in Trepal and Simpson.

Our tenth and eleventh recommendations addressed the development of written protocols generally for the scientific procedures utilized. For the analysis performed in the FBI Laboratory to have wide-ranging credibility in courts and in the forensic science community, examiners must strictly adhere to established protocols for the analysis of evidence or document the reasons for departing from them. The same is true for the handling of evidence and the adoption of measures to prevent and detect contamination.

Finally, the role of management is critical to achieving the types of reforms needed in the Laboratory. As we have noted, before and during our investigation Laboratory managers have begun the process of implementing many of the recommendations we noted above, as the process of preparing for accreditation continues. Those reforms must be substantive and should be structured to address the fundamental issues raised in our Report.

## **VIII. Conclusion**

The FBI's cooperation with the OIG investigation and acceptance of our systemic recommendations should be lauded. The process of managing necessary changes will be challenging in an environment in which scientific knowledge is expanding and forensic science is increasingly under scrutiny. We welcome the FBI's suggestion of our continued involvement in oversight to assist in ensuring that needed reforms are fully implemented. We will seek to perform that function in a manner consistent with the Laboratory's expeditious efforts to obtain ASCLD/LAB accreditation and its ongoing development of first-class examiners and standards. Although we have rejected the most inflammatory allegations made by Whitehurst, the FBI Laboratory must fully acknowledge past problems that have been identified as it continues its pursuit of excellence in forensic science.

Michael R. Bromwich

Inspector General

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## **PART TWO: BACKGROUND TO THE OIG INVESTIGATION**

In September 1995, the Department of Justice announced that the Office of the Inspector General (OIG) was investigating allegations made by Frederic Whitehurst about the FBI Laboratory. Whitehurst is an FBI Supervisory Special Agent (SSA) with a doctorate in chemistry who has worked in the FBI Laboratory since 1986. During most of his career in the Laboratory, Whitehurst performed chemical analyses of explosives and explosives residue, and his criticisms relate primarily to bombings and explosives cases.

Over several years, Whitehurst has accused other FBI personnel of serious misconduct and even illegal acts. Whitehurst alleges that Laboratory examiners have improperly testified outside their expertise, presented insupportable conclusions, perjured themselves, fabricated evidence, and failed to follow appropriate procedures. He also contends that FBI management retaliated against him for making these accusations. His allegations involve some of the most highly publicized and significant cases investigated by the FBI in recent years, including the mail bomb assassination of United States Circuit Judge Robert Vance, the World Trade Center bombing, the attempted assassination of former President George Bush in Kuwait, and the bombing of the Alfred P. Murrah Federal Building in Oklahoma City.

The OIG investigation focused on Whitehurst's allegations, which largely concern three components of the Laboratory: the Explosives Unit, the Chemistry-Toxicology Unit, and the Materials Analysis Unit. At the outset, the Inspector General emphasized that the investigation would not be restricted to Whitehurst's specific allegations, and that the report would also address any other pertinent issues identified in the course of the investigation and comment on ways to further enhance the quality of the Laboratory's work. We have not, however, attempted to review the Laboratory overall. This report should not be interpreted as either criticism or approval of the Laboratory as a whole or of particular components that are not addressed in the report.

We also think it appropriate to state explicitly our perspective in conducting the investigation and reaching our conclusions. The FBI Laboratory aspires to provide forensic services of the highest quality, and we did observe some impressive work by Laboratory personnel. We recognized, however, that one cannot expect an examiner's work or testimony to have been perfect in every case if it is subjected to a detailed, after-the-fact analysis such as we employed in our investigation. Laboratory examiners work under time constraints and other pressures; scientists can legitimately differ in their interpretation of data; and knowledge and practices in forensic disciplines evolve over time. We also reviewed, with the benefit of hindsight, certain testimony given under courtroom examination, where a witness generally cannot reflect at length on the questions or answers. Bearing these points in mind, when we critically evaluated individual conduct or Laboratory practices, we attempted to apply standards that were generally accepted at the time of the events in question.

Whitehurst's allegations encompass events dating from the early 1980s to the present. During this period, there have been significant changes in the Laboratory and the broader legal and scientific environment in which it operates. To place Whitehurst's allegations and the OIG investigation in context, this Part of the report provides background information. Section I briefly describes the organization of the FBI Laboratory, the Laboratory units that are central to Whitehurst's allegations,

and some recent developments affecting the Laboratory in general. Section II describes Whitehurst's background and career in the Laboratory and then reviews the history of his complaints about Laboratory practices and personnel. Section III summarizes the OIG's role in investigating Whitehurst's allegations and how this Report was prepared.

## **I. The FBI Laboratory**

This section of the report describes the Laboratory's organization and the particular units that are the focus of Agent Whitehurst's allegations. We also discuss three developments over the last several years that have affected, or will likely affect, the Laboratory's operations. These are: (1) the Laboratory's adoption of a formal quality assurance program and the decision to pursue accreditation from the American Society of Crime Lab Directors/Laboratory Accreditation Board (ASCLD/LAB); (2) the FBI's decision to reduce the number of agents assigned as examiners within the Laboratory and to replace many of them with professional support examiners who are not agents; and (3) changes in the legal standard for the admissibility of scientific testimony as a result of the Daubert decision and changes in the federal rules for pretrial disclosure concerning expert witnesses.

### **A. Organization of the Laboratory**

The FBI's Laboratory is formally known as the Laboratory Division. Approximately 583 FBI personnel now work in this division. As shown in the organizational chart that appears in Attachment B to this Report, the Laboratory Division comprises five sections: the Scientific Analysis Section (SAS), the Latent Fingerprint Section, the Special Projects Section, the Forensic Science Research and Training Center (FSRTC), and the Investigative Operations and Support Section. Sections within the Laboratory Division are divided into different units according to function. Although there have been certain organizational changes since the 1980s, the Laboratory's basic organizational structure and managerial hierarchy have largely remained the same.

The Laboratory Division is headed by an Assistant Director of the FBI. Donald W. Thompson has served as Acting Laboratory Director since January 16, 1996. His predecessor as Laboratory Director was Milton Ahlerich, who held the position from July 1994 until his retirement in January 1996. John Hicks was the Laboratory Director from 1989 until his retirement in July 1994.

The Scientific Analysis Section (SAS) is responsible for forensic examinations, except those involving the examination of latent prints or documents. Until recently, the SAS was divided into seven units: Chemistry-Toxicology, Explosives, DNA Analysis, Firearms and Toolmarks, Hairs and Fibers, Materials Analysis, and Forensic Science Systems. The SAS is headed by a Section Chief, currently Randall S. Murch, and each unit is headed by a Unit Chief.

Cases submitted for analysis in the SAS are typically assigned to a Principal Examiner, who may also be referred to as the Primary Examiner or PE. The Principal Examiner is responsible for preparing the Laboratory's final report on the case, which may include analyses performed by that examiner and other Laboratory examiners designated Auxiliary Examiners or AEs. When Auxiliary

Examiners complete their examinations, they submit reports, called dictation, for inclusion in the Principal Examiner's official report. For example, an explosives case might be assigned to a Principal Examiner in the Explosives Unit, who prepares a Laboratory report based on his or her own work and on dictation submitted by Auxiliary Examiners in other units.

In bombing and other explosives-related cases, two different units normally have important roles. The Explosives Unit (EU) has been responsible for the analysis of the overall construction of explosive devices, and examiners from that unit have been assigned as the Principal Examiners in most explosives-related cases. EU examiners, however, are not chemists and do not perform a chemical analysis of the explosive material of unexploded devices or the explosives residue of exploded devices. The EU examiners generally do not have academic degrees or significant experience in scientific disciplines; most of them are experienced FBI agents with backgrounds in military explosive ordnance disposal (EOD).

Until mid-1994, the chemical analysis of most explosives and explosives residue was largely conducted by examiners in the Materials Analysis Unit (MAU). From 1989 until 1994, Frederic Whitehurst was the Laboratory's senior examiner of explosives residue. In 1993, Steven Burmeister also began examining explosives residue, and since mid-1994, Burmeister has been the Laboratory's senior examiner in that field. Before 1994, the Chemistry-Toxicology Unit (CTU) also worked on certain explosives cases because that unit performed analyses to identify smokeless powder. The CTU had one or more mass spectrometers (a sophisticated instrument used to identify chemical materials), which the CTU used to analyze various substances for its own examinations or for other units, including the MAU. In the summer of 1994, SAS Chief Kearney transferred responsibility for explosives residue analysis from the MAU to the CTU. Burmeister was reassigned to the CTU, while Whitehurst remained in the MAU and later began training to become an examiner of paints and polymers.

## **B. The Laboratory's Quality Assurance Plan and Accreditation**

Changes in Laboratory practices are occurring due to the Laboratory's decisions over the last several years to implement a formal quality assurance plan and to seek accreditation by ASCLD/LAB. These changes merit comment for two reasons. In evaluating Whitehurst's accusations that others have violated Laboratory policies or otherwise acted unprofessionally, it is important to recognize that the Laboratory's practices related to quality assurance have evolved significantly. This fact is also relevant in attempting to identify ways to further improve the quality of the Laboratory's work.

Before November 1992, there was no formal quality assurance plan for the Laboratory. Instead, the Laboratory sought to promote quality through practices that included: (1) assigning agents to the Laboratory only after they had worked for at least three years in the field and requiring one to two years of on-the-job training in the Laboratory for agents to qualify to work as examiners; (2) consultation among examiners about the interpretation of their results; (3) review and approval of work by unit chiefs before reports were released; and (4) proficiency tests. Because there was no comprehensive quality assurance plan, however, separate units within the Laboratory largely implemented quality assurance measures on an individual basis.

In August 1991, Laboratory Director Hicks approved a recommendation by James Kearney, then the Chief of the FSRTC, to create a quality assurance group to develop a quality assurance and safety program for the entire Laboratory. At that time, an ASCLD Study Committee within the Laboratory was already conducting an internal review of practices and procedures based on standards used by the American Society of Crime Lab Directors/Laboratory Accreditation Board (ASCLD/LAB). ASCLD/LAB administers a voluntary program for accreditation of forensic laboratories based on several objective criteria.

On September 6, 1991, the Study Committee reported to Hicks that it had completed its self-review of the Laboratory. The Study Committee observed that the Laboratory could meet the requirements for accreditation, provided that ASCLD/LAB clarified certain requirements and the Laboratory implemented certain recommendations made by the Study Committee. Within a week of the self-review, however, the Study Committee advised Hicks that the internal inspection showed that several units had not incorporated recently approved policies, including policies related to protocols and the handling of evidence, into their respective manuals.

In December 1991, Study Committee member James Mudd participated as an observer in an ASCLD/LAB inspection of another laboratory. Mudd was impressed by the thoroughness of the inspection. Based on Mudd's experience, Kearney sent a January 17, 1992, memorandum to Hicks noting that:

Compared to the ASCLD/LAB inspection, the initial internal inspection conducted by the [Study Committee] lacked sufficient depth to be a true reflection of what might be encountered during a[n] actual ASCLD/LAB inspection. Therefore, before the Laboratory Division applies for accreditation by ASCLD/LAB, a more thorough and in-depth self-evaluation, based on ASCLD/LAB accreditation criteria, should be undertaken by the Laboratory Division.

Kearney also noted that the ASCLD/LAB inspection placed a great deal of emphasis on documentation and the extent to which a laboratory followed documented procedures. Hicks endorsed Kearney's recommendation that the Laboratory undertake a more thorough self-evaluation. During 1992, Mudd and others at the FSRTC developed a formal Quality Assurance Program Implementation Plan (the QA plan) based primarily on the ASCLD/LAB standards for accreditation.

Hicks approved the QA plan and distributed it to the section chiefs in November 1992, with a memorandum noting that the plan would be administered by the Quality Assurance and Safety Group (QASG) at the FSRTC. The plan outlined the organizational structure, procedures, and implementation schedule for a comprehensive, Laboratory-wide QA program. In 1993, Hicks approved a recommendation that each unit chief designate a quality control coordinator for each unit. The QASG also began developing a program to audit quality assurance within the Laboratory. Training of representatives from different units for the QA program was conducted in May and November 1993. Over the next two years, the Laboratory continued to refine its QA program and to conduct further internal reviews.

The Laboratory has also implemented several new policies since 1991 as it has formalized its quality assurance program. In May 1991, Hicks approved recommendations by the Study Committee that the Laboratory adopt policies related to the marking and storage of evidence, the use of new technical procedures, corrective actions, and open proficiency testing. Examiners know they are being tested in open proficiency tests; in contrast, they are not aware they are being tested in blind proficiency tests. In September 1991, Hicks endorsed the Study Committee's recommendation that individual units establish manuals for protocols, quality control, training, and safety. Hicks recirculated these policies in January 1994, along with a directive that each unit chief prepare a memorandum describing his unit's compliance.

Two reviews of the Laboratory were completed in the summer of 1994. In June 1994, the Audit Division of the OIG issued a report on the Laboratory. The Audit Report noted that not all Laboratory units had implemented the QA plan uniformly and recommended, among other things, that the Laboratory improve its procedures for documenting casework. That summer, the QASG evaluated the implementation of the QA plan by different units. The QASG review found inconsistent policies and procedures among units on such matters as the unit manuals, evidence handling policies, and protocol format. The review also noted a lack of Laboratory-wide guidelines for casework documentation, report writing, and proficiency testing.

In July 1994, FBI Director Louis J. Freeh appointed Milton Ahlerich to succeed John Hicks as Laboratory Director after Hicks retired. Freeh directed Ahlerich to improve quality assurance generally in the Laboratory and to actively pursue accreditation. Consistent with this directive, and as a result of the Laboratory's internal reviews and the OIG audit, Ahlerich implemented several new policies.

In September 1994, Ahlerich issued a memorandum restating Laboratory-wide policies for case review, documentation, evidence handling, and safety. In January 1995, the Laboratory adopted revised policies for blind proficiency testing. The next month, Ahlerich approved guidelines for standard operating procedures in the Laboratory. In July 1995, new policies concerning the preparation of case notes and the monitoring of testimony by Laboratory examiners were adopted. In September 1995, Ahlerich approved a new open proficiency testing program. That same month, Ahlerich also approved a new policy for the control of evidence.

Implementation of a formal QA plan is important to the quality of the Laboratory's work and is a preliminary step to obtaining accreditation by ASCLD/LAB. Many federal, state, and local forensic laboratories in the United States have been accredited, including eight operated by the Drug Enforcement Administration and three operated by the Bureau of Alcohol, Tobacco, and Firearms. Laboratories in Australia, Canada, Hong Kong, New Zealand, and Singapore also have been accredited by ASCLD/LAB.

The FBI Laboratory has not previously applied for accreditation, although the FBI supported the formation of ASCLD and the later development of the accreditation program. Former Laboratory Director Hicks told us that the FBI had not sought accreditation during his tenure for reasons that included: (1) the costs and time demands of the ASCLD/LAB inspection; (2) the fact that

accreditation was not required for examiners to testify; and (3) doubts by management whether the Laboratory needed to be formally accredited. ASCLD/LAB itself acknowledges that the fact that a laboratory chooses not to apply for accreditation does not imply that the laboratory is inadequate or that its results cannot be trusted.

To prepare for accreditation, in January 1995, the Laboratory created a separate Quality Assurance Unit (QAU) as part of the FSRTC in Quantico, Virginia. The QAU was charged with working with other units of the Laboratory and management to review practices and procedures and to assure that the standards for accreditation are met. James Mudd, who had worked on the Laboratory's quality assurance programs since 1990, was named the Quality Assurance Program Manager.

The QAU gave a presentation about the accreditation process to all Laboratory Division employees in March 1995. Subsequently, Ahlerich circulated a memorandum dated May 31, 1995, asking all Laboratory employees to read the ASCLD/LAB manual and to return a signed acknowledgment that they had done so. The Laboratory initially planned to submit an application in 1995, but that goal was not met because the QAU and other units of the Laboratory have continued to review and revise various policies and procedures.

Accreditation will be an on-going process. It begins with a self-evaluation by the applicant laboratory, which then submits an application to ASCLD/LAB. Teams of inspectors, who are from other accredited laboratories, inspect the applicant laboratory to determine if it meets specified criteria. After the inspection report is prepared, the applicant laboratory has a one-year period in which to remedy any deficiencies before ASCLD/LAB decides on the application. Once a laboratory is accredited, it must submit annual accreditation review reports to ASCLD/LAB. To remain accredited, a laboratory must complete the entire application process again after five years.

The FBI advised the OIG in February 1997 that it now intends to submit its written application to ASCLD/LAB later this year. Because the decision on accreditation may not occur until as long as a year after the on-site inspection, it will still be some time before the Laboratory obtains accreditation.

### **C. The Hiring of Non-Agent Examiners**

While attempting to implement a formal QA plan and to otherwise prepare for accreditation, the FBI Laboratory in the last few years has seen major changes in its staff of forensic examiners. Until 1994, the Laboratory Division generally required its examiners to also be FBI agents, except in the Latent Fingerprint section, where the examiners have always been non-agent professional staff. The FBI in 1993 reduced the number of agents assigned to FBI Headquarters in Washington, D.C., a step that had a substantial impact on the Laboratory Division. Many experienced agent examiners have left the Laboratory Division and have been transferred to FBI offices around the country, where they are working as investigative agents rather than as forensic examiners.

The Laboratory Division has begun training civilian professional support examiners to replace some of the former agent examiners. New examiners have been hired from other forensic laboratories and

from personnel who have worked in the Laboratory but were previously ineligible to become examiners because they were not agents. As of September 1996, the Laboratory had approximately 204 examiners, including 61 agent examiners and 143 professional support examiners. Of the latter, 102 had fully completed their training and had been deemed qualified by the FBI to testify to their examinations. Within the SAS, there were 68 examiners, including 38 agent examiners and 30 professional support examiners. In contrast, at the end of 1993, there were 60 agent examiners in the SAS and 103 agent examiners in the Laboratory Division overall, as well as 84 non-agent fingerprint examiners.

The reduced agent staff has continued to do case work while also assisting in the training of new examiners. The Laboratory Division acknowledges that these personnel changes have caused some disruption and delays in the processing of cases. Over time, the FBI intends to have professional support examiners occupy nearly all examiner positions in the Laboratory.

#### **D. Changing Legal Standards for Admissibility and Disclosure**

In the last several years, the legal standards for the admissibility of scientific expert testimony and for pretrial disclosure concerning expert testimony have significantly changed. Because these evolving standards are part of the context in which the Laboratory operates, and they may affect the operations of forensic laboratories in general, we comment briefly on them here.

The United States Supreme Court in June 1993 adopted a new standard for the admissibility of scientific evidence in its decision in Daubert v. Merrill Dow Pharmaceuticals, Inc. The Court there held that Federal Rule of Evidence 702 supersedes the general acceptance test established nearly 70 years earlier in Frye v. United States. Rule 702, the Supreme Court concluded, does not require general acceptance in the relevant scientific community as an absolute prerequisite for the admissibility of scientific evidence. Instead, when presented with proposed scientific testimony, the district court must make a preliminary assessment of whether the reasoning or methodology underlying the testimony is scientifically valid, and is therefore reliable in an evidentiary sense.

Daubert explicitly contemplates that the district courts will have a gatekeeping role with respect to scientific expert evidence. While declining to adopt a definitive checklist or test, the Supreme Court noted several factors a court should consider. Those factors include: (1) does the theory or technique involve testable hypotheses; (2) has the theory or technique been subject to peer review and publication; (3) are there known or potential error rates and are there standards controlling the technique's operation; and (4) is the method or technique generally accepted in the scientific community? The trial court must also consider the relevance or fit of the proposed testimony by determining if the reasoning and methodology can properly be applied to the facts at issue.

The application of Daubert in criminal cases will be clarified through further court decisions, and we do not attempt in this Report to assess Daubert's implications for testimony by Laboratory examiners in particular areas. Nor do we address how courts should distinguish scientific expert testimony from non-scientific expert testimony or what standards should determine the admissibility of the latter.



The federal rules concerning the disclosure of expert testimony changed effective December 31, 1993. Although the Federal Rules of Criminal Procedure previously allowed defendants to obtain certain test results and reports, some courts had held that the rules did not necessarily require pretrial disclosure of the identity of expert witnesses who had not prepared reports. Under the amended rules, the government, if requested by the defendant, must provide a written summary of intended expert testimony. The summary must describe the opinions of the witness, the bases and reasons therefore, and the qualifications of the witness.

Expert testimony may be subject to increased scrutiny as a result of Daubert and the changes in the disclosure rules. If so, these new legal standards will have an impact on forensic laboratories as well as the courts. Laboratories will need to provide sufficient information so counsel can make the required written disclosures, including the bases and reasons for opinions and the expert's qualifications. Such information in turn will likely be part of the material considered by district courts in those cases where Daubert is applied to evaluate proposed expert scientific testimony.

## **II. Whitehurst and His Allegations**

This section describes Agent Whitehurst's background and career in the FBI and provides a brief history of his allegations about misconduct in the Laboratory.

Frederic Whitehurst entered college in 1965 at East Carolina University in Greenville, North Carolina. In 1968, he interrupted his college studies to enlist in the U.S. Army. Whitehurst served in the Army until 1972, when he was honorably discharged after three tours of duty in Vietnam. In 1974, Whitehurst received a bachelor's degree in chemistry from East Carolina University. He received a doctorate in chemistry from Duke University in 1980 and then worked for two years as a research associate in chemistry at Texas A & M University.

In 1982, Whitehurst joined the FBI. After completing training at the FBI facility in Quantico, Virginia, he worked as a field agent on criminal investigations in Houston, Sacramento, and Los Angeles. In 1986, he began working in the Laboratory at FBI Headquarters in Washington, D.C., where he was assigned to the Materials Analysis Unit (MAU). As a matter of FBI policy, Laboratory scientists generally do not testify until they have been qualified as examiners. Whitehurst was qualified by the Laboratory as an examiner in forensic chemistry in 1987. From that time until 1994, his work focused on the analysis of lubricants, explosives, and explosives residue.

After the explosives analysis program was transferred to the CTU in June 1994, Whitehurst remained in the MAU, where he was reassigned to begin training to become an examiner of paints and polymers. He maintains that the transfer of the explosives analysis program to the CTU and his reassignment were in retaliation for his allegations that Laboratory scientists improperly performed analyses in certain cases, including the World Trade Center bombing case. In 1996, Whitehurst was reassigned to the newly-formed Hazardous Material Response Group (HMRG) after the MAU's paint and polymer analysis program was transferred to the CTU. In the HMRG, Whitehurst conducted studies related to environmental crimes investigations while he also continued to work on becoming qualified as an examiner in paints and polymers.

Whitehurst's complaints about other FBI scientists arose soon after he joined the Laboratory. Whitehurst trained as an examiner under Terry Rudolph, who also has a doctorate in chemistry and who was the Laboratory's senior examiner in the field of explosives residue analysis from 1977 to 1988. According to Whitehurst, Rudolph was very sloppy in his work habits. Whitehurst maintains that Rudolph kept his work area dirty and in disarray, that he was indifferent to problems of contamination, and that he reached conclusions that were not supported by adequate analyses. Whitehurst also maintains that he voiced his concerns about Rudolph to the MAU chiefs and others in the Laboratory to no avail.

In May 1989, Whitehurst communicated his concerns about Rudolph's work to persons outside the Laboratory during the trial in United States v. Psinakis. In that case, Whitehurst reexamined evidence that Rudolph in 1982 had determined contained traces of the explosive PETN. While the trial was under way, Whitehurst approached a defense expert and told him that he thought the identification of PETN on the evidence might have resulted from contamination due to Rudolph's work habits. Whitehurst did not tell the prosecutor or Rudolph about his misgivings before he spoke with the defense expert.

After returning to the Laboratory from the Psinakis trial, Whitehurst advised his unit chief and the Laboratory Director of his actions because he was concerned that he may have violated FBI policy. In August 1989, the FBI's Office of Professional Responsibility (FBI OPR) began an investigation of Whitehurst's actions in the Psinakis trial. John Hicks, the Laboratory Director, wrote to FBI OPR in November 1989, recommending that Whitehurst receive an oral reprimand. Hicks later repeated this recommendation in the fall of 1990. Consistent with FBI procedures, the FBI Administrative Service Unit (ASU) reviewed the matter to determine an appropriate sanction. On October 26, 1990, Whitehurst was suspended for one week without pay and placed on six months probation.

In July 1989, the Assistant United States Attorney (AUSA) in Psinakis wrote to Laboratory Director Hicks and stated that Rudolph's analysis was deficient, that the judge had nearly excluded Rudolph's testimony, and that the defense had seriously impeached Rudolph. This was the first formal, written complaint against Rudolph. It came from a reliable source, independent of Whitehurst. The prosecutor did not criticize Whitehurst, but instead noted that he appeared sincerely committed to the integrity of the judicial process.

As a result of the letter from the prosecutor, MAU chief Jerry Butler reviewed 200 of Rudolph's cases and found administrative shortcomings including missing notes and lack of documentation. After Butler recommended a more thorough technical review, CTU chief Roger Martz reviewed 95 of Rudolph's case files. In August 1989, Martz reported that Rudolph's analyses supported the results and that Martz found no technical errors in the final reports. The Laboratory concluded that further inquiry was not required. Despite the prosecutor's written complaint, the Laboratory did not then review a transcript of Rudolph's testimony in Psinakis, and Rudolph was never disciplined for his actions in that case.

In December 1990, Whitehurst again complained within the Laboratory about Rudolph's work habits and also alleged that Rudolph was a racist, had abused annual leave, had perjured himself, and

had lied to an AUSA. As a result, FBI OPR opened an investigation on Rudolph and the Laboratory in March 1991 directed MAU Chief James Corby to review a number of Rudolph's cases. After reviewing 200 cases, Corby found that 57 lacked sufficient information to support certain of Rudolph's conclusions. Based on this review, in April 1992, SAS Chief Kenneth Nimmich recommended to Director Hicks that Rudolph review the 57 cases and attempt, based on his recollection or personal notes, to add documentation to support the findings and then prepare a memorandum for each file describing any additional information. Nimmich also recommended that Rudolph be severely reprimanded for his casework. Instead, Director Hicks admonished Rudolph orally at a meeting in which Hicks also gave Rudolph a cash bonus.

After the FBI OPR completed its investigation, the FBI Administrative Services Division (ASD) advised Rudolph in June, 1982 that the inquiry had not developed facts warranting any administrative action. In March 1993, Nimmich reported to Hicks that Rudolph had reconstructed 57 files and that the action taken was documented in the files. Nimmich further recommended that the matter be closed. Whitehurst apparently was not formally told by Laboratory management about the results of the FBI OPR investigation or the various reviews of cases worked by Rudolph.

In the spring and summer of 1993, Whitehurst became embroiled in controversies within the Laboratory about the analysis of certain evidence from the February 1993 bombing of the World Trade Center. Briefly stated, he contended that Lynn Lasswell improperly labeled certain peaks on the output from an Ion Mobility Spectrometer (IMS) as indicative of the explosive urea nitrate; that Lasswell incorrectly concluded that urea nitrate could be identified with the use of mass spectrometry in a report approved by his Unit Chief Roger Martz; and that another examiner had pressured Whitehurst to remove qualifying language from his conclusions in a report. In July 1993, Whitehurst sent Hicks memoranda describing these complaints and also asserting that Lasswell and Martz were not qualified to examine explosives.

Whitehurst's allegations first came to the attention of the OIG in the fall of 1993 during an OIG audit of the Laboratory Division. When OIG auditors interviewed Whitehurst in October and December 1993, he described his complaints about other Laboratory personnel in the World Trade Center investigation and Rudolph. He later wrote two memoranda to OIG auditor Dan Strohl in December 1993 that primarily concerned the World Trade Center case.

The first trial related to the bombing of the World Trade Center began in September 1993. The government submitted copies of the Strohl memoranda to the district court, which in turn directed the government to give the memoranda to the defense attorneys and to allow Whitehurst to be interviewed by them. Defense counsel interviewed Whitehurst in January 1994; the transcript of the interview was placed under seal by the district court. Neither the prosecution nor the defense called Whitehurst as a witness at this trial.

In February 1994, Whitehurst's attorney, Stephen Kohn, wrote to the FBI describing various allegations regarding the Laboratory and stating that an investigation should be conducted by a special counsel. FBI General Counsel Howard Shapiro responded to Kohn that the FBI Office of General Counsel (FBI OGC) would conduct an investigation itself. Over the next several months, the FBI OGC interviewed Whitehurst and other persons, reviewed documents, and reviewed the previous internal investigations. The FBI OGC investigation is described in a May 1994

memorandum to Shapiro from Steven Robinson, the Principal Deputy General Counsel, and John Sylvester, an Assistant General Counsel. Robinson and Sylvester concluded that, except for the Rudolph matter, the Laboratory had fully investigated each of Whitehurst's allegations and taken appropriate action. Regarding Rudolph, the authors of the May 1994 memorandum noted that they did not think his work product would withstand significant scientific or legal scrutiny and they recommended that MAU chief James Corby review all of Rudolph's casework.

During the spring of 1994, the OIG Audit Division was completing a draft report based on its review of the Laboratory. In May 1994, the Audit Division referred the allegations made by Whitehurst to the OIG Investigations Division (OIG INV). That month, OIG INV agents interviewed Whitehurst, who repeated allegations he had made earlier to OIG audit personnel. After meeting with the FBI OGC and reviewing the May 1994 memorandum by Robinson and Sylvester, OIG INV concluded that the issues raised by Whitehurst were largely being addressed by either the OIG audit process or the FBI OGC investigation.

OIG INV did, however, decide to review further Whitehurst's allegations that conclusions or dictation he had prepared as an auxiliary examiner had not been accurately incorporated by EU examiner J. Thomas Thurman into final Laboratory reports. This was an issue that the FBI OGC had also determined merited further investigation. In the fall of 1994, the FBI gave the OIG copies of reports prepared by Thurman that incorporated dictation by Whitehurst. After reviewing these reports, Whitehurst identified to the OIG what he maintained were material alterations in several of his dictations. In January 1995, the OIG interviewed James Corby, then the unit chief of the MAU, who had also reviewed Thurman's reports and concluded that some of Whitehurst's dictations had been significantly changed.

OIG INV sought to interview MAU examiner Steven Burmeister to determine if his dictation, like Whitehurst's, had been changed in reports prepared by Thurman. Because Burmeister was involved in several on-scene bombing investigations, this interview did not occur until May 1995. In the interview, Burmeister did not identify any significant changes to his dictation, but he did support Whitehurst's allegations that some CTU examiners in the World Trade Center case had examined explosives residues without having been qualified by the Laboratory to perform such examinations and they had incorrectly concluded that urea nitrate had been identified in certain evidence.

Based on the Burmeister interview and additional correspondence from Whitehurst, the OIG concluded that it should review Whitehurst's allegations more broadly. Over the spring and summer of 1995, the OIG discussed with FBI OPR possibly conducting a joint investigation. In July 1995, the Inspector General determined that the OIG should expand its investigation to include those allegations previously being reviewed by FBI OPR. FBI Director Freeh agreed with this determination and advised the OIG that the FBI would cooperate fully in the investigation.

Whitehurst's allegations became publicized in the late summer and early fall of 1995. On August 14, 1995, he was called by the defense to testify in the trial of Sheik Omar Abdel-Rahman, who was charged with various co-defendants with a conspiracy that included the World Trade Center bombing as an overt act, other bombings in New York, and the murder of two individuals. In testifying, Whitehurst claimed that he had been pressured to bias his interpretation of evidence in the World Trade Center investigation and that initial reports about the presence of urea nitrate were incorrect.

Nearly one month later, on September 12, 1995, defense attorneys subpoenaed Whitehurst to testify in People v. O.J. Simpson, the California state court trial of O.J. Simpson for the murders of Nicole Brown Simpson and Ronald Goldman. Shortly thereafter, Whitehurst made several media appearances, appearing on the television programs Prime Time Live on September 13, 1995; The Larry King Show on September 14, 1995; and The Today Show on September 25, 1995. An article about Whitehurst's allegations also appeared in the September 25, 1995, issue of Newsweek magazine.

In response to the media attention, the FBI issued a press release on September 13, 1995. The release noted that Whitehurst had raised a variety of concerns about forensic protocols and procedures employed in the FBI Laboratory, and stated that the FBI had vigorously investigated his concerns and is continuing to do so. The FBI press release further stated that the FBI had reviewed more than 250 cases involving prior work in the Laboratory and to date had found no evidence tampering, evidence fabrication, or failure to report exculpatory evidence. The press release observed that [a]ny finding of such misconduct will result in tough and swift action by the FBI. The release also stated that the FBI was fully cooperating with the OIG investigation of Whitehurst's allegations.

On September 16 and 17, 1995, defense attorneys and prosecutors in the Simpson case interviewed Whitehurst regarding Roger Martz and related matters. In July 1995, Martz had testified in the Simpson trial that he had examined certain blood samples and concluded that they did not contain blood that had been preserved with the compound EDTA. The defense in Simpson proposed calling Whitehurst to testify that Martz had a habit or custom of biasing test results to support the prosecution.

In an order issued September 20, 1995, California Superior Court Judge Lance Ito ruled that Whitehurst would not be allowed to testify. Judge Ito noted that Whitehurst had no direct knowledge concerning the EDTA testing in the Simpson case and that whether Martz was qualified to conduct explosives residue testing in other cases had no direct bearing on the EDTA testing.

### III. The OIG Investigation

On September 18, 1995, the Department of Justice announced that the OIG was investigating allegations by Whitehurst and that the OIG would select a panel of forensic scientists to assist in the investigation. The OIG invited both the FBI and Whitehurst to suggest names of possible outside experts. Laboratory Director Milton Ahlerich responded with suggestions and also stated that the Laboratory welcomed a review of its work and would cooperate completely with the OIG to facilitate whatever review it deemed appropriate. Whitehurst also said he welcomed an outside review of his allegations, and he too suggested experts who might participate.

In identifying experts to assist in the investigation, the OIG sought scientists who are respected internationally and who have expertise both in the relevant scientific areas and in the operation of scientific laboratories. On November 8, 1995, the OIG announced that five scientists would serve as consultants in the investigation. Those scientists, their positions, and their qualifications are described below:

- Mr. Nicholas S. Cartwright is currently the Officer in Charge of the Science & Technology Branch of the Royal Canadian Mounted Police (RCMP) and the Manager of the Canadian Police Research Centre. He served previously as the Chief Scientist-Chemistry in the RCMP Central Forensic Laboratory and has extensive experience in the forensic applications of analytical chemistry, including explosives residue, paints, and fire debris. He chairs the International Civil Aviation Organization's Ad Hoc Group of Specialists on the Detection of Explosives and is a member of the Federal Aviation Administration's Security Research & Development Scientific Advisory Panel.
- Dr. Paul B. Ferrara is the Director of the Division of Forensic Science for the Commonwealth of Virginia. A nationally recognized expert in the field of DNA analysis, Dr. Ferrara serves on the National DNA Advisory Board. He is the past chairman of ASCLD/LAB and was a member and consultant, respectively, to the 1992 and 1996 National Research Council Committees on DNA Technology in Forensic Science.
- Mr. Douglas M. Lucas is the retired Director of the Centre of Forensic Sciences of the Province of Ontario, Canada. He is a past president of the American Academy of Forensic Sciences (AAFS), and served for twelve years as the Chair of the AAFS Ethics Committee. He also is a past president of ASCLD and the International Association of Forensic Sciences.
- Dr. Gerard Murray, a Principal Scientific Officer of the Forensic Science Agency of Northern Ireland, is one of the world's leading authorities in the analysis of explosives residue. He has testified in terrorist cases in the United States, Germany, the Republic of Ireland, and the United Kingdom. In 1994, he was named an Officer of the Order of the British Empire.
- Dr. Richard Schwoebel retired in 1995 from the Sandia National Laboratories in Albuquerque, New Mexico, where he had held numerous posts in a thirty-three year career. As Director of the Surety Assessment Center, he was responsible for nuclear weapon safety and reliability. While serving as Director of Components at Sandia, Dr. Schwoebel led a team of scientists that provided the General Accounting Office with an independent assessment of the 1989 explosion that killed 47 crewmen aboard the U.S.S. Iowa.

Four attorneys from the Department of Justice also played central roles in the investigation. These attorneys are Barry Rand Elden, an Assistant United States Attorney and the Chief of Appeals for the United States Attorney's Office for the Northern District of Illinois; Scott Bales, an Assistant United States Attorney in the District of Arizona; Nicole Cabbage, a prosecutor in the Fraud Section of the Justice Department's Criminal Division; and Lawrence Lincoln, an Assistant United States Attorney in the Western District of Washington. Also assisting in the investigation were several personnel

from the OIG, including Inspector Alison Murphy and Special Agents Robert Mellado, Kimberly Thomas, Joseph LeStrange, and Judson Spring.

After the investigative team was assembled in late 1995, the OIG began obtaining pertinent documents from the FBI and continued reviewing communications received from Whitehurst. Ultimately, the FBI provided more than 60,000 pages of documents in response to requests from the OIG, including case files, work notes, test results, policies, internal memoranda, and other materials. The OIG's investigative team also interviewed individuals who were identified as possibly having relevant information.

Interviews were conducted by the attorneys and OIG special agents working on the investigation. In some instances, one or more of the scientific experts attended the interviews and asked questions themselves. Certain witnesses, including Agent Whitehurst, were interviewed under oath, and their interviews were transcribed. Other interviews were summarized in memoranda prepared by OIG special agents. More than 100 witnesses were interviewed as part of the investigation, and several were interviewed more than once. The experts and attorneys met in Washington, D.C., beginning in late 1995 and continuing through early 1997 to discuss the course of the investigation, additional information to be obtained, and our conclusions.

After a draft of the Report was completed on January 21, 1997, the OIG invited the FBI to review the draft for factual accuracy. The FBI provided seventy-two pages of written comments on February 12, 1997 and twelve additional pages of comments on March 24, 1997. The OIG also solicited comments on parts of the draft from certain United States Attorneys' Offices or others who had been involved in the prosecution of particular cases. Agent Whitehurst began reviewing a draft of the Report, but declined to provide comments after the OIG refused to allow his private attorney to also review the draft. Based on the responses received from the FBI and others, the experts and attorneys again met and considered whether revisions were appropriate.

This report is the result of the foregoing investigative efforts.

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## **PART THREE: ANALYSIS OF PARTICULAR MATTERS**

### **SECTION A: ALLEGATIONS CONCERNING TERRY RUDOLPH**

#### **I. Introduction**

Since Whitehurst joined the Laboratory in 1986, he has repeatedly complained about SSA Terry Rudolph, who preceded Whitehurst as the Laboratory's senior examiner of explosives residue. Whitehurst alleges that Rudolph was incompetent and that the Laboratory sought to ignore or cover up his deficiencies. In this section, we address allegations that Whitehurst and others have made concerning Rudolph, and we evaluate the Laboratory's actions in response to those allegations.

Terry Rudolph worked as an explosives residue examiner in the Laboratory from 1979 until 1988, when he began teaching at the FBI Academy in Quantico, Virginia. After Whitehurst joined the Laboratory in 1986, he worked with Rudolph to become qualified to examine explosives residue. Whitehurst soon began complaining to his unit chiefs that Rudolph was sloppy in that he maintained a messy work area and performed inadequate examinations.

In 1989, Whitehurst voiced his concerns about Rudolph for the first time outside the Laboratory. During the trial in United States v. Psinakis, Rudolph was expected to testify about his identification of the explosive PETN on certain evidence. After the prosecutor learned the defense intended to challenge Rudolph's analyses, Whitehurst was asked to re-examine the evidence. Whitehurst also found PETN in his examinations, and he attended the trial prepared to testify. Without first raising his concerns with the prosecutor or Rudolph, Whitehurst approached a defense expert and said he thought the FBI's identification of PETN may have resulted from contamination of the evidence due to Rudolph's sloppy work habits.

Whitehurst ultimately did not testify at the trial. In Part Four of this Report, we discuss our evaluation of his conduct and his claim that the FBI improperly retaliated against him by suspending him for one week for his actions.

Rudolph did testify in Psinakis. At the end of the trial, the jury acquitted the defendant. In July 1989, the prosecutor, Assistant United States Attorney (AUSA) Charles Ben Burch, wrote to the FBI complaining that Rudolph's analysis was deficient, that the judge had nearly excluded his testimony, and that Rudolph had been seriously impeached by the defense.

In August 1989, the Laboratory completed two internal reviews of Rudolph's casework. MAU Chief Jerry Butler reviewed 200 cases, found numerous administrative shortcomings, and recommended a



further in-depth review. CTU Chief Roger Martz reviewed 95 case files, reported that Rudolph's analyses supported the results and that Martz found no technical errors, and recommended there be no further technical review of Rudolph's cases. The Laboratory concluded that no further action concerning Rudolph was necessary.

In 1991, the FBI OPR opened an investigation concerning Rudolph after Whitehurst complained not only about his sloppy work but also that Rudolph had perjured himself, lied to an AUSA, and abused annual leave, and that Rudolph and his technician Edward Bender were racists. As a result of Whitehurst's allegations, the Laboratory also initiated a third review of Rudolph's case files, this one by MAU Chief James Corby.

After reviewing 200 cases, Corby reported that he found 57 lacking adequate documentation or information to support the stated conclusions. CTU examiner Lynn Lasswell also reviewed the 57 cases identified by Corby. In April 1992, SAS Chief Kenneth Nimmich advised Laboratory Director John Hicks that Rudolph would be asked to review the 57 cases and, if possible, reconstruct from his personal recollection, diaries, or other personal notes sufficient documentation for the findings reported. Nimmich stated that a memorandum should be prepared for each file describing any additional information.

Nimmich also recommended in April 1992 that Rudolph be severely reprimanded for his lack of professionalism and inattention to detail. Instead, Hicks admonished Rudolph orally at a meeting in which Hicks also gave Rudolph a cash incentive award. In June 1992, the FBI advised Rudolph that the FBI OPR inquiry had not developed facts warranting administrative action. In March 1993, Nimmich reported to Hicks that Rudolph had reconstructed the 57 files and that Nimmich recommended the matter be closed.

Within the Laboratory, MAU Chief Corby advocated a further review of Rudolph's case work. In May 1994, after investigating Whitehurst's allegations on several matters, the OGC recommended that Corby review all of Rudolph's cases. After reviewing 654 of Rudolph's cases, Corby reported in November 1995 that 24% contained errors or were administratively or technically incomplete. Rudolph disputed these findings. He retired from the FBI in June 1996.

To investigate the Rudolph matter, we conducted sworn and transcribed interviews of Edward Bender, Steven Burmeister, Charles Calfee, James Corby, Terry Rudolph, Roger Martz, Kenneth Nimmich, and Frederic Whitehurst. We also interviewed other witnesses, including Milton Ahlerich, Roger Asbury, Ben Burch, John Dietz, Frank Doyle, John Hicks, James Kearney, Lynn Lasswell, Randy Murch, Robert O'Brien, Ralph Regalbutto, Steven Robinson, John Sylvester, and Don Thompson. We reviewed all available documents produced by the FBI pertaining to the Psinakis case, the reviews of Rudolph's case files, and the relevant FBI OPR investigations.

Based on our investigation, we conclude that, in Psinakis and in numerous other cases, Rudolph did not competently or professionally perform his work as an examiner. As is discussed infra in Part Three, Section H9, we also note similar problems in certain work that Rudolph did in the UNABOM case. We further conclude that the Laboratory did not adequately investigate or resolve the concerns

about Rudolph after the Psinakis prosecutor's July 1989 letter, after Butler's 1989 review, or after Corby's 1992 review. We recommend that a notation concerning this Report's findings be included in each of Rudolph's case files. We further recommend that the FBI not employ Rudolph in any capacity in the future.

## II. The Psinakis Case

### A. Factual Background

This case involved an American citizen suspected of smuggling explosives to the Philippines. During the investigation, a large quantity of detonating cord that had been stripped, or cut along the side so the explosive inside could be removed, was found in the suspect's garbage. At the Laboratory, Rudolph examined a white powder extracted from the cord and determined, through the use of x-ray powder diffraction (XRD), that it was PETN, an explosive commonly found in detonating cord. The suspect's home was then searched, and FBI agents found tools that were submitted for examination to ascertain if they had been used to strip the cord and extract the powder.

In January 1982, Rudolph conducted a liquid chromatography test on white powder removed from the tools and concluded it was PETN. He issued AE dictation stating that PETN was found on the tools, including pliers and a utility knife. A Laboratory report dated February 18, 1982, similarly stated that the identified tools had been instrumentally examined and determined to contain PETN. Neither Rudolph's dictation nor the final report identified the instrumental analyses performed. This report was given to the prosecutor and turned over to the defense.

In 1989, Rudolph was called to testify at the Psinakis trial. AUSA Burch recalls that Rudolph assured him that the examinations were sufficient, conclusive, and could easily be used at trial. Burch learned through discovery that the defense was prepared to offer expert witnesses to challenge Rudolph's conclusions. As a result, Burch retrieved certain evidence from the court's custody and sent it back to the FBI Laboratory for additional testing. By this time, Rudolph was no longer working in the Laboratory as an examiner. Whitehurst conducted the tests and confirmed the presence of PETN by the use of gas chromatography/mass spectrometry. He then went to San Francisco so he could testify about his results if needed.

In late May 1989, the court in Psinakis held an evidentiary hearing on the admissibility of expert testimony. While waiting to testify, Whitehurst approached a defense expert and told him he had concerns about the reliability of Rudolph's conclusions. Whitehurst told the defense expert that Rudolph's work area had always been very dirty and possibly contaminated, and he suggested that this sloppy behavior could have been the source of the explosive found on the evidence. Whitehurst did not tell the prosecutor or Rudolph about his misgivings before speaking with the defense.

At the May 1989 hearing, the court did not allow Whitehurst to testify about his own test results because the court concluded the government had improperly removed the evidence from the court's custody for further testing. Burch mistakenly thought the court clerk had the judge's approval to release the evidence. Defense counsel, however, asked the court to have Whitehurst held on call

because someone at the FBI had doubts about Rudolph's testimony. Whitehurst ultimately did not testify.

Rudolph testified at the evidentiary hearing about his identification of PETN on the tools. He acknowledged that the only instrumental technique he had used was liquid chromatography (LC). He agreed with statements in a treatise that LC most often provides only a tentative confirmation and that a final confirmation requires use of an ancillary method such as mass spectrometry and infrared spectroscopy. Rudolph admitted he had not used any confirmatory techniques in addition to the LC test.

To counter the defense argument that LC alone was insufficient to identify PETN, Burch elicited from Rudolph that his opinion rested on many other factors. Rudolph noted that the cord found in the garbage was found to contain PETN; that the tools were of the type used to strip detonating cord; that he had examined microscopically a known sample of PETN and white powder from the tools and they compared essentially identically ; that he tested the powder with diphenylamine and it gave a blue color in just seconds which is another factor that tells me that I'm dealing with PETN ; that the sample was immediately soluble in a mixture of acetonitrile and water, again, a factor, an indicator that we are dealing with the same material [PETN] ; and, additionally, I took into consideration that in the time that I had done these analysis I have never ever encountered another explosive that interfered with the analysis of PETN on this [liquid chromatography] system.

The court asked Rudolph why the diphenylamine test and other tests he described were not documented in his notes. Rudolph responded, When I examine a case I put in my notes things that are important to me when I . . . give testimony. I don't write my notes for the United States Attorney. I don't write my notes for the defense. I write my notes for myself. Rudolph said he had done thousands of tests since 1982 and could not possibly remember them all. The court asked, Isn't that one of the reasons you keep notes? Rather than respond directly, Rudolph said this case was different because he and his technician remembered it specifically. Rudolph also said he often used this case as an example in teaching classes.

On further examination by the defense, Rudolph was asked the following:

Q: Mr. Rudolph, did I understand you to say that your opinion is based, in part, on the suggestion that PETN was found in the garbage?

A: Yes.

Q: And therefore, that helped you conclude what the traces were on tools inside the house?

A: Yes.

Rudolph also stated the following:

Q: In other words, what you've done is take a liquid chromatography and then bolster it or add to it by your own observations about the state of the physical evidence in the case; is that right?

A: That would be correct.

Rudolph admitted that liquid chromatography was not used to identify total unknowns. He said that as a chemist he had learned to do things in an expedient way, but yet still efficient. As an example, he said he would confirm the identity of PETN in blasting caps by liquid chromatography, because I could do a liquid chromatography analysis in a few minutes while it would take 45 minutes to do x-ray powder diffraction. Regarding the evidence in Psinakis, Rudolph stated that there is absolutely no doubt that that material was PETN, absolutely none. I felt as strong about that identification that that material on those blades were PETN as I have in any analysis I have ever done.

After the evidentiary hearing, the defense urged the court to exclude the evidence because all the witnesses, including Rudolph, agreed that LC was not an adequate test to identify PETN. Without directly countering this argument, AUSA Burch noted that the FBI had recently tested the powder from the utility knife by the use of mass spectrometry and another test and determined it was PETN. Burch also argued that Rudolph based his opinion on information in addition to the LC test. Burch stated that Rudolph doesn't purport to be somebody who is simply a chemist testifying. He is a forensic examiner of materials. He uses chemistry as one of the bases for his opinion. Burch argued that Rudolph's testimony should be admitted and the jury could assess its weight.

The court ruled:

Well, I'll permit the testimony of Mr. Rudolph with the understanding that if he persists in making his statement that he is as positive about this as he is that the sun rose this morning, I may very well make some comment to the jury to put the basis for his opinion in somewhat better perspective.

So he better be alerted to the fact that his testing was not totally adequate.

I thought for a time that if he used this case, as he says, as a subject matter of his courses of

instruction, that it might have stood for a different proposition than he has had it stand for up to now; that proposition being that even with the FBI lab, completion of all necessary processes in investigations is an awfully good idea, and leaving things undone because it takes more than 45 seconds to do them is not one of the smarter things to do.

But this jury, I think, is capable of appraising what he has done and what he hasn't done. And it is, in large degree, a matter of weight. And I'll permit him to testify.

After this ruling, the defense moved to exclude Rudolph's testimony because it offered an investigative opinion rather than a scientific one. The defense attorney stated, [Rudolph] bolsters his opinion, as I understand it, by saying I was a trained FBI agent and, therefore, I look things over and I see certain things and this helps me in my opinion.' The court responded, [H]e is entitled to tell the jury what he based his conclusion on. Some of these things may be a little strange for a scientist, but he will be testifying as a scientist, not as an FBI agent.

Rudolph later testified at the Psinakis trial. On direct examination he testified that he identified PETN through the use of LC in conjunction with other factors which indicated to him that he was dealing with PETN. On cross-examination, Rudolph admitted that he had other instruments available to confirm the presence of PETN but that he did not use them. Rudolph agreed that what happened in this case is that [he] used one method which is used to separate substances, not to identify them, and [he] didn't use anything else in the whole FBI lab. On redirect AUSA Burch asked Rudolph, [W]as your opinion that the material was PETN based solely upon the liquid chromatography test that you ran? Rudolph answered, No it was not, or I would have not -- If it was just based solely on that, I would have used some confirmatory techniques.

The trial ended in an acquittal.

In a four-page letter dated July 8, 1989, AUSA Burch informed Laboratory Director John Hicks that Rudolph's performance in the Psinakis case was deficient. Burch stated, I believe part of the reason for the acquittal stemmed from some serious questions that arose concerning the handling of exhibits involving trace or residue amounts of explosives and the analysis of these exhibits at the FBI laboratory. Burch complained that Rudolph relied on the hearsay reports of a field agent in rendering an expert opinion that evidence contained PETN. Burch observed:

The first deficiency in Rudolph's analysis seems obvious. Relying on the hearsay views of field agents in rendering an opinion as to the presence of a chemical compound seems obviously wrong-headed. The FBI chemist is being asked to independently ascertain the existence of a substance not just regurgitate information he has received from the field. Secondly, the information from the field agents may be wrong or so speculative as to be accorded little weight. Finally, using any basis other than instrumental analysis for an opinion as to the presence of a chemical or compound leads, [a]s in this case, to insufficient instrumental testing.

(Emphasis in original).

Rudolph, Burch stated, used liquid chromatography as the only chemical test to ascertain the presence of PETN, and he failed to perform confirmatory tests. Burch noted that the defense called a world-renowned expert who testified that liquid chromatography was the equivalent of a presumptive test that did not rule out the possibility of compounds other than PETN. Burch noted that the case raised serious questions about the Laboratory's procedures:

The first problem is that there appears to have been no protocol establishing what analytical/instrumental tests were to be performed in order to identify trace elements on items. Second, it appears that no peer review or other review process existed in order to confirm the sufficiency of instrumental analysis and the accuracy of the results obtained. Had such a review existed in 1982, it is likely that the inadequacy of Rudolph's procedures might have been detected.

In this letter, Burch did not criticize Whitehurst, but instead observed that he appeared sincerely concerned about the integrity of the judicial process.

Hicks responded to Burch on July 28, 1989, by writing, I share your concerns and as a result of this matter, I have instituted an internal audit of the protocols used in the identification of explosive residues.

## **B. Analysis of Rudolph's Conduct in Psinakis**

In reviewing Rudolph's laboratory work and testimony in Psinakis, we identified several significant problems. As noted later in this section, we found similar problems in his work on other cases.

### **1. Forming Opinions on a Non-Scientific Basis**

Rudolph acknowledged that his identification of PETN on the tools was based in part on the fact that stripped detonating cord was found in the defendant's garbage. In his interview with the OIG, Rudolph observed that given this information, he presumed the material on the knife was PETN and he used LC simply as a confirmatory test.

Rudolph's approach reflects a fundamental misunderstanding of the role of a forensic scientist. As an

investigative matter, the FBI had good reason to suspect that the defendant had used the tools to strip the detonating cord found in his garbage. As a forensic scientist, however, Rudolph could not identify PETN based in whole or in part on the field agent's suspicions. Rather, his conclusions had to be based on a scientific examination.

Rudolph failed to distinguish between the separate and distinct roles of an investigator and a forensic scientist. With his academic training, Rudolph should have known not to state his scientific conclusions more strongly than could be supported by the underlying analytical results. Had he recognized this fact, he would have acknowledged in his Laboratory reports and testimony that the LC tests he performed gave results consistent with, but did not necessarily identify, the presence of PETN on the tools.

## **2. Biasing Reports**

Whitehurst has generally alleged that FBI examiners in explosives-related cases have purposefully slanted reports to favor the prosecution. Although he did not make this complaint about Psinakis specifically, the case merits comment on this issue. At best, Rudolph's explanation for his opinion in Psinakis reflects incompetence. Given the tests that Rudolph described, he could only say the results of his 1982 examinations were consistent with the presence of PETN. By opining that PETN had been found on the tools, Rudolph overstated the significance of his analytical results in a way that supported the government's theory of the case. This overstatement partly reflected that Rudolph inappropriately relied on information from the field agent in reaching his forensic conclusions.

## **3. Inadequate File Documentation**

Rudolph failed to adequately document the work he claimed that he had done in Psinakis. At the trial, he testified that he prepared his notes for his own use and not for the defense or the prosecutor. These remarks reflect a basic misunderstanding of the purpose and importance of adequately documenting case files. The notes should allow someone to understand the analyses done and the basis for the conclusions reached by the examiner. The absence of such notes, as Psinakis illustrates, means that an examiner may not be able credibly to defend his or her conclusions at a later date. His supervisors should also be faulted for approving his AE dictation in the absence of adequately documented files.

## **4. Lack of Confirmatory Tests and Protocols**

Because it is well understood in the scientific community, Rudolph should have recognized the need to perform a confirmatory test in addition to the LC before concluding that PETN was found on the tools. His failure to do so reflects not only that he improperly based his opinion on the assumption that the defendant had stripped PETN from the detonating cord found in the garbage, but also that Rudolph did not follow any identified protocol in examining the evidence.

## 5. Conclusion

We conclude that Rudolph's performance in Psinakis was wholly inadequate and unprofessional. We do not find a factual basis to conclude that he intentionally overstated or biased his conclusions.

### III. The Laboratory's 1989 Reviews of Rudolph's Casework

In August 1989, the Laboratory conducted two partial reviews of Rudolph's casework. Based on those reviews, Laboratory management concluded that further action was not required. As explained below, those reviews were not adequate to resolve concerns about Rudolph's work in Psinakis or in other cases.

#### A. Factual Background

After receiving Burch's letter complaining about Rudolph, Hicks gave it to SAS Chief Kenneth Nimmich and instructed him to review Rudolph's casework. Nimmich in turn asked MAU Chief Jerry Butler to review Rudolph's work in Psinakis and to also review a representative sample of Rudolph's cases to determine if appropriate analytical techniques were applied and properly performed. Butler concluded that the analytical procedures used in Psinakis were weak but laboratory accepted practice in 1982.

Over a period of several weeks, Butler reviewed Rudolph's work in approximately 200 cases and prepared a memorandum dated August 2, 1989, which described the preliminary review. Butler found numerous administrative shortcomings in the files such as insufficient notes, missing charts and weak analytical procedures. In light of the itemized weaknesses found in Rudolph's work and the potential serious impact these types of weaknesses could have on the proper administration of justice, Butler recommended that an examiner from the CTU do an in-depth review of Rudolph's case work. Rudolph told the OIG that Butler also directed him to return to the files any notes and charts that Rudolph had retained himself.

Nimmich agreed with Butler's recommendation and orally asked CTU Chief Roger Martz to conduct the further review. Over approximately two weeks, Martz reviewed 95 cases in which Rudolph had worked as a principal or an auxiliary examiner. In an August 16, 1989, memorandum to Nimmich, Martz summarized his findings and stated:

In all of these cases, chemical, instrumental and or physical analyses were performed. These analyses were sufficient to base an expert opinion as to the results that were provided . . . In all cases reviewed, no technical errors were found in the final reports. Even though other techniques could have been employed, it is believed that no changes would be made in the reporting of the ninety-five cases that were reviewed.



Martz cross-referenced Butler's August 2, 1989, memorandum and recommended that no further technical reviews be performed on Rudolph's case work.

With regard to the Psinakis case, Martz noted that Rudolph had been criticized for not performing confirmatory analyses. Martz observed that while liquid chromatography (LC) would not be the instrument of choice to identify an unknown powder, it could be sufficient depending on other circumstances to identify an explosive. Martz also noted, It is not unusual for a defense attorney to deliberately ask why a technique, which he knows wasn't employed, wasn't used in the identification of a chemical.

During the OIG investigation, Nimmich and Martz gave conflicting accounts of what Martz was asked to do in his review of Rudolph's cases. Martz recalled that Nimmich asked him to determine if Rudolph had in fact done some analyses to support his reported conclusions. Martz said he did not attempt to determine whether the tests conducted by Rudolph were analytically sufficient to support the reported results, but instead whether there was some work in the file to support the conclusions drawn.

Martz told the OIG that he also informed Nimmich orally in 1989 that Rudolph did the very minimum work to come to a conclusion and he did a very poor job of documenting his work. Martz, however, did not mention these things in his August 16, 1989, memorandum to Nimmich. Martz also informed the OIG that in his 1989 review, he found that approximately 10% of Rudolph's files lacked any notes at all. This information also was not included in Martz's August 1989 memorandum.

Nimmich told the OIG that he expected Martz to review the technical sufficiency of Rudolph's work. Nimmich further said he understood that Martz had done such a review, because Martz stated in his memorandum that chemical, instrumental, or physical analyses were performed in all the cases and that [t]hese analyses were sufficient to base an expert opinion as to the results that were provided. Nimmich said he interpreted these remarks to mean that Martz was satisfied that a sufficient amount of work was done to reach the stated conclusions. Nimmich told the OIG that he relied upon Martz's conclusions in determining that no further review of Rudolph's work was warranted.

Rudolph, on his own initiative, prepared a letter dated August 25, 1989, to Laboratory Director John Hicks. In this letter, Rudolph attempted to respond to criticisms MAU Chief Butler had made in his August 2, 1989, memorandum. Rudolph defended at length his work in Psinakis. With regard to record keeping and note taking, Rudolph said that many files lacked notes because he had retained them himself because the FBI's filing system was unreliable. He stated that his unit chiefs knew of this practice and that in the past five years he had received one exceptional and four superior ratings for case management and control.

In his August 25, 1989, letter to Hicks, Rudolph also said that he had returned almost all the notes and serials to the FBI files and added detailed comments to files where such materials were missing.

Rudolph also observed that the quantity of notes an examiner takes is a matter of personal preference. Although Rudolph asked that this letter be made part of the official record, Hicks said he refused to accept it because he thought the issues had been resolved through Butler's review.

## **B. Analysis of the 1989 Reviews**

Laboratory management failed to assure that concerns about Rudolph's casework were thoroughly investigated in 1989. First, neither Butler in his initial review nor Martz in his subsequent review addressed the concern raised by AUSA Burch that Rudolph in Psinakis had erroneously relied on information from a field agent instead of conducting sufficient confirmatory tests to identify PETN. On a related point, as part of the 1989 reviews of Rudolph's work, Laboratory management failed to obtain and review a transcript of Rudolph's trial testimony in Psinakis. In light of the prosecutor's complaints, the transcript should have been reviewed.

In light of the conclusions stated in Butler's preliminary review, Laboratory management also failed to take appropriate further steps. Butler noted numerous administrative shortcomings, such as insufficient notes, missing charts, and weak analytical procedures in his review of some 200 cases. Rudolph says Butler directed him to return any notes or charts to the files. This directive was insufficient. First, it did not in any way sanction Rudolph for work habits that could, as the Psinakis case illustrates, undermine if not eliminate the value of the Laboratory's results at trial. Second, Rudolph had worked on several hundred cases other than the 200 Butler reviewed. At the least, in 1989 Laboratory management should have directed a more comprehensive review of Rudolph's casework.

We also find fault in the way Nimmich and Martz handled the follow-up review. Given Butler's findings, the Laboratory should have reviewed Rudolph's work to determine whether sufficient analyses were done to support the stated conclusions. Although Nimmich might reasonably have expected Martz, as an experienced examiner and unit chief, to understand the need for a thorough technical review, in retrospect Nimmich should have taken steps, preferably through written instructions, to assure that Martz understood this to be his task. It also would have been desirable for Martz to have clearly stated the object and methodology of his review in his memorandum.

Whatever he understood Nimmich's instructions to be, Martz stated the conclusions of his review in a misleading way. He observed that analyses had been performed that were sufficient, yet he told the OIG that he did not review the sufficiency of Rudolph's work to support the stated conclusions. Martz's August 16, 1989, memorandum shows that he knew of Butler's August 2, 1989, memorandum, which recommended an in depth review of Rudolph's cases. Martz in his memorandum indicated he conducted a technical review and recommended that there be no further review of Rudolph's cases. As a unit chief, Martz should have recognized that this misleadingly suggested that he had completed an in depth review and concluded that further review was not necessary.

Martz also failed to note in his memorandum that, in his review, he found that notes and other documentation were missing. These findings deserved comment even if Nimmich did not ask Martz

to conduct an administrative review of the files. Finally, Martz stated in his August 16, 1989, memorandum that, while other tests could have been performed, no changes would be made in the reporting of the 95 cases reviewed. Martz lacked any basis to make this statement if, as he told the OIG, he did not assess whether the analyses identified in the files were sufficient to support the stated conclusions.

Martz's review of the Psinakis case was inadequate to address the concerns raised by AUSA Burch. Martz commented that LC might be sufficient to identify explosives, depending on other circumstances. This begged the relevant question of whether LC was sufficient in Psinakis, which it clearly was not. Martz also noted that it was not uncommon for defense attorneys to question examiners about tests they knew had not been performed. The proclivities of defense counsel were not pertinent to the issues Martz should have been addressing. Martz's comments about Psinakis inappropriately tended to excuse Rudolph.

Nimmich told the OIG that he understood from Martz's memorandum that Martz had concluded that Rudolph had a sufficient basis for his conclusions in Psinakis. Martz confirmed in his interview with the OIG, however, that he did not review Rudolph's work in Psinakis and did not address AUSA Burch's concerns about the lack of confirmatory techniques. Given these facts, Martz should not have included his comments concerning the Psinakis case in his memorandum, because they misleadingly suggested that he had approved Rudolph's work.

Finally, we find that Hicks did not take sufficient steps in response to the concerns raised by AUSA Burch's letter. Given the specific allegations, Hicks should have assured that someone at least reviewed Rudolph's testimony in Psinakis. Hicks told the OIG that he did not remember reviewing the testimony and did not recall hearing that any one else reviewed it; Nimmich did not recall if it had been reviewed; and none of the documents provided to the OIG by the FBI suggests that the Laboratory reviewed Rudolph's testimony.

Moreover, Hicks advised Burch that based on his complaints about Rudolph, the Laboratory would conduct an internal audit of the protocols used in the identification of explosive residues. Hicks told the OIG that he understood that such an audit was done as part of whatever file reviews were ordered by Nimmich. Nimmich, not surprisingly, said he did not consider such reviews to be an audit of the Laboratory's protocols for examining explosives residue. Our investigation did not identify any documents suggesting that a general audit of the protocols was ever done as a result of Burch's letter. If Hicks intended such an audit to occur, he failed to communicate his instructions clearly to others in the Laboratory.

In sum, the Laboratory's 1989 review of Rudolph was inadequate. The allegations that prompted the review came not from Whitehurst but from an Assistant United States Attorney with first-hand knowledge of the alleged deficiencies. The AUSA not only rendered his own low opinion of Rudolph's work, but repeated the similar view of the district court judge who almost excluded Rudolph's testimony. The AUSA further stated that Rudolph's inadequate work contributed to an acquittal. These were serious charges. That the Laboratory did so little in response to these allegations is deplorable. The Laboratory should have recognized Rudolph's incompetence in 1989 and initiated a complete file review and appropriate disciplinary measures. This was not only required by the proper administration of justice, but it also might have obviated the great time and

effort expended in later reviews of Rudolph's files that were still continuing seven years later.

#### **IV. The FBI OPR Investigation in 1991-92**

In late 1990 and early 1991, Whitehurst again complained within the Laboratory about Rudolph's work habits and also made allegations of other misconduct, including that Rudolph was a racist, had abused annual leave, had perjured himself in a trial, and had lied to an AUSA. After an investigation by the FBI OPR, the FBI Administrative Services Division (ASD) advised Rudolph in June 1992 that the inquiry had not developed facts warranting any administrative action against him and it considered the matter closed. As explained below, we conclude that FBI OPR should have investigated certain of these allegations further, but we do not find facts indicating that FBI OPR or the ASD improperly sought to ignore or cover up the allegations made by Whitehurst.

In December 1990 Whitehurst prepared a draft memorandum detailing various allegations against Rudolph and recommending, among other things, that MAU Chief James Corby review all of Rudolph's cases. Whitehurst repeated his complaints that Rudolph was sloppy, had failed to conduct appropriate tests, and had not properly documented his work. He also alleged that Rudolph and his technician Edward Bender were racists, that Rudolph had perjured himself in a case in the Southwest, that Rudolph had lied to AUSA Burch by telling him the Laboratory lacked equipment in 1982 to do certain tests, and that Rudolph had abused annual leave.

Whitehurst discussed his memorandum with Corby. At Corby's recommendation, Nimmich forwarded the memorandum to FBI OPR in January 1991, and FBI OPR opened an investigation. In March 1991, Nimmich also directed Corby to review a number of Rudolph's cases. That review is discussed in the next section. The FBI OPR investigation was conducted primarily by Special Agent Robert O'Brien, who reported to Special Agent Ralph Regalbutto. During 1991, FBI OPR interviewed several witnesses, including Rudolph, Whitehurst, and others who worked with them in the Laboratory. FBI OPR concluded that the evidence did not support Whitehurst's allegations. Based on FBI OPR's investigation, the ASD advised Rudolph in a letter dated June 22, 1992, that the inquiry was considered closed.

Based on our review, we conclude that FBI OPR should have conducted a more thorough investigation with respect to three of Whitehurst's allegations.

Whitehurst alleged that both Rudolph and Bender were racists and that this affected their work product. None of the witnesses interviewed by FBI OPR substantiated the allegation that Rudolph made racist remarks at work or was a racist. Several witnesses did confirm, however, that Bender regularly made racial jokes or remarks in the Laboratory.

Given Whitehurst's allegations, FBI OPR should have pursued its investigation further by asking witnesses if they knew of any specific case in which Bender's racial remarks or any biases might have affected his work. In response to the OIG investigation, O'Brien of FBI OPR said that a further investigation of Bender was not undertaken because there was no evidence that racial views had

influenced his work and he was no longer an FBI employee. Similarly, Ralph Regalbuto, who supervised O'Brien at the time of the investigation, stated that FBI OPR would not have investigated the allegations against Bender because there was no indication of conduct that might be referred to a criminal investigative body and FBI OPR lacked authority to investigate non-FBI employees.

FBI OPR should have pursued its investigation to the point of asking witnesses if they knew of instances where Bender's views on race had affected his work. If the facts suggested they did, it is conceivable that some remedial action would have been appropriate with regard to cases he worked on while at the FBI. Moreover, if there were facts suggesting he slanted conclusions because of racial animus against a suspect, a criminal referral might have been appropriate.

In the course of our investigation, we contacted the individuals interviewed by FBI OPR in its earlier investigation and asked if they knew of any instances where Bender's racial views affected his casework. Several individuals again recalled him making racial comments in the Laboratory, but no one identified any specific instances where they thought his attitudes affected his work. These same persons stated that they did not think Bender would have altered reports or data based on the defendant's race.

The second allegation by Whitehurst that we think merited further investigation by FBI OPR is that of Rudolph's alleged perjury. Whitehurst claimed that in an unidentified case in the southwestern United States, Rudolph falsely testified that his initials were on a piece of evidence. According to Whitehurst, Rudolph told him about this incident to illustrate that [b]efore you embarrass the Bureau, you should be willing to perjure yourself.

In response to the FBI OPR investigation, Rudolph denied ever falsely stating that his initials were on evidence. Both O'Brien and Regalbuto of FBI OPR advised the OIG that because Whitehurst had not provided more specific information about the case in which the alleged perjury occurred, it was not necessary to investigate the allegation further once Rudolph denied it. O'Brien also noted that Whitehurst may have misunderstood remarks that Rudolph intended as teasing or a joke.

We disagree. Whitehurst in his allegations noted that the testimony was in a southwestern court, that Rudolph had only testified six or seven times before this incident, and that form FD-126s used by the Laboratory would list trials in which Rudolph testified. In view of the serious nature of the accusation, and the information identified by Whitehurst, we think FBI OPR should have attempted to identify cases in the Southwest in which Rudolph had testified and to review transcripts of his testimony. If that review disclosed testimony similar to that described by Whitehurst, FBI OPR then could have investigated further by contacting the prosecutor and seeking to examine any evidence that remained available.

Whitehurst also accused Rudolph of falsely telling AUSA Burch in the Psinakis case that he could not have more thoroughly examined the evidence because Rudolph lacked the equipment in 1982 that he had in 1989. Rudolph, Whitehurst noted, had stated in a paper published in 1983 that he used mass spectrometry and infrared spectrophotometry in 1981 and 1982 and that he had used these techniques in hundreds of explosives cases. Rudolph denied ever providing false information to

AUSA Burch.

O'Brien stated that FBI OPR did not investigate this allegation further because it did not seem to contain the elements of a lie or concern an important issue. O'Brien observed that Rudolph's published statements that he used certain equipment in 1982 did not mean it was available to him when he did the Psinakis examinations. O'Brien also noted that Rudolph's former unit chief Charles Calfee thought Rudolph would have been accurate in stating that certain equipment was unavailable because it was still in an experimental mode within the Laboratory.

FBI OPR did not interview AUSA Burch about this issue or review Rudolph's 1983 paper. Regalbuto of FBI OPR acknowledged that these might have been reasonable investigative steps, depending on the circumstances, but noted that the investigating agent has some latitude in determining if a sufficient investigation has been done. He also observed that if the investigation was insufficient, the FBI's Administrative Summary Unit (ASU), which makes recommendations based on the investigations, should have asked for more to be done.

Rudolph's alleged lying about the availability of equipment was a serious issue that merited further investigation by FBI OPR. Despite Rudolph's denial, O'Brien should have pursued this matter further by at least questioning Burch about it and reviewing Rudolph's paper.

After FBI OPR completed its investigation of the allegations against Rudolph, the ASU reviewed the matter and recommended it be closed. The ASU is part of the ASD, which later advised Rudolph that the inquiry was considered closed. In the ASU, the agent who reviewed the matter was John Dietz, who had been assigned to the ASU on temporary duty for three months. In an interview with the OIG, Dietz stated that he did not know either Rudolph or Whitehurst at the time of the investigation and he said that he had no reason to think the allegations were discounted because they were made by Whitehurst. Dietz acknowledged that, in hindsight, further investigation might have been helpful, but observed that he must have been convinced at the time that the FBI OPR investigation had been sufficient.

In sum, we conclude that FBI OPR should have investigated further the allegations concerning Bender's racial bias and Rudolph's alleged perjury and the alleged lie to AUSA Burch. Our review of the FBI OPR investigation and the ASU's resulting recommendation to close the matter did not disclose facts indicating that there was a deliberate effort to dismiss or ignore Whitehurst's allegations.

## **V. The 1992 Corby Review**

### **A. Factual Background**

Because the FBI OPR did not have the technical expertise to review Whitehurst's allegations

concerning Rudolph's casework, the Laboratory itself conducted another case review. SAS Chief Kenneth Nimmich directed MAU Chief James Corby to review a representative sample of Rudolph's cases.

Corby reviewed approximately 200 cases and found many serious flaws in Rudolph's work. He described his findings in a handwritten draft memorandum that he gave to Nimmich in the spring of 1992. Corby noted that Rudolph had failed to follow his own explosives residue protocol, had formed conclusions and prepared dictation without a basis, had failed to run standards or confirmatory tests, had offered opinions to fit the case scenario or findings of other units whether or not supported by his own analyses, had failed to label charts properly, and, where data was present in the file, had sometimes made technical errors.

Based upon his review, Corby recommended that appropriate disciplinary measures immediately be administered to SSA Rudolph for unacceptable casework performance and that such disciplinary action include censorship, suspension and probation for a period of time. Corby also recommended that SSA Rudolph immediately be barred from participating in any explosive-related program or research being conducted by the FBI laboratory and that all files be thoroughly reviewed in those cases where SSA Rudolph testified before any judicial proceeding in order to determine if further action is warranted in this matter.

Nimmich returned the draft memorandum to Corby and told him it was not his place to recommend particular disciplinary measures. According to Nimmich, he also asked Roger Martz, then the CTU Chief, and CTU examiner Lynn Lasswell to participate with Corby in a panel review of Rudolph's cases. Nimmich told the OIG that he told the panel members to review the cases to see if there were errors that we needed to address back to a prosecutor, to a defense attorney, or anything of that type in terms of bad casework, if you would, errors that would have been made, misrepresentations of what was actually there. He expected each panel member to review all of the files.

The panel review evidently was not implemented in the manner Nimmich contemplated. Corby believed that Lasswell and Martz became involved only after Corby had given his draft memorandum to Nimmich. Lasswell received 57 cases from Corby and reviewed them for technical and administrative errors. He took detailed notes of his findings and gave them to Corby. Among other things, Lasswell observed that certain of Rudolph's cases lacked sufficient tests to support the stated opinions, that notes and charts were missing for some evidence, and that confirmatory techniques had not been used. Lasswell thought these problems were very serious and could greatly affect the cases if they went to court.

Martz, when interviewed during the OIG investigation, could not recall participating in the 1992 panel review. While he remembered talking with Corby and Lasswell about their review, Martz said he did not remember reviewing 200 cases himself and he had no notes related to any such review. Lasswell and Corby, like Nimmich, each thought that Martz was also reviewing Rudolph's cases. Our investigation, however, did not identify any memorandum, notes, or other documents by Martz reflecting such a review.

Nimmich prepared a memorandum to Hicks dated April 30, 1992, reporting on the results of the panel review of Rudolph's cases. Nimmich's memorandum stated that 200 cases were reviewed by a panel consisting of Corby, Martz and Lasswell. The memorandum observed:

Over 100 of the 200 cases reviewed revealed marginally acceptable records (notes and charts) in the case files. Fifty-seven of these cases were found to have incomplete and or missing documentation. A list of these cases is attached. These cases reflected dictation which could not be totally supported by the records and notes contained in the file jacket, failure to follow his own published guidelines, reporting on multiple samples having run only one chart and failing to confirm identification on multiple instrumentation.

The memorandum reported that [n]o instances of fraud or intentional misrepresentations were found during this review; however, it was evident that the quality of work was severely lacking.

The memorandum recommended that Rudolph receive a severe reprimand based on the lack of professionalism and attention to detail reflected in his casework. Nimmich also recommended that for the 57 files with unacceptable documentation, Rudolph should be asked to bring the working notes up to an acceptable level through the use of personal diaries, notes, or recollection and to prepare a memorandum reflecting the additional information for each file.

Nimmich's memorandum does not indicate that copies of it were sent to any of the panel members. Corby said he did not see the memorandum until several years after it was prepared; Martz and Lasswell said they had not seen it before it was shown to them during the OIG investigation. Nimmich recalled consulting with Corby in preparing the memorandum, but Corby did not remember such a discussion. Nimmich also recalled that he consulted with Corby and Hicks before recommending that Rudolph receive a severe reprimand.

On May 18, 1992, Hicks discussed the file review with Rudolph. Without consulting Nimmich, Hicks decided to verbally admonish Rudolph rather than reprimand him. Rudolph recalled that Hicks gave him a mild chewing out and told him he was not being reprimanded because his unit chiefs had approved his work. Rudolph said that in this meeting, Hicks also gave him a \$500 incentive award for something Rudolph had recently done, and Hicks said words to the effect that maybe this would help your day. The verbal admonishment was the only sanction imposed by the FBI on Rudolph for the poor quality of his work. During the OIG investigation, Rudolph said he was surprised by this leniency, as he had expected and even thought he deserved a letter of censure.

Consistent with Nimmich's recommendation, Rudolph was directed to attempt to bring the files up to an acceptable level by adding information to them. In an August 18, 1992, memorandum to Hicks, Rudolph identified changes he made in 40 of the 57 files. Rudolph stated in his memorandum that [n]o attempt was made to alter or change any conclusion or report, only to improve the clarity and understanding of what was done.



Rudolph was directed to place a memorandum in each file documenting that changes were made. In his memorandum to Hicks, Rudolph resisted this action, stating that it would only serve as a red flag in any future defense subpoena and could draw unwarranted attention to the file. Rudolph stated that most of the additions and labeling that was done is something an examiner might do anyway in sprucing up the file' before a court testimony and did not need to be memorialized in the file.

Despite Rudolph's protest, Nimmich required him to prepare a memorandum for each file reflecting that changes had been made. Nimmich said he reviewed the memoranda himself and directed that they be placed in the files. Based on these actions, Nimmich wrote a memorandum to Hicks dated March 12, 1993, advising that the review of Rudolph's cases should be considered closed and no further action be taken.

## **B. Analysis of the 1992 Corby Review**

The 1992 review of Rudolph's cases and the Laboratory's response to that review were insufficient in several respects.

At the outset, Nimmich should have given clear, written directions to those participating in the review as to its objective and the procedures to be used. Had such directions been given, substantial problems of miscommunication or misunderstanding might have been avoided. Nimmich indicated in his April 30, 1992, memorandum to Hicks that a panel of Corby, Lasswell, and Martz had reviewed 200 of Rudolph's cases. In fact, Lasswell only reviewed 57 cases, and it is unclear whether Martz reviewed any at all as part of the 1992 review.

On a related point, Nimmich should have circulated to the panel members drafts of the sections of his April 30, 1992, memorandum which described the panel's findings. This would have assured that the memorandum that later went to Hicks accurately described what each panel member had done in the review and that they agreed with the description of their findings. Moreover, reactions to the drafts by Corby or Lasswell might have been significant to Nimmich as he considered his recommendations for sanctions against Rudolph for the condition of his files.

Given the problems identified in the 1992 case review, we also think that Laboratory management failed to take sufficient remedial steps or to impose adequate sanctions on Rudolph. The 1992 case review identified serious deficiencies in 57 of approximately 200 cases reviewed. But Rudolph had worked on hundreds of cases before leaving the Laboratory in 1988. Once Laboratory management learned that a case review identified deficiencies in more than 25% of the reviewed cases, a comprehensive review of all of Rudolph's case work should have been undertaken.

We do not fault Hicks and Nimmich for directing Rudolph to attempt to bring the 57 files to an acceptable level and to document his actions, but this directive was not followed appropriately by Rudolph or monitored adequately by management. During the OIG investigation, Rudolph stated that he did not recall documenting in the individual memoranda every change he made to the files.

Rudolph also admitted that it was not uncommon for him to label charts or otherwise to change files before trial without documenting these actions. This echoes his earlier statements to Hicks in his August 18, 1992, memorandum when Rudolph argued he should not be required to place a memorandum in each file reflecting any changes, because it was common for examiners to spruce up a file without documenting that action.

Rudolph's statements reflect a fundamental misunderstanding of the importance of accurate work notes and adequate case documentation. As noted earlier, the lack of such documentation may mean, as was demonstrated in Psinakis, that it is impossible to determine what was done in earlier analyses. Moreover, work notes are generally understood to have been prepared contemporaneously with the examinations or analyses they concern. Such notes can be misleading if they are created or spruced up at a later date without that fact being indicated in the notes themselves. Their preparation sometime after the work they describe obviously can be relevant to the weight or credibility of any testimony that is based on them. When Rudolph communicated to Hicks the view that it was common and appropriate for examiners to spruce up their files before trial without documenting such action, Laboratory management should have taken appropriate steps to advise Rudolph and others that such a practice is not acceptable for a forensic laboratory and would not be tolerated.

Despite the findings reported in Nimmich's April 30, 1992, memorandum, Rudolph received only an oral admonition, one of the most lenient punishments available. The 1992 file review revealed that Rudolph's cases had extensive problems with inadequate documentation, insufficient confirmatory tests, and conclusions that were not fully supported by the information in the files. Rudolph should have been seriously disciplined for his inadequate work and his failure to return documentation to the files in accord with directions he was given in 1989. We find unpersuasive the suggestion that Rudolph deserved no more than an admonishment because unit chiefs had approved his work. The case files do suggest that his unit chiefs, particularly Charles Calfee, did not adequately review his work to assure that it was appropriately documented and that the stated conclusions were reasonably supported. This fact does not excuse Rudolph's lack of professionalism. He should have recognized the shortcomings in his own work, particularly given his academic credentials in chemistry and experience in the Laboratory.

## **VI. The 1995 Corby Review**

### **A. Factual Background**

In the spring of 1993, Laboratory Director Hicks named James Kearney to replace Kenneth Nimmich as the chief of the SAS; Nimmich in turn took Kearney's former position as the chief of the FSRTC in Quantico. Shortly after Kearney took his new position, James Corby approached him to complain about Rudolph's work and to argue that a further review should be made because there were serious problems in the files.

After learning of Corby's concerns, Kearney asked Martz to review several of Rudolph's problem files to see if corrective action had been taken. Martz prepared a memorandum for Kearney that described the contents of particular files but did not state any findings or conclusions. During the

OIG investigation, Martz explained that he had been unable to find certain notes and charts that Rudolph said had been returned to the files. Martz, however, did not recall discussing this point with Kearney, but remembered only giving him the memorandum.

Corby was so concerned about the condition of Rudolph's files that he asked Kearney to raise the issue with Hicks. That concern led to Corby meeting sometime in the spring of 1993 with Hicks, Martz, Kearney, and Wayne Taylor, who was then Hicks' deputy. Corby argued that technical problems with Rudolph's work merited a further review. According to Hicks, Martz disagreed and represented that Lasswell also disagreed with Corby. Martz denies saying Lasswell disagreed with Corby and told us he thinks Lasswell also found problems in Rudolph's work.

Hicks recalls concluding that the Rudolph matter should be closed in 1993 because he thought the allegations had been reasonably investigated and no technical deficiencies had been found in the several case reviews. During the OIG investigation, Hicks stated that his conclusion was significantly influenced by his belief that Lasswell had not found serious problems in Rudolph's cases, and Hicks said he would have reacted differently had he known that Lasswell in fact thought there were serious errors that would affect Rudolph's ability to testify to the results.

In February 1994, Whitehurst's attorney Stephen Kohn wrote to the FBI describing various allegations regarding the Laboratory, including complaints about Rudolph. During the spring of 1994, the OGC conducted an investigation in response to Kohn's letter. In a May 26, 1994, memorandum describing the results of the investigation, the OGC concluded that Corby should undertake a final, more comprehensive review of all of Rudolph's cases. The FBI memorandum observed that such a review of the files would most likely reveal that they are sloppy and that his [Rudolph's] conclusions are not supported by appropriate documentation.

One of the OGC attorneys involved in the 1994 investigation, John Sylvester, recalls that the Laboratory Division was furious with the recommendation for another review. Kearney, however, said that by May 1994 he had independently concluded that such a review should be done. In any event, in June 1995, about a year after the OGC made its recommendation, Corby was directed to review all cases in which Rudolph had worked as a principal examiner or auxiliary examiner in the MAU.

Corby's instructions were outlined in a June 12, 1995, memorandum from Kearney to Milton Ahlerich, who had recently become the Laboratory Director after Hicks retired. The memorandum asked Corby to categorize his findings as follows:

Category one - Cases that are sufficiently complete and require no further review.

Category two - Cases that are administratively incomplete (lack proper marking of charts and notes) but contain enough documentation to support

conclusions.

Category three - Cases that are administratively and technically incomplete, i.e., lack documentation (no notes, charts, or graphs) for conclusions reported.

Category four - Cases that contain omissions or technical errors.

In a memorandum dated November 30, 1995, Corby reported the results of his review. Corby noted that he characterized Rudolph's conclusions as correct if he found any basis for the reported results in his file review. Applying this standard, Corby found 20 files in category four, 137 in category three, 76 in category two, and 421 in category one. Corby concluded that 24% of Rudolph's cases were in categories 3 or 4 and did not meet the administrative or technical guidelines at the time the cases were worked. (Emphasis in original.) In Corby's opinion, they would not be acceptable under close judicial scrutiny, or past or present peer review. (Emphasis in original.)

Rudolph was allowed to review the cases Corby placed in categories 2, 3, and 4 and to respond in writing. On May 7, 1996, Rudolph submitted a nearly 200-page response in which he defended his work and strongly disputed many of Corby's criticisms. Rudolph made general responses to certain recurring issues and also addressed individual cases. In an interview during the OIG investigation, Corby commented on Rudolph's responses.

## **B. Analysis of Corby's 1995 Review**

In this section, we assess Corby's findings and Rudolph's response. We begin by discussing several recurring problems identified by Corby.

Corby noted in his 1995 review that Rudolph seemed to report a disproportionately large number of examinations relative to the number of specimens. Rudolph responded that it was common for examiners to conduct multiple examinations of the same specimen. Unfortunately, Rudolph's files generally lacked work notes or other documents that would explain the number of examinations conducted.

In several cases, Corby found that Rudolph had failed to follow protocols. Rudolph argued that the FBI Laboratory did not have any official protocol during his tenure there. Even so, as Corby noted, Rudolph had described a protocol in the FBI's 1983 Symposium on Explosives Residue Analysis, and we do not understand why he would disregard that protocol in his own work.

Corby also found that charts or notes were missing in many cases. Rudolph offered several responses: the documents may have been lost during the multiple file reviews, he kept documents himself because of the FBI's inadequate filing system, and his unit chief's approval of his work indicates that adequate documentation was once there. Rudolph's responses are unpersuasive. He was directed by Butler in 1989 to return any notes or other documents to the files, so the files should not have been incomplete in 1995. Moreover, his former Unit Chief Charles Calfee observed that the commonly understood practice was that an examiner would make a notation in the file if he or she had removed or retained documents. No such notations appear in Rudolph's files. Rudolph's case files in general are much more incomplete than others we reviewed, and therefore we find it implausible that the shortcomings in Rudolph's files are primarily due to deficiencies in the FBI's filing system.

One of the main criticisms made by Corby in his 1995 review was that Rudolph's files reflected sloppy note taking and other administrative deficiencies, such as insufficient documentation, charts that did not have specimen or file numbers, and charts without identified peaks. In his response, Rudolph again observed that his unit chiefs had approved his work and stated that he only recalled one, Roger Asbury, asking for more precise notes and that none had asked that charts be completely identified. In fact, in a 1987 Progress Review for Rudolph, Asbury observed that communications of results could improve with more comprehensive and detailed notes in preparing reports. Rudolph signed this Progress Review.

In his OIG interview, Rudolph also defended the condition of his files by stating that he dismissed identifying all of these notes and charts as not important because he would do it if it goes to trial. He said he would spruce up a file if a case went to trial; that is, he would identify peaks on charts, add additional notes if necessary, and clean up the notes already in the file. But Rudolph did not document in the file which material had been added at a later date. As we have noted earlier, Rudolph fails to recognize the importance of accurate, complete work notes and documentation, and his practice of sprucing up files is both unprofessional and unacceptable for any credible forensic laboratory.

Corby's 1995 review also criticized Rudolph for using ion chromatography (IC) as the only identification technique in some cases and for failing to identify all the peaks on charts from x-ray powder diffraction (XRD). Rudolph responded that IC has long been used as an identifying technique and that in some instances other techniques could not be employed. The files, however, generally lack information that would indicate why other techniques were or were not used. With regard to the XRD charts, Rudolph argued that labeling was not necessary because he could recognize what the peaks represented when he later reviewed the charts. He also maintained that once he identified the main component, he compared the remaining peaks against peaks for other known explosives. The lack of adequate documentation is inexcusable, despite Rudolph's claim that he could later recognize the peaks, and makes it impossible to corroborate his assertion that he made comparisons with other unlabeled peaks.

Another recurring problem noted by Corby is that Rudolph failed to report results that might have been significant. In his response, Rudolph asserted that this is mostly a matter of experts differing about what constitutes a significant result. In an interview with the OIG, Corby observed, and we agree, that this is another manifestation of Rudolph's inadequate note-taking practices. If tests or analyses yield results that could affect the examiner's conclusions, those results should be recorded in the examiner's notes. This will assure that potentially useful information is not lost, and the

examiner can document his reasons for not utilizing particular results in forming his conclusions.

In responding to Corby's 1995 review, Rudolph also addressed particular cases. As part of the OIG investigation, we reviewed a sample of the cases and concluded that Corby's criticisms were for the most part justified. Our ability to evaluate Corby's findings was limited, however, by the fact that Rudolph had made further changes in the files in responding to Corby's review. During a February 28, 1996, interview with the OIG, Rudolph admitted that he was still sprucing up files after the most recent review and was not documenting the changes. Accordingly, when we reviewed particular cases and could not validate Corby's criticisms, it was unclear whether this reflected particular additions made to the file after Corby's review.

Our limited review of case files convinced us that Corby's findings were generally correct. There is one issue that was not addressed in Corby's most recent review or the earlier reviews, and that is contamination. As illustrated by the Psinakis case, Whitehurst has complained for some time that Rudolph, because of his sloppy work habits, could have reached conclusions based on his own contamination of the evidence. During an OIG interview, Rudolph stated he had never contaminated evidence but admitted that he did not always wear gloves in the Laboratory, place paper down when doing examinations, or take control swabs of his work area. Rudolph also admitted that his work area was unkempt and that a messy laboratory was almost his and Bender's trademark. These remarks suggest that Rudolph did not appreciate the significant problems of contamination in explosive examinations and therefore failed to take appropriate preventive measures.

## **VII. Conclusion**

### **A. Rudolph**

In a substantial number of his cases, Terry Rudolph did not perform his work as an examiner in a manner that would withstand peer review or judicial scrutiny. In Psinakis, he did not adequately document his case work, he failed to conduct required confirmatory tests, and his stated conclusions lacked a valid scientific basis. The reviews of Rudolph's work conducted by the Laboratory after Psinakis confirm that his lack of competence was not isolated to that case.

Rudolph displayed an attitude towards case documentation that is inconsistent with the presentation of credible scientific conclusions. His belief that notes are only for the examiner's own use and that files may be spruced up on the eve of trial is unacceptable. In our investigation we found no evidence that other examiners had made after-the-fact changes to case documentation without noting such actions in the file.

That Rudolph continued to spruce up his files without documenting the changes even after he had been directed by Nimmich to produce such documentation, and while his files were being reviewed, was insubordinate and constitutes willful misconduct.

Rudolph attempted to justify his conduct by noting that unit chiefs had approved his work. The

condition of Rudolph's files suggests that his unit chiefs, particularly Charles Calfee who served as his unit chief from 1979 through 1986, did not sufficiently review his work. That fact, however, does not excuse Rudolph's failure to conduct confirmatory tests, to run appropriate standards or controls, to follow protocols, or to document his work appropriately.

Our investigation did not identify facts suggesting that Rudolph made intentional misrepresentations in his files or attempted to slant his results to favor the prosecution. Indeed, our own review of Rudolph's cases, our interviews with him, and the 1995 review by Corby indicate that Rudolph indiscriminately disregarded appropriate scientific methods and failed to document his work without regard to whether the results favored the prosecution or the defense.

## **B. Management**

In the Rudolph matter, Laboratory management repeatedly failed to address serious concerns about the very integrity of the Laboratory's forensic results. A complete review of Rudolph's case work should have been conducted in 1989, after AUSA Burch complained about Rudolph's conduct in Psinakis and MAU Chief Butler identified numerous administrative shortcomings in 200 cases and the need for an in-depth review.

The 1989 review by Martz of 95 cases was not sufficient. Nimmich should have given written directions to assure that an in-depth review did occur. That review should have encompassed all of Rudolph's cases. Martz presented his conclusions in a misleading way that incorrectly suggested he had reviewed and approved the technical sufficiency of Rudolph's work and that Rudolph had done nothing wrong in Psinakis. We did not conclude that Martz intentionally sought to mislead in his memorandum, but, whatever he understood his instructions to be, Martz should have stated more clearly what he did to reach his conclusions.

We especially deplore the inadequacies of the Laboratory's 1989 review because (1) it was prompted by an AUSA who stated that Rudolph's shortcomings contributed to an acquittal of a defendant in a federal prosecution, and (2) a proper review in 1989 could have obviated the need for later efforts to evaluate Rudolph's work. Hicks' inadequate response to the AUSA's letter and Martz's misleading memorandum contributed most to the failure of the 1989 review.

Laboratory management also failed adequately to respond to the results of the 1992 review. Again, Nimmich should have provided clear, written instructions concerning the objectives and methodology of that review. He also should have allowed Corby, Lasswell, and Martz to review relevant parts of his memorandum that purportedly described their conclusions. We think Laboratory Director Hicks erred in rejecting Nimmich's recommendation that Rudolph should be severely reprimanded and deciding instead to impose a mere verbal admonition. Moreover, the Laboratory failed to assure that Rudolph had returned materials to the identified files and fully documented any additions or changes he made. Given the findings in Corby's 1992 review, the Laboratory again should have directed a complete review of Rudolph's files, rather than determining that the matter should be closed.

Although we conclude that Laboratory management failed to assure that the allegations about Rudolph were adequately investigated and resolved, we cannot conclude that those allegations were deliberately ignored or that there was an effort to cover up Rudolph's deficiencies as an examiner.

The OGC appropriately recommended in 1994 that Corby undertake a comprehensive review of Rudolph's cases. As noted above, we generally agree with the conclusions reached by Corby when he completed the review in November 1995.

Based on the above findings, we recommend that a notation describing the conclusions of this Report should be included in each case file for which Rudolph prepared AE or PE dictation. Rudolph, as noted above, retired in June 1996. Accordingly, we do not recommend disciplinary action against him. We understand that after his retirement, he did some work for the FBI on a contractual basis. Based on our investigation, we recommend that the FBI not employ him in the future.

Finally, we note that the Rudolph matter illustrates several respects in which the Laboratory policies or procedures could have been improved. During Rudolph's tenure in the Laboratory, there was no formal quality assurance program. The problems exhibited in Rudolph's case work might have been prevented if such a program had been implemented and had provided guidelines for case documentation, adequate case review, and the use of properly validated protocols. We comment on these issues further in Part Six of this Report, which discusses general recommendations to enhance the quality of the Laboratory's forensic work.

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## **SECTION B: THE VANPAC CASE**

### **I. Introduction**

This case concerns four mail bombs sent in December 1989 to different locations in the southeastern United States. One killed federal judge Robert Vance in Alabama, a second killed a civil rights attorney in Georgia, and two others were discovered before they exploded. A massive investigation ensued involving the FBI and several other law enforcement agencies. The FBI referred to the case as VANPAC because it involved the assassination of Judge Vance with a bomb sent in a mail package. In June 1991, a federal jury convicted Walter LeRoy Moody, Jr. on charges related to the bombings.

In this case, Whitehurst has made numerous allegations of wrongdoing by J. Thomas Thurman of the Explosives Unit (EU) and by Roger Martz of the Chemistry-Toxicology Unit (CTU). Whitehurst complains that Thurman and Martz circumvented the procedures of the FBI Laboratory because Thurman, as the principal examiner, asked Martz to analyze material in the mail bombs even though the Materials Analysis Unit (MAU) was responsible for analyzing explosives residue. He also alleges that because Martz did not follow the protocol for residue analysis developed by the MAU, Martz reached a flawed opinion in concluding that the mail bombs contained a particular smokeless powder.

Whitehurst alleges that Thurman improperly based his opinions on the flawed residue analysis performed by Martz; that Thurman improperly testified outside his field of expertise on various matters; and that Thurman lacked a factual basis for certain testimony about the explosives used in the bombs. Whitehurst has accused both Thurman and Martz of fabricating evidence, perjuring themselves, and obstructing justice in the VANPAC case. He also has suggested that prosecutors Louis J. Freeh and Howard Shapiro, who were then Assistant United States Attorneys and who tried the VANPAC case, may have committed misconduct by offering the testimony of Martz and Thurman.

To investigate Whitehurst's claims regarding this case, we reviewed the pertinent reports prepared by the FBI Laboratory and, where available, the underlying work papers and test results. We reviewed transcripts of the testimony given by certain witnesses and the closing arguments in Moody's trial for the bombings. We also questioned agents Thurman, Martz, and Whitehurst about the case in interviews in which their answers were given under oath and transcribed. We also interviewed others involved in the case, including Director Freeh, FBI General Counsel Shapiro, and current or former Laboratory personnel James Corby, James Kearney, Roger Peele, Charles Peters, and Robert Webb.

We find no factual basis to conclude that Thurman or Martz perjured themselves, fabricated evidence, obstructed justice, or violated any FBI policies or procedures in this case. Nor do we find any evidence to support Whitehurst's claims of prosecutorial misconduct. Whitehurst did not make allegations against MAU examiner Robert Webb. Based on the documents provided by the FBI,

however, we did conclude that Webb stated conclusions about the common origin of certain tape, paint, sealant, and glue more strongly than was justified by the results of his examinations and the background data. In our view, Webb did not intentionally attempt to fabricate evidence or to present biased conclusions. Our investigation of the VANPAC case also reveals several areas in which Laboratory practices or procedures should be improved. These matters are discussed further in the following sections.

## **II. Factual Background**

In December 1989, four mail bombs were received at different addresses in the southeastern United States. One bomb killed Eleventh Circuit Court of Appeals Judge Robert Vance in Birmingham, Alabama; another killed attorney Robert Robinson in Savannah, Georgia; the third was discovered before exploding at a federal courthouse in Atlanta, Georgia; and the fourth was discovered before exploding at the Jacksonville, Florida office of the National Association for the Advancement of Colored People (NAACP).

The mail bombs had numerous similarities, which included: they were delivered in packages wrapped in brown paper, tied with string, addressed with typed red-and-white labels, and posted with stamps depicting an American flag over Yosemite National Park; they were placed in cardboard boxes that had been painted black in the inside; and each bomb included a steel pipe filled with smokeless powder, finishing nails secured to the outside of the pipe, and a detonator fashioned from a flashbulb filament with distinctive wiring and a ballpoint pen casing. The detonators from the two bombs that did not explode contained a green powder identified as high explosive primer. Three of the bombs also had welded end plates that were joined together by a steel rod through the center of the pipe.

The bombings were followed by a large-scale investigation involving the FBI, the Bureau of Alcohol, Tobacco and Firearms (ATF), the U.S. Postal Inspection Service, the Georgia Bureau of Investigation, and other law enforcement agencies. The unexploded devices found in Atlanta and Jacksonville were sent to the FBI Laboratory for analysis in December 1989, as was debris from the mail bombs from Savannah and Birmingham. J. Thomas Thurman of the EU was assigned as the principal examiner.

Thurman enlisted various auxiliary examiners in other units of the Laboratory to examine evidence. The other examiners included Roger Martz, who was then chief of the CTU. In January 1990, Martz determined that each mail bomb contained Red Dot double base smokeless powder. He also determined that a green powder found inside the detonators of the two unexploded mail bombs was a small arms primer manufactured by CCI Industries.

Walter LeRoy Moody, Jr. was identified as a suspect after ATF forensic chemist Lloyd Erwin recalled that Moody had been convicted in a 1972 case involving a pipe bomb with a design similar to that of the 1989 bombs. In February 1990, federal investigators searched a storage area rented by Moody in Chamblee, Georgia, and found a device constructed from a metal pipe that was similar in some respects to the construction of the mail bombs. Several searches of Moody's house, however,

failed to reveal evidence of Red Dot smokeless powder or the type of CCI primer identified by Martz in the explosive devices.

In April 1990, a witness named Paul Sartain told ATF agents that while he was working at the Shootin' Iron gun store in December 1989, he had sold someone a four pound can of Red Dot smokeless powder and a quantity of CCI primers. Sartain later identified Moody as the person who had purchased these items.

In July 1990, Moody was indicted on charges that he had suborned perjury by a witness in connection with a 1988 hearing on a coram nobis petition he had filed related to his 1972 conviction. A jury convicted Moody of these charges after a trial in Brunswick, Georgia, in December 1990.

In November 1990, Moody was charged with various federal crimes related to the bombings. Venue for trial was transferred to St. Paul, Minnesota and the case was assigned to Senior Judge Edward J. Devitt. After a trial in June 1991, a jury convicted Moody on 71 separate counts. The judge sentenced Moody to seven life terms plus four hundred years.

During the trial, Lloyd Erwin, Frank Lee, and Terry Byer of the ATF testified about the construction of the four mail bombs, the 1972 bomb, and the Chamblee device. They opined that all had been made by the same person. Moody's former wife Susan McBride Moody testified that she had purchased various items at Moody's direction. The items she purchased were consistent with components used in the mail bombs. A former cellmate of Moody's, Ted Banks, testified that at Moody's request he had welded end plates onto three metal pipes that were similar to those used in three of the bombs. Paul Sartain testified that in December 1989, he had sold Moody a four-pound keg of Red Dot smokeless powder and 4,000 CCI small pistol primers.

During the third week of trial, the government presented testimony by Thurman and Martz from the FBI's Laboratory Division. Thurman testified about the construction of the mail bombs and opined that they had been made by the same person who made the 1972 bomb. Martz testified that the mail bombs contained Red Dot double base smokeless powder and that he identified CCI small arms primer in detonators from the two unexploded devices.

### **III. Analysis of the Whitehurst Allegations**

Whitehurst did not do any work himself on the VANPAC case. In a September 5, 1994, letter to the OIG, Whitehurst detailed numerous criticisms of the testimony by Martz and Thurman in Moody's 1991 trial. Whitehurst made similar criticisms in a 26-page memorandum to James Kearney that was prepared near the time of Kearney's retirement as chief of the Scientific Analysis Section in June 1995.

In making his criticisms, Whitehurst relied on the transcripts of the trial testimony of Thurman and

Martz and the closing arguments by Freeh and Shapiro. He did not review the trial exhibits or other evidence. Nor did he review any of the Laboratory reports or analytical data related to the testimony by Martz and Thurman.

For purposes of our report, we have summarized the various criticisms under the following identified headings.

### **A. The Alleged Violation of Protocols**

Whitehurst claims that Thurman and Martz circumvented the FBI's protocols for the analysis of explosives residue when Martz analyzed the contents of the explosive devices.

Contrary to Whitehurst's position, at the time of the VANPAC case, there was no Laboratory protocol or policy requiring that all analysis of explosives be conducted by the MAU. That unit did generally perform the analysis of explosives residue and certain bulk explosives. The CTU, however, had been analyzing smokeless powders since the 1980s. This apparently occurred because Roger Martz had, within the CTU, developed techniques, including the use of the mass spectrometer, to confirm the presence of smokeless powder and to attempt to identify the manufacturer. At the time, there were no written policies describing the respective roles of the CTU and the MAU in analyzing explosives.

Martz stated in his sworn interview that the CTU became responsible for the analysis of smokeless powders sometime in the early 1980s after the CTU and MAU completed proficiency tests. We were unable to locate any FBI documents describing the results of such tests or a decision that the CTU would analyze smokeless powder. Former MAU Chief Charles Calfee, although not recalling the proficiency tests, confirmed that responsibility for the analysis of smokeless powder was transferred from the MAU to the CTU after the latter unit developed identification techniques with the mass spectrometer. James Corby, MAU chief from June 1990 through October 1995, also confirmed that the CTU was conducting smokeless powder analyses during his tenure. Others also acknowledged in interviews that the CTU was analyzing smokeless powders when the Laboratory received the VANPAC case.

Thurman stated in his sworn interview that he had not made any effort to avoid or circumvent the MAU in connection with the VANPAC case. Thurman explained that he identified what appeared to be smokeless powder particles in the evidence, and he therefore sent it on for analysis by Martz because the CTU analyzed smokeless powders. Martz gave a similar account of his initial involvement in the case. Martz also stated in his sworn interview that Whitehurst knew in December 1989 that Martz was working on the VANPAC case to analyze possible smokeless powders and Whitehurst did not at that time express any concern. Whether or not Whitehurst knew in 1989 or 1990 that the CTU was analyzing the powder, we find no factual basis to conclude that Thurman and Martz attempted to circumvent Laboratory protocols or bypass the MAU.

### **B. The Identification of Red Dot Smokeless Powder**

After receiving the evidence, Martz determined that each device contained Red Dot double base smokeless powder made by the Hercules Corporation. Martz reached this conclusion after visually examining and measuring particles that appeared to be smokeless powder and then analyzing the substances with a mass spectrometer. The results confirmed that Red Dot double base smokeless powder was present in each device. Martz also had Fourier Transform Infrared Spectroscopy (FTIR) performed on one sample to confirm the presence of nitrocellulose, a component of smokeless powder.

In analyzing the samples, Martz followed a protocol for the identification of smokeless powder that had been used in the CTU for several years. The basic procedure was outlined in an article published by Martz and FBI examiner Lynn Lasswell in 1983. Before Moody's trial, at least one defense expert reviewed the physical evidence and the FBI Laboratory reports and agreed with the conclusion that each device contained Red Dot smokeless powder as its main charge.

Whitehurst alleges that Martz improperly analyzed the evidence because he did not follow the protocol for analysis of explosives residue developed in the MAU. The MAU protocol would have involved additional analytical tests that might have detected certain inorganic explosives or fillers that cannot be identified by the mass spectrometer. Because these tests were not performed, Whitehurst asserts that Martz, and subsequently Thurman, could not conclude that smokeless powder constituted the explosive in the mail bombs.

Whitehurst is correct that the analytical tests performed by Martz may not have detected certain substances. Martz, in his interview with us, acknowledged that if trace amounts of certain inorganic materials were present, they conceivably would not have been identified by the tests he performed. Martz noted, however, that he physically examined the evidence, including debris from the bombs, and did not observe traces of other possible explosive components. In retrospect, we think a more comprehensive analysis might have been desirable, particularly given the scope of investigative efforts otherwise made in the case. The possibility that one or more of the devices may have contained other explosives or fillers, which were not identified by visual or microscopic examination, does not mean that the conclusions by Martz or Thurman about smokeless powder lacked a factual or scientific basis.

Although we do not believe that Thurman or Martz perjured themselves or fabricated evidence with regard to the presence of smokeless powder in the mail bombs, this case does illustrate an area in which the Laboratory's procedures should be improved. As noted above, during this time, both the CTU and the MAU were analyzing explosives. There was no clear delineation of the respective responsibilities of each unit. Moreover, because the units did not share a common protocol, the tests might vary depending on which unit received the evidence.

### **C. Thurman's Testimony About the Explosives**

Whitehurst complains about several aspects of Thurman's testimony concerning the explosives used

in each of the mail bombs.

Early in his testimony, Thurman discussed factors that affect the strength of a pipe bomb. With respect to the particular explosive used, Thurman noted, within the smokeless powder family there's two types of low explosives that we deal with more than anything else, and that's single base low explosive, and a double base low explosive. Thurman then said that a single base low explosive does not have nitroglycerin, while a double base explosive does. Whitehurst complains that [t]here are no such things as double and single base explosives, and that if Thurman was referring to smokeless powders, his remark is inaccurate, because those are not the explosives the FBI deals with most. Thurman apparently misspoke in using the term explosives rather than smokeless powder in this context. Thurman would have been accurate in saying that within the smokeless powder family, single and double base powders are the ones we deal with more than anything else.

Discussing the Birmingham device, Thurman testified that the main charge was double base smokeless powder and that the detonator contained a high explosive. These statements, Whitehurst asserts, rest on conjecture. We disagree. As noted above, Martz found Red Dot double base smokeless powder in debris from the Birmingham bomb. Thurman relied on this fact and the observable characteristics of the bomb debris to conclude that double base smokeless powder was the main charge.

With regard to the detonators, Martz did not identify primer in the debris from either the exploded Birmingham or Savannah devices. The FBI Laboratory reports, which were produced to the defense at trial, reflect this fact. Thurman's conclusion that these bombs also utilized a detonator containing a high explosive rested primarily on similarities in the debris indicating that the bombs had detonators constructed from pen casings, a distinctive wiring system, and an initiator devised from a flashbulb. Thurman also noted that a mockup device, which included a high explosive detonator, had been detonated by the FBI and the resulting fragmentation was similar to that observed in the exploded bombs.

Thurman did not, in our view, fabricate evidence in opining that the Birmingham and Savannah detonators contained a high explosive. He did have a reasoned basis for that opinion. Thurman did not in his testimony or reports state that analytical tests had confirmed the presence of primer in the exploded mail bombs. The defense attorney could have explored the basis for Thurman's opinion on cross-examination. Instead, the defense did not dispute that each device contained double base smokeless powder and a high explosive detonator. This may have reflected a tactical decision, since the defense attorney attempted to raise doubt in the mind of the jurors not by arguing that the 1989 bombs were different from each other, but by arguing that Moody could not be connected to these bombs because Red Dot smokeless powder was not found in Moody's house and the 1989 bombs were different from the 1972 device.

Whitehurst is correct insofar as he suggests that the type of explosives residue analysis performed by the MAU might have confirmed the presence of primer in the exploded devices. Martz acknowledged in his interview with us that, in retrospect, it would have been desirable to have examined the exploded devices for traces of primer residues. This again shows that the Laboratory should have clearly delineated which unit would analyze explosives residue and what tests would be performed.

Another complaint by Whitehurst is that Thurman lacked a basis to testify that the characteristics of the metal fragments from the Birmingham and Savannah bombs indicated there was a low-explosive main charge initiated with a high explosive detonator. Such testimony, Whitehurst says, is fabricated evidence and has no basis in fact. Whitehurst maintains that the observable characteristics of the metal pieces could have been caused by [a]ny number of other energetic materials. We find that Thurman had some basis for his statements. They reflected his personal experience observing exploded devices and the results of the FBI's detonation of the mock-up device modeled on the bombs sent to Savannah, Atlanta, and Jacksonville.

Whitehurst further asserts that Thurman incorrectly stated that the cut-off between high explosives and low explosives is where the shock wave travels at more than 3,000 feet per second. Thurman's statement is technically incorrect. See Attachment C, *infra*. We note, however, that it is not uncommon for bomb technicians or persons working in the field of explosives ordnance to distinguish high from low explosives by the explosive's velocity. The technical error here was inconsequential.

With respect to the Birmingham device, Thurman was asked on direct examination whether he had been able to reconstruct the bomb. Thurman said he had, and then agreed that he had been able to do so to a high degree of scientific certainty. Whitehurst asserts that Thurman perjured himself because he lacked scientific training and he knowingly and purposely had circumvented the FBI's protocol for the analysis of explosives residue. We do not agree with these accusations. Thurman's comments about being able to reconstruct the Birmingham device were preceded by fifteen pages of testimony about that device. When the prosecutor subsequently asked Thurman if he had been able to reconstruct the device to a high degree of scientific certainty, no objection was made to the possibly ambiguous nature of the question or to Thurman's qualifications to respond. By answering affirmatively, Thurman did not in our opinion perjure himself or intentionally misrepresent his background. As explained above, Thurman did not circumvent an FBI protocol in the analysis of the mail bombs.

Whitehurst also alleges that Thurman relied on conjecture in testifying that the location of a metal rod in the debris of the Savannah bombing indicated that the pipe had been full of powder. At the trial, Thurman stated that in photographs of the crime scene, he saw the metal rod on a desk at the scene of the explosion. He observed that the rod's essentially intact condition suggested that the rod was at the center of the bomb and had dropped straight down after the explosion. He further opined that the rod's location indicated that the pipe in which it was contained had been totally full of powder, so that you have got equal pressure all the way around this threaded rod.

Thurman did not base his opinion that the Savannah device was full of powder on any analytical test results. We do not agree, however, that his opinion was therefore merely conjecture. Thurman reasoned that if the rod connected the plates through the middle of the pipe, and the rod was found at the center of the explosion, the pipe must have been filled with powder so that the rod was at the center of the explosive force. According to Thurman, when the FBI detonated its mock-up bomb in a model of Robinson's office, the connecting rod was again found at the center of a desk. There was a reasonable basis for Thurman's opinion, and the defense attorney could have explored the basis for that opinion on cross-examination.

With regard to the Atlanta device, Whitehurst asserts that Thurman fabricated evidence on the witness stand when he testified that black particles on the recovered detonator were Red Dot smokeless powder. This accusation lacks any factual basis. The analysis done by the CTU identified Red Dot smokeless powder on the Atlanta detonator, as was noted in the Laboratory's March 3, 1990, report. Thurman relied on these results in his testimony.

#### **D. Claims That Thurman Testified Outside His Expertise**

Whitehurst makes several claims that Thurman testified about matters beyond his training or qualifications. Such testimony, Whitehurst maintains, violated FBI Laboratory policy. Related arguments made by Whitehurst are that Thurman testified about certain matters without supporting scientific tests or he improperly testified about results reached by other examiners.

To evaluate these arguments, several background points must be kept in mind. The FBI Laboratory did not at this time have any expressly stated policy concerning the permissible scope of an examiner's testimony. The common understanding within the Laboratory was that examiners should be careful not to stray outside their expertise, a point that reportedly was emphasized in the moot courts that were part of the examiner qualification process. During our investigation, many examiners told us that in testifying they had sometimes been asked to read into the record conclusions reached by other, non-testifying examiners. This generally was viewed as acceptable so long as the testifying examiner was careful not to comment further as to matters on which he or she lacked personal knowledge.

In the VANPAC case, Thurman, as the principal examiner, received dictation from other auxiliary examiners which he in turn incorporated into the Laboratory reports. He presumably was the examiner with the best overview of the work done by the Laboratory in the case. The defense received copies of Thurman's reports, which set forth the findings made by different units within the Laboratory. The attorney who led Moody's defense agreed before trial that Thurman could testify as a summary witness about the results of work done by certain auxiliary examiners. Thurman similarly understood from the prosecutors that he would testify about results reached by certain other examiners. Moreover, we note that an expert may properly draw on personal experience or common sense in forming opinions, and a conclusion is not necessarily improper because it is not based on a scientific test.

Whitehurst complains that Thurman testified outside his expertise in stating that a white sealant material or RTV was rubbery and spongy at room temperature and that nails found in the debris were bent by the explosion. The comment about the RTV appears to have been properly based on Thurman's own personal knowledge. In stating that the nails had been bent from the explosion, Thurman drew a common sense inference from the presence of bent nails among the debris. Similarly bent nails were found in the debris from the mock-up device detonated by the FBI. We do not think Thurman's statements about the RTV or nails were improper.



Thurman also testified that the use of welded end plates in the devices would create more pressure within the bomb and that the detonator would have been placed inside at least hours after the welding was done. We think the first statement is unobjectionable and was properly based on Thurman's experience. Thurman noted in our interview that it is not uncommon for pipe bombs to explode by simply blowing off their end caps, leaving the pipe itself intact. One could reasonably conclude that the use of welded end plates would cause more pressure to build up before the pipe exploded. Thurman's statement that the detonator would have been placed inside the pipe at least hours after the welding reflected his view, which seems merely common sense, that no one would place the high-explosive primer into a hot metal pipe.

Thurman testified that certain testing had been done by the Serology and DNA units, and that the results were negative in that no traces of saliva were found. These statements were consistent with the underlying Laboratory reports. We do not agree with Whitehurst's contention that Thurman violated Laboratory policy by testifying on these matters.

Similarly, Thurman testified about paint and tape found in the devices. During that testimony, Thurman noted that the Laboratory had determined that 2-inch wide, tan plastic tape and black paint found in the devices were from the same source or manufacturer. In this regard, Whitehurst asserts that Thurman was simply fabricating evidence to suit his hypothesis that all the bombs were made from the same source.

Thurman in fact was testifying based on the analytical work and dictation of MAU examiner Robert Webb. Webb, an experienced examiner in the MAU, examined several items of evidence during the VANPAC investigation. In examining packaging tape, black paint, RTV, and glue found in the devices, Webb followed an unwritten protocol that included microscopic examination, so-called wet chemical analyses, analysis with Fourier Transform Infrared Spectroscopy (FTIR), and Pyrolysis Gas Chromatography (PGC). Based on these techniques, Webb concluded that packaging tape in each device came from the same manufacturer and the same batch or lot, that black paint in each device had physical and chemical characteristics indicating it came from the same manufacturer, that RTV sealant in each device had physical and chemical characteristics indicating it was from the same manufacturer and originated from the same batch or lot, and that glue in three of the devices had physical and chemical characteristics indicating it came from the same manufacturer.

Thurman did not fabricate evidence or otherwise testify improperly about the paint and tape analysis insofar as it was based on Webb's dictation. Webb had described his conclusions about the comparison of samples of paints, adhesives, and tape in auxiliary examiner dictation dated March 19, 1990. Thurman incorporated this dictation verbatim into the FBI Laboratory report dated April 2, 1990. As part of our investigation, Webb reviewed Thurman's testimony about the paint and tape and observed that it was consistent with Webb's dictation.

Whitehurst also has maintained that the conclusion that the black paint came from the same manufacturer is flawed because data do not exist to allow one to say that two samples with a similar chemical composition necessarily came from the same source. A similar criticism could be made concerning the conclusions that the 2-inch wide tape and the RTV sealant came from the same batch or lot. When asked in our investigation about his conclusions, Webb maintained that in his experience, the battery of tests he employed would reveal some differences if paint samples did not

come from the same manufacturer or if the tape had been made in different batches or lots.

We find that Webb's conclusions about the tape, paint, RTV, and glue were stated more strongly than was justified by the results of his examinations and the background data. As a general matter, we question the validity of Webb's working proposition that the examinations he performed would have necessarily revealed some differences if the materials had come from different manufacturers (or different batches or lots for the tape and RTV). At the time of the VANPAC case, neither Webb nor the FBI had a data base to confirm that black latex paints, RTV, glue, and tapes like those involved in the samples did in fact differ among manufacturers in terms of their chemical composition and physical characteristics. Moreover, the tests that Webb performed had not been validated by the FBI or, to our knowledge, any other laboratory, with regard to their ability to successfully determine if samples actually came from the same source. In these circumstances, the methods employed by Webb would allow an examiner to conclude that samples could have come from the same source or manufacturer, but not to opine that they necessarily did.

Webb's conclusions about the common origin of the different samples also seem overstated in light of differences in the results from certain analyses he performed. More specifically, the PGC chart for the black paint from the Jacksonville device contains a peak not observed on the PGC charts for samples from Atlanta and Birmingham; the FTIR chart for a sample of glue from the Atlanta device contains a peak that is absent from the FTIR results for glue from the Jacksonville device; the PGC chart for a clear glue sample from Atlanta has a peak absent from the PGC charts for another sample from Atlanta and a sample from Jacksonville; the FTIR chart for a sample of RTV from the Savannah device has a different pattern than the FTIR charts for samples from Atlanta, Jacksonville and Birmingham; and the PGC chart for a sample of RTV from Birmingham has a peak absent from the PGC charts for samples from Atlanta and Jacksonville.

With regard to the comparison of the 2-inch wide tapes, charts could not be located for analyses done on samples from Atlanta and Jacksonville. The FTIR charts for the tape adhesive from the Birmingham and Savannah devices exhibit several differences. The notes that we reviewed do not explain how Webb reconciled these differences with his ultimate conclusion that tape found in each of the four devices had come from the same batch or lot. When we interviewed Webb about these differences, he said that they may reflect contamination, variations due to sample preparation, the fact that tests were run on different dates, or calibration. Webb acknowledged that certain differences in the test results for the tape and other items he examined are significant enough to require further explanation, but he did not retract the conclusions he reached in 1990 about the common origin of the identified samples.

The differences noted above do not in themselves establish that samples of a particular substance, such as paint or tape, did not have a common origin. Such differences, however, appear to preclude the firm conclusion that the samples came from the same source or manufacturer (or batch or lot). Our questions about the differences in the test results remain unresolved, in part because the case files do not include all the pertinent charts or complete notes explaining the basis for the ultimate conclusions.

We conclude that Webb did not intentionally attempt to fabricate evidence or to present biased conclusions in his work on VANPAC. It appears that Webb's unit chief reviewed and approved his

conclusions about the intercomparison of paint, adhesives, and tape. More significantly, Webb also did analytical work and prepared dictation that identified differences between certain samples. For example, he concluded that the white glue found in the Birmingham device did not match samples from the other devices. He also concluded, as was stated in the FBI reports, that certain glues and tape seized from Moody's residence and storage area did not match samples from the explosive devices. Such a match would, of course, have been very incriminating.

The comparison of tapes, paints, and adhesives in VANPAC does illustrate several areas in which we think the ASCLD/LAB accreditation process should improve the quality and consistency of the Laboratory's work. To become accredited, the Laboratory will have to assure that there are written, validated procedures for standard analytical techniques and examinations. Such protocols did not exist within the Laboratory for the types of analyses done by Webb during the VANPAC case. Accreditation will also require the Laboratory to provide for the review of reports to confirm that examiners' conclusions are reasonable and within the constraints of scientific knowledge. In order to become accredited, the Laboratory will also be required to maintain a case record that includes all the notes, worksheets, charts, and other data that support the examiner's conclusions. Such complete information was not included in the files we reviewed for the VANPAC case and several other matters that were the subject of our investigation.

Whitehurst also complains that Thurman improperly testified outside his expertise with respect to metallurgical matters. Thurman testified that a rod found in the debris from the Savannah device had been stretched as a result of the explosion. On cross-examination, he admitted that the metal people in the Laboratory could sometimes identify metal filing residues from files or grinding wheels and compare them to other metals. Defense counsel then elicited Thurman's acknowledgment that no metal residue was found in grinding wheels or files seized from the defendant that could be compared to debris in the bombs.

Thurman's testimony about the effects of the explosion on the rod was based on his visual inspection of the rod. The Laboratory reports did not indicate that any analytical test had been performed to confirm that the explosion caused the stretching of the rod. We do not believe that Thurman testified improperly in opining that the rod had stretched as result of the explosion. If the defense attorney had wished to explore the basis for Thurman's comments, he could have done so on cross-examination.

We also think Thurman responded properly to the questions that were posed on cross-examination concerning metallurgy. If he in fact believed that the tests he was asked about could be performed, and if to his knowledge no metal debris was found on wheels and files for comparison purposes, we think he was obliged to respond as he did. Notably, in responding to these issues, Thurman was conceding points the defense wished to develop, which further belies the allegation that Thurman was determined to perjure himself or fabricate evidence to secure a conviction.

Whitehurst also asserts that during the cross-examination, Thurman improperly testified outside his expertise concerning paints, tool marks, DNA analysis, smokeless powder, and the analysis of primers. With respect to paints, Thurman was asked whether you would have the capability of matching the paints, if black paint had been found at the defendant's properties. Thurman responded, I would expect so, yes, sir. Given the reports Thurman had received in the case from examiner Robert Webb, we see no basis to criticize Thurman's response.

The defense counsel later asked Thurman to explain what a useful gripping tool mark would be. Thurman noted he was not a tool mark examiner, but said he would try his best. He then explained how some tools will leave identifying marks that allow a particular tool to be matched with a marked object. Thurman then acknowledged that no identification had been made in the case with respect to certain tools seized from Moody.

Regarding DNA analysis, Thurman acknowledged that this was a new scientific technique and the defense attorney himself noted that Thurman was not a DNA expert. Thurman agreed that an enzyme called amylase that is in saliva can be used for DNA analysis. In response to further questioning, Thurman admitted that DNA testing could not be done on certain envelopes because no amylase was recovered from them. Defense counsel then had Thurman concede that there was no DNA match to Moody based on the envelopes.

With respect to smokeless powders and primer, Thurman admitted Moody's house had been vacuumed in virtually every conceivable area to identify minute microscopic grains of gunpowder, but none had been found. He was also asked if he recalled that the CCI primer had a unique two percent aluminum component. Thurman noted that the question concerned examinations done by Martz, and that he thought Martz would be testifying during the trial. When asked if the primer material could be obtained not only from primers but also from small arms ammunition, Thurman told the defense attorney he would have to pose the question to Martz. When asked if powders could be matched to determine if they were from the same batch, Thurman said, sometimes yes, sometimes no, and again referred the question to Martz. The defense attorney noted that primer had not been recovered from all four devices, and Thurman then agreed that the Laboratory had not been able to determine that the primer recovered from the devices and the primer sold by Sartain to Moody had come from the same lot.

On cross-examination, Thurman further admitted that the Laboratory had not been able to match a keg of Red Dot smokeless double base gunpowder obtained from the Shootin' Iron Gun Shop with the gunpowder found in the four bombs. On re-direct, Thurman noted that although batches could not be matched, the powder was of the same type and the same manufacturer. Thurman also said the CCI primer that Sartain said he sold to Moody was of the same type and manufacturer as that used in the bombs.

Thurman did not improperly testify outside his expertise or contrary to FBI policy with respect to the matters raised in his cross-examination. As noted above, Thurman as principal examiner had assembled the Laboratory reports after reviewing the dictation of the various auxiliary examiners, and defense counsel had agreed that he could testify as a summary witness. In an apparent effort to raise doubt about the connection between Moody and the mail bombs, the defense counsel sought Thurman's acknowledgment that the Laboratory had not made certain findings. If anything, Thurman might have been fairly subject to criticism if he had refused to concede the points he did.

In testifying about the DNA tests, Thurman correctly stated that there had been no DNA match to Moody, but his testimony was inaccurate in a relatively minor respect. Thurman erred in agreeing with the defense attorney that the DNA testing was based on amylase recovered from saliva.

Amylase is an enzyme present in saliva, but it is not the basis for DNA analysis. Such analysis can be based on epithelial cells taken from saliva. The FBI Laboratory reports noted in separate sections that serological tests for amylase were negative and that DNA test results could not be obtained. Thurman's imprecision regarding the DNA tests illustrates that examiners must be very cautious in testifying, even as summary witnesses, outside their area of expertise.

We also think Thurman testified appropriately on re-direct in stating that the smokeless powder and primers that Sartain said he sold to Moody were of the same type and by the same manufacturer as the materials used in the bomb. Whitehurst asserts that Thurman could not have known that the smokeless powder was of the same type because Hercules manufactures Red Dot powders for sale in products other than the canister powder identified by Sartain. Whitehurst evidently believes that Thurman, by saying the powder was of the same type, misleadingly indicated it could only have come from one kind of container. We disagree with this interpretation of Thurman's testimony. With respect to the primer material, Thurman had earlier acknowledged that it was not found in all four devices. When Thurman agreed on re-direct that the CCI primer that Sartain said he sold to Moody was the same type as that used in the bomb, Thurman would have been more precise if he had said the same type as was identified in the two unexploded bombs.

Whitehurst makes two criticisms about Thurman's testimony on cross-examination which we think are best characterized as disagreements over the choice of words. Thurman agreed when the defense lawyer asked if he had, as the supervisory scientist, received all the reports of scientific examinations in the case. Whitehurst claims that this is misleading and a fraud upon the court because Thurman is not a scientist. We do not agree. Earlier in his testimony, Thurman had explained both his experience and the fact that as principal examiner he had coordinated the work done by various laboratory units on the case. Thurman could have spoken more precisely by stating again that he was the principal examiner rather than accepting the defense counsel's phrase supervisory scientist.

Whitehurst also states that Thurman incorrectly agreed with the defense attorney that smokeless powder has a dusty residue. The defense attorney phrased in everyday language how many people would describe the feel of such powders, but to be technically accurate, Thurman should have noted that they do not actually leave a residue of dust. Before Thurman testified, ATF Agent Frank Lee had agreed on cross-examination that, double base smokeless gun powder is like a dust and will adhere to walls, floors, clothing, [and] vacuum cleaner brushes. The defense attorney apparently sought to compare smokeless powder to a dust as background to his emphasizing that no traces of smokeless powder were found in the searches of Moody's house or the storage unit he rented. Both Lee and Thurman acknowledged that no smokeless powder was found in the searches.

### **E. Claims That Martz Misled the Jury About His Qualifications**

Whitehurst contends that Martz testified in a misleading way about his education and qualifications and the role of the CTU. Martz testified that he received a bachelor's degree from the University in Cincinnati and had worked as a chemist for several years both before and after he had joined the FBI. Whitehurst complains that Martz failed to disclose that his bachelor's degree was in biology rather than chemistry and that he had never been qualified by the FBI to examine explosives residue.

Martz was not asked on either direct or cross-examination to identify his undergraduate major. Since 1980, Martz has been qualified as a forensic chemist examiner within the FBI Laboratory. Martz has stated he had 40 quarter credit hours in chemistry during college, and he worked as a chemistry technician in the CTU before becoming an examiner. With regard to the analysis of explosives, Whitehurst is correct that Martz never completed the MAU's program to become qualified by that unit as an explosives residue examiner. As noted above, however, the CTU had analyzed smokeless powders since the early 1980s. We do not think that Martz testified improperly with respect to his background or qualifications.

Martz testified that in the CTU, [w]e do chemical analyses on . . . evidence. In some cases, it may be drugs, in other cases it may be arson, or the identification of an accelerant, the identification of explosives. We do a wide range of identification of unknown chemicals. Whitehurst asserts that Martz led the trier of fact astray because the CTU never was entrusted with the analysis of explosives. This allegation again reflects Whitehurst's view that the MAU was solely responsible within the Laboratory for the analysis of explosives. The CTU, however, was at least analyzing smokeless powders, as several witnesses confirmed during our investigation.

#### **F. Claims That Martz Improperly Testified About Smokeless Powders Found in the Devices**

Apart from the allegations previously discussed that the analysis by Martz was flawed because he did not follow the MAU protocol, Whitehurst also criticizes other aspects of Martz's testimony concerning smokeless powders.

On direct examination, Martz agreed that Red Dot smokeless powder came in the types of canisters represented by three exhibits. Whitehurst suggests Martz should have volunteered that the powder also comes in other types of products and containers. Similarly, Whitehurst states that Red Dot smokeless powder might be removed from manufactured ammunition. These points, if relevant, could have been developed by the defense attorney on cross-examination. Given the questions posed, Martz's responses were not improper.

Whitehurst also asserts that Martz lacked knowledge to testify about the degradation of smokeless powders and that he gave misleading testimony about his inability to match smokeless powders found in the devices with powder later obtained from the Shootin' Iron Gun Shop. Our interview with Martz left us persuaded that his remarks concerning degradation of smokeless powder had a basis in his prior work in the Laboratory, but his testimony about his attempts to compare powders was unnecessarily ambiguous.

With regard to determining whether different powder samples came from the same lot, Martz received a can of Red Dot smokeless powder that had been obtained from the Shootin' Iron Gun Shop sometime after Moody had bought powder there from Sartain. In our interview, Martz said he

initially opposed attempting to determine if powder samples had come from the same lot, because he knew that smokeless powder's chemical composition changes with exposure to air and he anticipated that samples would yield different results. Martz performed liquid chromatography and gas chromatograph/mass spectrometer analysis of a sample from the can obtained from the Shootin' Iron, a sample from the Jacksonville device, and other lots of Red Dot smokeless powder from the Laboratory. Martz observed similarities and differences in his test results. This caused him to conclude, as stated in the Laboratory report dated June 6, 1990, that he could not determine whether the smokeless powder obtained from the Shootin' Iron came from the same lot as smokeless powder recovered from the bombs.

In his direct testimony, Martz stated that he examined four exhibits consisting of powder from each of the four devices and that the powder was Hercules Red Dot smokeless powder. Martz then acknowledged that he had also received a four-pound can of Hercules Red Dot smokeless powder. He then testified as follows:

Q: Were you asked to compare the four specimens in front of you with the off-the-shelf can?

A: Yes, I was.

Q: Did you do that?

A: Yes, I did.

Q: Could you determine anything at that point?

A: No, I was not able to determine it. Even the smokeless powder, as I mentioned, will break down over time. And I was not able to successfully compare this particular smokeless powder with that because of the different environments that the powders were in. That was a can that was sealed when I got it. These particular powders were placed into pipe bombs, some of them exploded, some of them didn't. And I was not able to make that comparison.

Q: Hypothetically, from a chemical point of view, is it possible for you to take shell (sic) powder and powder from an exploded device and tell whether or not it is from the same batch?

A: Not after the -- in my opinion, not after the bomb has gone off you can not make that comparison.

Later on cross examination, Martz again stated that he had tried to compare the powders but was unable to do so. The defense attorney asked, [t]hey were both Red Dot but you could not determine from your comparisons if they came from the same batch? Martz responded that he could not make that determination.

Martz was ambiguous in stating on direct examination that he had been unable to successfully compare the powders. In fact, he did compare a sample from the Jacksonville device, a sample from the four-pound can, and some known samples from the Laboratory. He should have stated more directly that he found differences and similarities when he compared certain samples. The differences, however, were insufficient to draw a meaningful conclusion as to whether the powders originated from different lots. As Martz stated in his interview with us, he found nothing in his comparison work suggesting that the samples had come from different lots. Accordingly, we conclude that Martz did not suppress exculpatory information regarding his comparison of the powder samples.

### **G. Claims That Martz Improperly Analyzed Primers**

Whitehurst asserts that Martz should not have testified about the identification of primers in the detonators because examiner Roger Peele in the Elemental Analysis Unit (EAU) was responsible for primer residue analysis.

The green powder found in the detonators was sent initially to the CTU for analysis because its chemical composition was unknown. Based on analyses with infrared spectroscopy and a scanning electron microscope, Martz determined that the green powder was similar to primer materials that he had recently been analyzing. Through contacts with industry representatives, Martz learned that small arms primers made by CCI Industries were unique in having a 2% aluminum content.

In order to have the composition of the green powder analyzed further, Martz recalled that he asked Charles Peters, who then was an EAU technician, to perform inductively coupled plasma (ICP) atomic emission spectroscopy analysis of the samples. A logbook maintained by Peters indicates that he performed primer analysis for Martz in January 1990. Peters told us he could not specifically recall his work on the VANPAC case, and said he would have forwarded all his analytical results to Martz. Results of the ICP analysis have not been located, but Martz recalls that they confirmed a 2% aluminum content in the primers.

Roger Peele told us that he thought there was nothing improper in Martz's having analyzed the primer material in the VANPAC case. The EAU, Peele explained, at that time attempted to confirm the presence of gunshot primer residues on persons suspected of firing a gun by locating antimony and barium, components of primers. This analysis did not attempt to identify the particular primer or its manufacturer based on the overall composition of the primer. Peele believed that some interaction of units would have been necessary even if the unidentified green powder had first gone to the EAU, and he thought Martz properly involved the EAU by having Peters perform the ICP analysis.



## **H. Testimony by Martz About the Search at Moody's House**

On direct examination, Martz said that he had participated in a search of Moody's house in January 1991. He described his assignment as looking for residues of primer material and also smokeless powder. Martz explained that he and other agents had vacuumed the house and even pulled up a floor that Moody had replaced. Martz acknowledged on cross-examination that they had searched throughout the house, including the bags and brushes of vacuum cleaners that were there, and found no evidence of Red Dot smokeless powder.

Whitehurst complains that Martz was not qualified to search for residues. He also asserts that Martz lacked any basis to say that what was found in the search could have been affected if someone had vacuumed the area previously. We do not believe Martz lacked qualifications to conduct the search he described. Martz's statement that the results of his search might have been affected if someone had already vacuumed the scene strikes us as unobjectionable common sense.

Finally, Whitehurst complains that Martz lacked a basis to state on cross-examination that if any chemical tests had been done under the house, there would likely be detectable residue remaining on the pipes. Martz's observation was based on his experience as an agent and chemist, and we do not think it was improper because it was not supported by specific data or analytical results. In response to further defense questions, Martz said he had taken swabbings of pipes and other areas of the house looking for gunshot residues. He then acknowledged that no evidence of primers was found. The defense clearly pursued this line of testimony to underscore that although the FBI had conducted an extensive search, certain evidence was never found at Moody's house.

## **I. The Conduct of the Prosecutors**

Whitehurst has suggested that prosecutors Howard Shapiro and Louis J. Freeh may have engaged in misconduct through their presentation of testimony by Martz and Thurman or their arguments in the VANPAC case.

We find no basis to conclude that either Shapiro or Freeh knowingly presented any improper evidence in the case. Both Freeh and Shapiro said that while they worked on the case they had never heard any suggestion that there was any impropriety in how the evidence had been analyzed within the Laboratory. Nor did they ever hear any suggestion that Thurman or anyone else had attempted to circumvent the Laboratory's procedures for the analysis of explosives or that the MAU should have done certain work rather than the CTU.

With respect to the closing argument, Whitehurst notes that Freeh reminded the jury of testimony by Paul Sartain, who said he had sold Moody four pounds of gunpowder and 4000 primers in December 1989. Whitehurst asserts that Freeh did not know what kind of explosive was used in the bombs, so

this evidence was not probative in tying Moody to the bombs. For reasons noted earlier, we think that the FBI examiners could reasonably conclude that Red Dot smokeless powder and a high explosive detonator were components of each bomb. Sartain's testimony noted by Freeh in closing was both relevant and, in our view, highly probative.

Whitehurst also questions the basis for Freeh's remark to the jury that some eighty nails were traveling at 13,000 feet per second in the Birmingham bomb that killed Judge Vance. When interviewed in our investigation, Director Freeh could not recall the specific basis for his remark. The comment about 13,000 feet per second may reflect that Freeh misspoke or that the court reporter misheard him. Thurman testified that the cutoff between high and low explosives was 3,000 feet per second, and Freeh may have had in mind that number in his remarks. Both Thurman's testimony and the relevant Laboratory report indicated that eighty nails were attached to the Birmingham bomb.

Whitehurst also notes that Freeh in his closing commented about black paint being sprayed inside the devices to cover up fingerprints and also asked why every color of paint was found at Moody's house other than black. The statement that paint was sprayed was incorrect, as the Laboratory reports indicated the paint was brush-applied, and Thurman testified that the Laboratory had determined that the paint was hand-applied. We have no reason to think this was anything other than an honest mistake by Freeh. Whitehurst's other complaint here is that an FBI paint examiner, and not Thurman, should have testified about the significance of the paint. As noted above, Thurman understood and Moody's lawyer confirmed that Thurman could testify as a summary witness.

Freeh also stated in his closing that Thurman had been very conservative in his testimony. Freeh noted that Thurman did not conclude that the partially constructed Chamblee device was made by the same person who built the 1972 and 1989 devices. Whitehurst asserts that the jury may have been misled by these remarks because Thurman testified incorrectly, outside his expertise, or without a basis on various matters. We have addressed the allegations about Thurman's testimony above, and we find no basis to conclude that Freeh misled or attempted to mislead the jury in his comments about Thurman.

Whitehurst also notes that Howard Shapiro referred in the government's rebuttal argument to a survey conducted by the FBI that involved some 16,000 devices in a computer data bank and 217 crime laboratories around the country. Shapiro stated that the survey had not found any other device with certain features present in both Moody's 1972 bomb and three of the 1989 bombs. Whitehurst states that [t]his evidence should be thoroughly reviewed in detail because an EU technician named Mike Fanning had told Whitehurst that the FBI's Express computer data base had been built because the EU lacked such a data base at the time of the VANPAC case.

Shapiro's remarks in closing were based on Thurman's testimony. With regard to data bases, Thurman testified that the FBI had access to essentially three data bases: the EU's collection of previous Laboratory reports; the information on bombing incidents collected by the FBI's Bomb Data Center; and the data base maintained by the ATF. Thurman later described a review the FBI had conducted to determine if there had been other bombing incidents with devices with features similar to those of the bombs involved in VANPAC. He noted that the FBI had examined its own data base as well as the data bases maintained by ATF and the U.S. Postal Service and also had sent a survey to 217 forensic laboratories. Subsequently, Thurman testified that the survey and data bases

had involved more than 16,000 devices, and that no devices were identified other than those involved in VANPAC that had certain design features and were designed to be sent in the mail.

The statements by Thurman and Shapiro concerning the review of some 16,000 devices had a factual basis. We interviewed Steve Schied, an Intelligence Research Specialist with the ATF, who has overseen the Exis data base since 1975 and who reviewed the data base for the VANPAC case. Schied said that at the time of the VANPAC case, the ATF Exis data base alone included 15,921 entries. He observed that it would have been accurate to say that the FBI survey involved approximately 16,000 devices based only on the ATF data base. Insofar as the FBI also examined other data bases and surveyed other forensic laboratories, we find Thurman could properly testify that the FBI's review involved more than 16,000 devices.

#### **IV. Conclusion**

We find no basis for the allegations made by Whitehurst that Thurman and Martz obstructed justice, circumvented Laboratory protocols and procedures, perjured themselves, or fabricated evidence in the VANPAC case. We also find no support for Whitehurst's suggestion that Freeh or Shapiro engaged in prosecutorial misconduct. As explained above, there were certain areas in which we believe that agents Thurman or Martz testified ambiguously or, in relatively minor ways, inaccurately. We do not find any basis to conclude that this testimony involved knowing or deliberate misconduct.

Given the documentation we were provided by the FBI, we also conclude that the conclusions made by examiner Robert Webb concerning the origin of black paint, glue, RTV, and 2-inch wide tape were stated more strongly than was justified by the methods employed and the analytical results. We find that Webb did not intentionally attempt to fabricate evidence or to present biased conclusions.

The case does highlight several areas in which we believe the Laboratory's procedures should be improved. The Laboratory would benefit from: (1) expressly stated and agreed upon guidelines concerning the respective responsibilities of different units with regard to explosives analysis; (2) clearer guidance as to the proper scope of principal examiner testimony concerning work done by auxiliary examiners; (3) an improved record retention and retrieval system; (4) written and validated protocols for standardized procedures; and (5) file review to ensure that conclusions are supported by appropriate analysis and data.

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## **SECTION C: WORLD TRADE CENTER BOMBING**

### **I. Introduction**

On February 26, 1993, an explosion occurred at the World Trade Center, in New York City, New York, resulting in six deaths, numerous injuries, and substantial property damage. An investigation was undertaken by the FBI, as lead agency, with the assistance of other agencies including the ATF and the New York City Police Department. Several defendants were indicted, tried, and convicted in a case dealing primarily with the Trade Center bombing--United States v. Salameh, which was tried from September 1993 to March 1994 in the Southern District of New York. A broader case, which included evidence of the Trade Center bombing (United States v. Omar Ahmed Ali Abdel Rahman a/k/a Sheik Omar), was tried in 1995 in the Southern District of New York, resulting in the conviction of the defendants.

Prior to the Salameh trial, Whitehurst complained about several matters, all of which were resolved to his satisfaction prior to trial. On January 8, 1996, Whitehurst submitted to the OIG an 80-page critique of the Salameh testimony of SSA David Williams, an examiner in the Explosives Unit. Whitehurst covered a multitude of topics and concluded that Williams misrepresented the truth, testified outside his area of expertise, and presented testimony biased in favor of guilt.

To investigate Whitehurst's allegations, we interviewed Whitehurst, Williams, EU Chief J. Thomas Thurman, Special Agent Steven Burmeister (an examiner who worked on the case), former MAU Chief James Corby, CTU Chief Roger Martz, other examiners and employees at the FBI Laboratory, a chemist at the Eglin Air Force Base, persons who allegedly discussed the case with Williams prior to the Salameh trial, other FBI and ATF personnel (some of whom worked at the scene of the blast), and other persons associated with the case. The interviews of Whitehurst, Williams, Thurman, and Martz were sworn and transcribed. Additionally, we considered relevant trial transcripts, pertinent FBI documents, and applicable literature in the field of explosives.

As explained below, we conclude that in the Salameh trial Williams gave inaccurate and incomplete testimony and testified to invalid opinions that appear tailored to the most incriminating result. Regarding most of Whitehurst's many other allegations, we either find them meritless or conclude that any error was insignificant. We first address the allegations relating to Williams' Salameh testimony (Section II), then the pre-trial issues (Section III), followed by our conclusion (Section IV).

### **II. Testimony of SSA David Williams in the Salameh Trial**

David Williams testified at length on direct examination in the Salameh case regarding several areas, including the following: his manufacture of urea nitrate pursuant to formulas found in manuals seized in the case; his calculation of the amount of urea nitrate that could have been produced based

on certain chemical purchases; and the possible explosives used at the bombing and their weight, based on the damage at the scene. On cross-examination Williams elaborated on some of these subjects and opined specifically that the main explosive used in the bombing was urea nitrate. The principal allegations relate to these areas of Williams' testimony. We address first the FBI's manufacture of urea nitrate (Section A), then Williams' opinions on defendants' capacity to make urea nitrate and on the explosive used in the bombing (Section B), then Williams' testimony regarding an attempt to modify Whitehurst's dictation (Section C), and finally the other allegations concerning Williams' testimony (Section D).

## **A. FBI's Manufacture of Urea Nitrate**

Whitehurst asserts that Williams falsely testified that Williams manufactured urea nitrate pursuant to formulas in certain blue manuals that were seized in the case and were linked to the defendants. Whitehurst maintains that Williams in fact did not manufacture any urea nitrate and that the explosive was made by other Laboratory personnel who did not use the formulas in the manuals. First we will summarize Williams' testimony; then we will present the facts found in our investigation and our analysis of the issues.

### **1. Williams' Testimony**

Williams testified that he had experience in manufacturing or putting together urea nitrate. He further testified that in manufacturing the urea nitrate I actually used two formulas that were removed from one of the blue manuals. (The blue manuals were manuals in Arabic and English for home-made bomb-making.) Williams further testified that the formula recommends that you mix the urea to the nitric acid in a one-to-one range; . . . [i]t suggests that you mix by amount 60 parts of urea to 63 parts nitric acid. He further testified, When I made a large quantity of urea nitrate in the large plastic tubs, it was very heavy. On both direct and cross examination, Williams used both the first person, singular pronoun I and the first person, plural pronoun we to describe who made the urea nitrate.

On cross-examination he testified:

Q. You reproduced an explosion using the same chemicals and the formulas that was in the book?

A. Yes, I did.

Q. When did you do that?

A. In the early part of the spring and summer, we started by making small batches of urea nitrate. And then in August, I made approximately 1,300 pounds of urea nitrate in Florida.

When asked whether he concocted a bomb with some of the urea seized in the searches, Williams responded: I did. In the early tests in the summer, I used some of the urea from Mallory [the location of one of the searches] and made small one-pound bombs of urea nitrate and detonated it.

Williams further testified to the production of urea nitrate at the Eglin Air Force Base in Florida in August 1993. When asked why he used an outdoor laboratory there, he stated, I didn't want to have any of the fumes bother myself or any of my workers. Williams testified that we started with smaller batches of 20 pounds of urea and 20 pounds of nitric acid. On cross-examination, Williams listed the persons who worked on the project with him including Whitehurst, Steven Burmeister, agents from the Jacksonville office of the FBI, technicians in the Explosives Unit, and personnel from the Air Force Base. He then testified:

Q. Okay. Anyone else you can remember?

A. I believe they were all that were immediately involved in the mixing process.

Q. Okay. And of course you were involved as well?

A. That's correct.

Q. You were supervising this?

A. That's correct.

Williams further testified:

The first batch of urea nitrate that I made I relied on instructions. After making it one time, you didn't need instructions any longer. . . . The first bit of instructions came out of the blue manuals that I saw the other day.

Williams testified that he used two formulas from the blue books to make the urea nitrate. The first

(G.Ex. 2781, p.172) was in Arabic and English. The second formula (G.Ex. 2783T, p.2) was entirely in Arabic.

## 2. Facts

Personnel in the FBI Laboratory made several batches of urea nitrate prior to the Salameh trial. Several small batches were made in the spring and summer of 1993, and approximately 1200 pounds were made at Eglin Air Force Base in August 1993.

### a. Early Batches

The first two batches were made in test tubes by Chemist James Molnar on March 8 and 9, 1993. He followed the procedures set forth in Davis, The Chemistry of Powder & Explosives 372-73 (1943) (Davis book ). For the second batch, he calculated a synthesis yield of 97%. He wrote up his findings.

The next batch was made by Chemist Mary Tungol. She also followed the procedures set forth in the Davis book. She also prepared a formula for the synthesis of urea nitrate in a four or five gallon quantity. In summary, she calculated the amount of water (2 gallons), urea (20 pounds), and nitric acid (8.7 liters) needed to produce a theoretical (100%) yield of 42.5 pounds of urea nitrate. Tungol made smaller batches (5 to 10 pounds of urea nitrate) using a percentage of the quantities in the formula. These batches were taken to the FBI range at Quantico, Virginia, and detonated.

Another batch was prepared by Whitehurst and Burmeister at Quantico pursuant to the Tungol formula. It would not detonate because it had not been properly dried.

### b. Eglin

In August 1993, Williams, Whitehurst, Burmeister, and other FBI personnel manufactured approximately 1200 pounds of urea nitrate at the Eglin Air Force Base in Florida. Williams and Whitehurst jointly decided to undertake this project, and both helped set it up, including the acquisition of the necessary personnel, equipment, and materials. The mixing occurred outdoors. Reagent grade (99% pure) or technical grade (about 97%) urea and reagent grade (70.4%) or technical grade (67%) nitric acid were used, as well as distilled water. Whitehurst and Burmeister did the mixing in plastic trash cans surrounded by ice water to cool the solution. Although the evidence is conflicting, the recipe they followed was apparently based on the one developed by Tungol. First, the urea was weighed and dissolved in the distilled water. Then the nitric acid was put in. Several batches were mixed at the same time. Whitehurst and Burmeister wore protective clothing during the mixing. After a precipitate (the urea nitrate) formed, the liquid was filtered through a funnel. The urea nitrate was then put on drying trays, which were put in drying ovens provided by Eglin. The urea nitrate was allowed to dry overnight. Personnel from Eglin then weighed and bagged the urea nitrate. It took about three or four days to produce the 1200 pounds of urea nitrate.

### 3. Analysis

We conclude that the basic point of Williams' testimony--that Williams personally manufactured urea nitrate pursuant to formulas found in the blue manuals--was inaccurate in two respects. First, no one in the FBI used the formulas from the blue manuals to manufacture urea nitrate. Second, Williams' role in the manufacture of the urea nitrate by the FBI was much more limited than his testimony described. We reach these conclusions for the following reasons.

#### a. Use of Formula

In his testimony Williams indicated that he personally took the formulas from the blue books, followed them, and was able to produce the explosive urea nitrate. Neither Williams nor anyone else in the FBI actually did this. The first (test tube) batch, by Molnar, was made pursuant to the information in the Davis book. From then on, the Tungol formula (also based on the Davis book) was used. All of the formulas (Molnar's, Tungol's, and the Arabic) used the same essential ingredients (urea and nitric acid). The weights and concentrations in the FBI's formulas, however, were different from the weights and concentrations in both of the Arabic formulas referred to in Williams' testimony.

The first formula from the blue books (G.Ex. 2781) sets out the chemical equation for the reaction and states that urea and diluted nitric acid (34%) should be mixed. The formula does not prescribe dissolving the urea in water before adding the diluted nitric acid (34%). Williams testified that the numbers 60 and 63 on the exhibit meant that the formula suggests that you mix by amount 60 parts of urea to 63 parts nitric acid. The numbers 60 and 63 are the molecular weights of urea and nitric acid and were noted underneath the chemical equation. A 60 to 63 ratio by weight is theoretically the correct ratio for the reaction, but only if both substances are in the same concentration. Here, the manual prescribes that the nitric acid be diluted to 34%, which would require a ratio of 60 parts urea to about 189 parts nitric acid (63 divided by .34) if the urea was 100% pure, or some other ratio if the urea was less pure.

The second formula (G.Ex.2783T) is closer to, but is not exactly, what the FBI followed. This formula indicates that 200 grams of urea should be dissolved in water, and then 200 grams of diluted nitric acid should be put in. No mention is made of reagent or technical grade products or distilled water. The manual's translated discussion of how to dilute nitric acid is difficult to understand. In a 1997 interview Burmeister told us he construes the discussion to mean that the nitric acid should be diluted to 35% purity. Thus, the weights and concentrations of G.Ex.2783 differed from those in the formulas used by the FBI, and, as explained in note 41, *infra*, it is unclear whether G.Ex. 2783 could effectively produce urea nitrate. In any event, prior to the Salameh trial no one in the FBI attempted to decipher the dilution procedure and actually dilute nitric acid pursuant to it; nor did anyone in the FBI otherwise attempt to make urea nitrate pursuant to this formula.

In his OIG interview Williams did not say that he or anyone else in the FBI actually manufactured urea nitrate by literally following the formulas in the manuals. Despite Williams' trial testimony that the early (pre-Eglin) batches were made using the formulas in the manuals, he testified in the OIG



interview that he did not know what formulas were used in the only two pre-Eglin batches he was aware of.

As for Eglin, Williams testified at the interview as follows: He did not see the written formula Whitehurst and the other members of the team were following and did not know whether it was the formula from the manuals. However, based on Whitehurst's verbal instruction to the team, Williams thought that the formula from the manuals appeared to be the formula that we were also using. Williams further testified that on the first day of mixing at Eglin he received a fax of one of the translated Arabic formulas; he showed it to Whitehurst and the Eglin chemists and asked how it compared to what they were doing; and they said it was the same.

Whitehurst, Burmeister, and the Eglin chemist at the scene of the mixing (Paul Bolduc) told the OIG that they could not recall telling Williams that a formula in the fax was the same as the formula the FBI was using at Eglin. Two bomb technicians present at Eglin, however, recall the conversation. FBI Comments at 10.

After Williams' OIG interview, we obtained a copy of the fax Williams received at Eglin. The fax includes two Arabic formulas and their translations. The first formula (First Fax Formula) is one of the two formulas Williams testified in Salameh he used to make urea nitrate and became G.Ex. 2781. The second formula in the fax (Second Fax Formula) is different from the two Arabic formulas Williams testified he relied on to make the urea nitrate.

As noted above, the First Fax Formula (G.Ex. 2781) differs from the formula used at Eglin in that the fax formula fails to prescribe that the urea should be dissolved in water prior to the addition of the nitric acid and further states that the nitric acid itself should be diluted to a 34% concentration. As indicated above, at Eglin the urea was first dissolved in distilled water, and then reagent grade (70.4%) or technical grade (67%) nitric acid was added. The fax formula, moreover, is essentially a chemical equation with molecular weights. It does not include a specific amount of 34% nitric acid to be added to a specific amount of urea.

The Second Fax Formula is quite different from the Eglin formula. The Second Fax Formula uses human or animal urine as an ingredient. The formula sets forth a procedure for evaporating and filtering the urine; then 90% nitric acid is added to the urine filtrate at a ratio by volume of one part acid to three parts urine.

Thus, the fax formulas were different from the formula the FBI used to manufacture urea nitrate at Eglin, and no one in the FBI at Eglin attempted to manufacture urea nitrate from the fax formulas.

Because he was not a chemist, Williams lacked the expertise to determine on his own whether a fax formula was the same as the formula Whitehurst was following. When Williams testified at the OIG interview that the formulas seemed to be the same because both used a 60 to 63 ratio by weight of urea to nitric acid, it is clear he did not understand that the ratio of the weights must take into account the concentrations of the ingredients. Because the concentrations of the ingredients at Eglin

were different from the concentrations in the Arabic formula, the ratios of weights would have to be different as well. Additionally, the formulas were different with respect to the form of the urea (solid versus water solution) and the absence in the Arabic formula of specific amounts (in pounds or liters) for the ingredients.

As we have noted, the Eglin and fax formulas utilized the same basic ingredients but were different as to the weights, concentrations, and the form of the urea. Nevertheless, Williams and the bomb technicians maintain that Williams was told by a chemist that the Eglin formula and the Arabic formula were the same. In his trial testimony Williams should have made the source of his information clear. Instead of testifying that I made the urea nitrate at Eglin and in the pre-Eglin batches pursuant to the Arabic formula, he should have said that he had no personal knowledge of what formulas were used, that comparing chemical formulas is a matter beyond his expertise, but that, when Williams asked, a chemist told him that the Arabic and Eglin formulas were the same.

We conclude that Williams' trial testimony that the formulas from the manuals were the source from which the FBI manufactured urea nitrate was incorrect. The source of the formulas used by the FBI was the Davis book. Moreover, Williams told us that he did not know or did not have a clue as to what formulas were used before Eglin and that he had no idea as to the source of the Eglin formula. Williams' testimony concerning the use of the Arabic formulas was seriously flawed.

#### **b. Williams' Role**

Williams also gave inaccurate testimony about his role in the FBI's manufacture of urea nitrate. Regarding the batches before Eglin, he had no role other than attempting to dry some of the product and was not even aware of all the batches. Thus, his testimony that I made the early batches of urea nitrate was apparently false. Williams responded at the OIG interview:

Well, in a lot of this testimony, when you see me saying, Yes, I did, I'm the FBI Explosives Unit and laboratory representative; so I'm using that term I as the laboratory. So when I say, Yes, I did, that meant the laboratory.

Williams acknowledged that [p]erhaps they were a bad choice of words. We are troubled by the choice of words. Williams' testimony that I performed some Laboratory procedure implied that he was in a position to know something about that procedure--when in fact he was not. Thus, instead of saying I made the pre-Eglin batches of urea nitrate pursuant to the Arabic formulas, Williams should have testified to the truth--that he was not involved in those batches and did not know what formulas were used.

As for Eglin, Williams' testimony on direct that I made approximately 1300 pounds of urea nitrate in Florida, and his testimony on cross that he supervis[ed] the mixing process, was inaccurate.

According to Williams' OIG interview, the decision to manufacture the large quantity of urea nitrate in Florida, and the planning for the project, were jointly undertaken by him and Whitehurst, but Whitehurst decided how to make the explosive and what formula to use. Special Agent Burmeister stated in his OIG interview:

It was a team effort. Everybody had their own function, but the responsibilities were on certain individuals to do certain things. The logistics on getting personnel out to the scene and buckets, and stuff like that, that was in Dave's [Williams'] court.

The mixing and knowing how much to mix, that was in Fred [Whitehurst] and myself, that was our responsibility, to mix and prepare this stuff. And we were brought down there to prepare this material, period. . . . [I]t was our [Whitehurst's and Burmeister's] responsibility to control and organize the actual manufacturing of this material . . . .

[Question by OIG:] Would you say that, in a sense, Dave Williams was supervising the FBI people there [at Eglin]?

AGENT BURMEISTER: No. I don't think, I don't think he was supervising. It wasn't that Dave would tell us -- would come over and say, I think you're adding too much nitric acid. No, no, Dave wasn't doing that.

If Dave was supervising, Dave was supervising the fact of telling the guys from Eglin, you know, we're going to be here tomorrow at 9:00, telling the bomb techs from the FBI office, I want you guys to be down here at a certain hour.

That kind of logistics, yes, he was supervising that. But when it came to the people mixing and preparing, he wasn't supervising that activity.

OIG: . . . At any time did he [Williams] tell you or Fred how much of a certain chemical to use?

AGENT BURMEISTER: No, never. . . . I know that because he wasn't involved in the mixing process. Dave would not know how much to add, if we didn't tell him how much to add. He could not derive that just on the site.

In his OIG interview, Paul Bolduc, the Eglin Air Force Base chemist present for the mixing operation, characterized Williams' role in the mixing process as that of a gofer.

We find that Williams' role in the mixing operation was to provide manual assistance under the direction of Whitehurst and Burmeister.

Accordingly, we conclude that Williams' trial testimony on direct examination that I made the urea nitrate at Eglin, and his testimony on cross-examination that he supervis[ed] the mixing process, was incorrect. The reference in his trial testimony to the other FBI personnel at Eglin as my workers could be interpreted to manifest an intent to downplay the role of the others and to aggrandize his own. Williams' exaggeration of his role erroneously suggested that Williams was an expert in the manufacture of urea nitrate, that he was in a position to know how the FBI made its urea nitrate, and that therefore he could say authoritatively that it was manufactured pursuant to the formulas in the blue books. Williams' flawed testimony about the manufacture of urea nitrate was the first of numerous errors he committed in the Salameh trial.

### **B. Williams' Opinions on Defendants' Capacity to Manufacture Urea Nitrate and on the Explosive Used in the Bombing**

An important part of Williams' Salameh testimony consisted of his opinions concerning (1) the capability of the defendants to manufacture urea nitrate and (2) the main explosive ( main charge ) used in the World Trade Center bombing. We conclude that Williams' testimony about these subjects was deeply flawed.

As noted above, urea nitrate is made by combining urea with nitric acid. Regarding the defendants' capacity to make urea nitrate, Williams subtracted the amounts of urea and nitric acid recovered in the searches from the amounts the defendants ordered from chemical companies. From the amounts of urea and nitric acid missing, he calculated that the defendants could have produced approximately 1200 pounds of urea nitrate.

Williams then rendered opinions concerning the main explosive used in the World Trade Center bombing. On direct examination, based on the damage at the scene, he opined that the main charge consisted of about 1200 pounds of a category of explosives that included urea nitrate. On cross-examination, he went further and rendered a specific opinion that the bulk of the main charge was urea nitrate.

Taken together, the opinions concerning the defendants' capacity to make urea nitrate, and the likelihood that urea nitrate was used in the bombing, were incriminating in view of the uniqueness of the criminal use of urea nitrate. Williams testified that his research revealed only one prior use of urea nitrate as an improvised explosive charge--in a pipe bomb in 1988. If such an unusual explosive was indeed used at the World Trade Center, the defendants' link to a bomb factory and storage facility capable of making the precise amount of urea nitrate allegedly used at the Trade Center would substantially contribute to the proof of guilt.

Williams' opinions were important for another reason. Normally, the way a crime laboratory determines the main charge of an exploded bomb is by finding unconsumed particles or distinctive

byproducts of the explosive among the residue. The search for such particles is made by a forensic chemist. In the FBI at the time of the World Trade Center case, the chemists specializing in the examination of explosives residue were Whitehurst and Burmeister, who were assigned to the MAU. One problem for the prosecution in the World Trade Center case was that the MAU chemists did not find any residue identifying the explosive. Thus, the normal way of scientifically determining the main charge was unavailable. Williams' purported identification of the explosive filled that void.

## **1. Defendants' Capacity to Make 1200 Pounds of Urea Nitrate**

### **a. The Science**

Williams calculated the amount of urea nitrate the defendants could have produced from the amounts of urea and nitric acid that were missing--i.e., from the amounts ordered minus the amounts recovered in searches of premises associated with the defendants. To make such a calculation, the area of chemistry known as stoichiometry must be applied. Stoichiometry concerns molecular weight relationships in chemical reactions. In this instance, the chemical reaction was: one molecule of urea plus one molecule of nitric acid produces one molecule of urea nitrate. As previously noted, each of these molecules has a different mass or weight. The molecular weight of urea is 60; that of nitric acid is 63; and that of urea nitrate is 123. Thus theoretically (100% yield), 60 grams of urea plus 63 grams of nitric acid produces 123 grams of urea nitrate. For every 60 grams of urea, 63 grams of nitric acid is required. (Similarly, for every 60 pounds of urea, 63 pounds of nitric acid is needed.)

Determining the potential amount of urea nitrate that could have been produced requires a determination, first, of the limiting reagent because it is the chemical that will run out first. For example, with only 63 grams of nitric acid, one could only produce 123 grams of urea nitrate even with an unlimited amount of urea. In this example, the nitric acid would be the limiting reagent.

Once the limiting reagent is determined, the potential amount of urea nitrate can be determined with a simple calculation: If urea was the limiting reagent, for every 60 grams (60 pounds) of urea that was missing, the perpetrators potentially could have produced 123 grams (123 pounds) of urea nitrate. If nitric acid was the limiting reagent, for every 63 grams (63 pounds) of nitric acid that was missing, the perpetrators potentially could have produced 123 grams (123 pounds) of urea nitrate.

One additional factor must be taken into consideration: the purity of the components. The calculations above assumed that the components were 100% pure. If, for example, the urea was only 50% pure, you would need twice as many grams (or pounds) of urea as indicated above: 120 grams (or 120 pounds) would be needed for every 63 grams (63 pounds) of 100% pure nitric acid. Similarly, if both components were less than 100% pure, appropriate adjustments would have to be made.

### **b. Factual Background: Jourdan's Calculations**

On March 7 or 8, 1993, Williams provided a list of the missing components to a forensic chemist in the CTU (Thomas Jourdan) and asked him to calculate the potential amount of urea nitrate that could have been produced. Jourdan made the calculations and reported back to Williams, Agent Richard Hahn, and possibly EU Chief J. Christopher Ronay. It appeared to Jourdan that they did not understand his explanation of how nitric acid was the limiting reagent, so Jourdan prepared a memorandum explaining his calculations and gave it to Ronay and Williams and probably to Hahn.

Based on the figures Jourdan had, he determined that the nitric acid was the limiting reagent, and determined that the upper limit was the production of 1821 pounds of urea nitrate. Jourdan used a 97% yield instead of 100% because a staff member (this was James Molnar, see p.85, supra) had achieved such a yield in the Laboratory. Jourdan also noted that [r]ecovered empty bottles of HNO<sub>3</sub> [nitric acid] indicated usage of about equal portions of 70.4% (reagent grade) nitric acid and 67% (technical grade) nitric acid. He defined limiting reagent as stoichiometrically you run out of it first, and stated that ordinarily, urea is the limiting reagent to make sure the urea nitrate is not adulterated with unreacted urea, which would inhibit the explosive's effectiveness.

At the time Williams testified at the Salameh trial, his figures regarding the missing components were different (presumably updated) from the ones given to Jourdan. At the time of the trial it was determined that 1200 pounds of urea and 1694 pounds of nitric acid were missing. See G.Ex. 862. Using these figures and Jourdan's basic methodology, a proper stoichiometric calculation would be as follows: Jourdan assumed, as we will do here, that the concentration of the urea was 100% and the average concentration of the nitric acid was 68.7%. A quantity of 1694 pounds of 68.7% nitric acid is the equivalent of 1164 (1694 x .687) pounds of 100% nitric acid. Since, as noted above, 63 pounds of nitric acid is needed for every 60 pounds of urea, 1164 pounds of 100% nitric acid is inadequate to achieve a complete reaction of 1200 pounds of 100% urea. Accordingly, the nitric acid was the limiting reagent.

For every 63 pounds of completely reacted nitric acid, 123 pounds of urea nitrate is theoretically (100% yield) produced. Therefore, with a 100% yield, 1164 pounds of nitric acid would produce 2273 pounds of urea nitrate. A 97% yield, as obtained by Molnar, would produce 2205 pounds of urea nitrate.

### **c. Williams' Salameh Testimony**

In his testimony in the Salameh trial, Williams was asked to calculate how much urea nitrate could be produced from the missing urea and nitric acid. Williams first addressed the concept of a limiting reagent:

Whenever you have a reaction like this, there is a limiting reagent when you mix two things together. You can only go so far because one of the components limits the quantities that you're going to have.

In the case of manufacturing urea nitrate, urea is the limiting factor. So, you'd always want to add a little bit more nitric acid than the recipe calls for to make sure that you've reacted all the urea.

Next, Williams addressed the issue of yield. He testified that in a laboratory type environment the [b]est case scenario would be in the neighborhood of 90 percent. He then testified:

Q. And if you're not working in a scientific laboratory, what effect would that have on the yield?

A. It's drastically reduced. You're going to have a lot of spillage because you're going to be cautious. It will splash out. You will lose some of the mixture on the ground. You're going to lose some because it's getting held up in your filter paper and that's a pretty good amount. So, in reality, in a non-laboratory environment, I would expect that and, as a matter of fact, you would get somewhere around a 60- to 70-percent yield.

Williams then testified:

With 1,500 pounds ordered and delivered of urea to the storage area, and finding 300 pounds left in that shed, mixing it with the quantities of nitric acid, the urea and nitric acid would form ideally about 90 percent of the gross weight.

So, if we have 1,200 pounds of urea used unaccounted for, if it was used, we could make a mixture of somewhere around 2,100 pounds, give or take, on ideal conditions of urea nitrate. If the urea nitrate was mixed in a less than ideal environment, not laboratory techniques, and using something as simple as newspaper for filter paper, I would expect that we would get in the neighborhood of somewhere between 1,200 and 1,800 pounds of urea nitrate and then depending on how it was packaged, how sloppy the individual or individuals were that were packing it, you might lose a few more pounds.

So, in essence, you could have an explosive charge of urea nitrate perhaps between 1,200 and 1,800 pounds.

Later in his testimony Williams referred to the amount of urea nitrate that could have been made as about 1,200 pounds.

#### d. Analysis

We have reached several conclusions regarding Williams' testimony.

First, Williams lacked the requisite scientific knowledge to testify competently in this area. When Jourdan initially discussed the calculation of potential urea nitrate, Williams appeared to Jourdan not to understand the concept of a limiting reagent. His testimony makes clear that he never learned the concept. Urea is not always the limiting reagent and was apparently not the limiting reagent here. Moreover, in his memorandum Jourdan explicitly defines limiting reagent as stoichiometrically you run out of it first and finds nitric acid to be the limiting reagent based on the information he was given. Accordingly, Williams' testimony was inconsistent with the Jourdan memorandum.

Moreover, assuming that urea was the limiting reagent in this case, Williams' numbers do not add up. Because, as earlier noted, 60 pounds of fully reacted urea will produce 123 pounds of urea nitrate, 1200 pounds of urea will produce a theoretical (100% yield) of 2460 pounds of urea nitrate. A 90% yield would produce 2214 pounds (not 2100 pounds), and a 60% to 70% yield would produce 1476 to 1722 pounds (not 1200 to 1800 pounds). The errors in Williams' calculations conveniently produced a range that included the exact amount of urea nitrate--1200 pounds--that he later testified was used in the Trade Center bombing.

Second, Williams' discussion of laboratory yield was problematic. Williams testified that in a laboratory type environment the [b]est case scenario would be a yield in the neighborhood of 90 percent. In his OIG interview Williams said he got the 90% figure from Whitehurst or Burmeister, although they do not confirm this. Assuming they said it, we nevertheless question Williams' choice of words, which implied that his testimony about laboratory yield was based on his own expertise. A laboratory yield for a chemical reaction is obviously outside Williams' area of expertise. He told us in his OIG interview that he had no way of knowing, independent of the chemists, the accuracy of the 90% number, but believed he could rely on the opinion of other experts in his testimony. An expert may rely on opinions of other experts if this is the normal practice in the field. See Fed. R. Evid. 703. Accordingly, Williams would have been fully justified, in rendering his own opinions, in relying on the chemist's statement about yield. For example, he could have testified, My opinion is based in part on the statement of Chemist W, who told me 90% is the best yield. But if he had so testified (with an attribution for the yield statement), the court would have known on whose expertise the 90% number rested. But that is not what Williams did. He did not attribute the 90% number to anyone else, but rather continued to give the impression that he was speaking from his own expertise, which was misleading.

The failure to attribute the 90% figure was particularly inappropriate here because at this point in Williams' testimony he was apparently testifying about the manufacture of urea nitrate based on his personal experience in making it. Because the 90% figure was not based on that experience, Williams should have revealed the source of the yield number.



Third, Williams' trial testimony about non-laboratory yield was unscientific and speculative, was based on improper grounds, and appears tailored to correspond with his estimate of the amount of explosive used in the bombing. Williams testified that in reality, in a non-laboratory environment, I would expect that and, as a matter of fact, you would get somewhere around a 60- to 70-percent yield.

When asked in his OIG interview the basis for this testimony, he explained that it was based on three factors. The first factor was the yield at Eglin. He said the yield there was 1158 pounds of urea nitrate from 1600 pounds, or 1500 pounds, give or take, of ingredients (urea and nitric acid). A yield of 1158 pounds from 1600 pounds would be 72%; a yield from 1500 pounds would be 77%. Williams described the Eglin operation as a pseudo-laboratory environment.

The second factor was Williams' observations during the searches of the defendants' alleged bomb factory and storage facility. During these searches he observed evidence of a lot of spillage of urea nitrate, which was more than at Eglin.

When asked whether the evidence of spillage suggested a yield much lower than 60-70%, Williams identified the third factor he considered to determine non-laboratory yield :

Along with the investigation that I had results from, from the purchase of chemicals, the known purchase of chemicals, there was a quantity that was purchased, we found no other places where they had purchased urea or nitric acid. But we did find where they did purchase a quantity. We have knowledge of a quantity of chemicals they had purchased. And I had knowledge of how much chemical was left in the Space Station Storage [the defendants' alleged storage facility] unused.

I also used that to base on what potential percentage of yield was.

We are deeply troubled by Williams' rationale. The first factor used--the yield at Eglin--is problematic. To use Williams' words, Eglin was a pseudo-laboratory environment, in which chemists did the mixing. It is impossible to say whether the typical non-laboratory environment --if there is one--would be better or worse than Eglin. Assuming it would be worse because of an absence of chemists, one could only speculate about how much worse. Further, improvised (i.e., homemade) explosives are sometimes produced by chemists; so an assumption that non-chemists made the explosive would be invalid.

The second factor was also inappropriate. Williams' trial testimony about a non-laboratory yield was offered as an expert opinion based on his experience making urea nitrate. He was asked what the yield typically would be in a non-laboratory setting. By basing that opinion on residues found at the defendants' storage facility and bomb factory, Williams really offered an opinion on the yield he thought the defendants would have had, but masked it in the guise of a general opinion. Moreover, it is pure speculation to say what the defendants' yield would have been from the discovery of some urea nitrate crystals evidencing spillage.

The third factor, however, is the most problematic. There is a degree of ambiguity as to what exactly Williams meant. In essence, he said he based his testimony about non-laboratory yield in part on the amount of chemicals missing (amounts purchased minus amounts recovered at the storage facility). Our interpretation of the passage is this: Williams apparently assumed the Trade Center bomb was made from the chemicals missing from defendants' storage facility. He estimated, as he later testified, that the main charge at the Trade Center weighed 1200 pounds. He then divided 1200 by the weight of the applicable amount of missing urea and nitric acid to give him an estimate of defendants' yield. He then considered defendants' yield to help him determine non-laboratory yield generally.

Based on the amount of urea and nitric acid missing from the defendants' facility, they had the capacity to produce urea nitrate in an amount in excess of 2000 pounds if the yield was high (over 90%) and in an amount less than 1200 pounds if the yield was low (below 50%). Williams testified at trial that the amount of the explosive used in the Trade Center bombing was about 1200 pounds. If the defendants' yield was substantially below 90% but not below 50%, a good match could be obtained between the amount the defendants could have produced and the amount supposedly used in the bombing. By setting the non-laboratory yield at 60 to 70 percent, Williams obtained a good match.

The purpose of a criminal trial, of course, is to determine guilt. The issue of guilt is the ultimate question to which all others are directed. In contrast, Williams began with a presumption of guilt as a foundation on which to build inferences. (As we shall see below, this is not the only time in the Salameh trial that Williams so utilized a presumption of guilt.) The agent simply assumed that the perpetrators produced a 1200 pound bomb at the Trade Center using the urea and nitric acid missing from the defendants' facility, and that yield (the amount used at the bombing divided by the amount missing) informed his testimony about non-laboratory yield, which was presented to the jury as a general number applicable to all non-laboratory environments.

It appears Williams may have worked backwards --that is, he may have first determined the result he wanted (here, that the defendants could have produced 1200 pounds of urea nitrate, the amount he estimated was used in the bombing) and then tailored his testimony about yield to reach that result. We are deeply troubled by this possibility.

We conclude that a competent expert cannot give a narrow range for the yield in a non-laboratory environment. A commercial production facility or a meticulous chemist in a garage can potentially achieve a yield as high as that produced in a laboratory. On the other extreme, careless persons without knowledge or skill may be unable to produce the explosive at all (0% yield) or may achieve only a very low yield. Accordingly, we find that Williams' testimony about non-laboratory yield was invalid and beyond his area of expertise.

Fourth, had Williams or another witness performed the stoichiometric calculation correctly, the result--a 100% yield of about 2273 pounds of urea nitrate with a real possibility of a much lower figure in a non-laboratory setting--would have been perfectly acceptable to the prosecution's theory of the case. Williams seemed to have pushed the envelope to get to 1200 pounds--his estimate of the

weight of the explosive used in the bombing. Such exacting symmetry was unnecessary.

In sum, we conclude that Williams' testimony about the potential production of urea nitrate was outside his area of expertise and deeply flawed, and his excesses were unnecessary to an effective presentation of the prosecution's case.

## **2. Williams' Opinion Regarding the Explosive Used in the Trade Center Bombing**

Having established the defendants' capacity to manufacture 1200 pounds of urea nitrate, Williams went on to render an opinion in the Salameh trial that the main explosive charge in the Trade Center bombing was 1200 pounds of urea nitrate. This testimony was also seriously flawed.

### **a. Velocity of Detonation**

An important part of Williams' opinion concerning the explosive used at the Trade Center was his determination of the velocity of detonation (VOD) of that explosive based on his assessment of the damage at the scene. Attachment C: A Primer on Explosives and Velocity of Detonation, infra, defines VOD and is a necessary foundation for the discussion that follows. The significance of the VOD determination was that it provided a basis for Williams' opinion concerning the type of explosive used in the bombing.

#### **(1) The VOD of Urea Nitrate**

##### **(a) Background**

Williams testified at the Salameh trial to the VOD of urea nitrate:

Urea nitrate in smaller quantities detonates at a velocity of about 14,000 feet per second. The larger quantity that you get of urea nitrate it compacts on top of itself and may approach 15,500 feet per second.

When asked at his OIG interview the basis for these figures, Williams stated that they were a rough estimate from information I had obtained from different sources. The information was allegedly

received orally from persons Williams regarded as knowledgeable sources within the field of explosives. These sources told him, [I]t's approximate. These fellows had not worked with it. And wherever they got the information from, this is what I had received from them. Williams told us there was very little literature on the subject. He continued:

And the actual written material that I found was -- it was a very broad definition. It didn't seem that two people agreed on the same thing. . . .

[Question by OIG:] That literature indicated that it was unclear as to what the velocity of detonation was?

AGENT WILLIAMS: Not unclear. There was just such a wide parameter of detonations and pressure. Very little research had been done and written about that I was able to locate.

OIG: And it was wider than 14,000 to 15,500 feet per second; is that correct?

AGENT WILLIAMS: I don't recall.

OIG: You don't recall that -- I mean, the literature did not reflect 14,000 to 15,500 feet per second; is that right?

AGENT WILLIAMS: I don't recall. . . . I do recall seeing these figures visually. . . . And I don't recall if it was after I prepared it from the verbal information or if it's information that I received by looking at some type of research document.

After the OIG interview we obtained Williams' notes for the World Trade Center case. There is nothing in the notes indicating that the VOD of urea nitrate is 14,000-15,500 feet per second.

The notes, however, do contain two copies of page U103 of the Encyclopedia of Explosives and Related Items (U.S. Armament Research and Development Command 1983) ( Encyclopedia ), a standard text in the field. Page U103 contains the following:

urea nitrate has a deflagration pt of 186 [degrees]; a deton rate of 3400m/sec (at d 0.85g/cc in a 30mm diam paper tube when driven by 1.5g of MF), and 4700m/sec (at d 1.20g/cc in a 30mm diam steel tube when driven by 1.5g of MF)

(Abbreviations in original.) A VOD of 3400-4700 meters per second converts to about 11,155 to 15,420 feet per second. In the OIG interview, Williams stated that he reviewed the Encyclopedia regarding the VOD of urea nitrate before he testified in Salameh.

Also among the case notes is a notation of 12-15,500 FPS, without further elaboration, on a sheet from Williams' notepad. In a letter in August 1996 Williams commented on this notation:

I do not specifically recall why I had written down 12-15,500, nor where I had found it. I did in fact write it and it suggests to me that either I or someone to whom I had conversation with had rounded off the possible VOD of what most likely would have been urea nitrate.

In his OIG interview and correspondence, Williams named only three knowledgeable sources within the field of explosives who he allegedly consulted prior to his testimony--Tom Dowling and Fred Smith of the Institute of Makers of Explosives and Paul Cooper of Sandia National Laboratories. In his OIG interview Dowling stated that he did not recall talking to Williams or talking to anyone from the FBI about the VOD of urea nitrate after the Trade Center blast, but said he was reasonably sure he talked to FBI employees on the telephone about other aspects of urea nitrate. Dowling said that if he had been asked about the VOD of urea nitrate, he would have consulted his reference material and given the caller the information he had. Dowling had only one reference book that contained the VOD of urea nitrate--the Encyclopedia. Smith stated in his OIG interview that he did not recall that anyone ever asked him about the VOD of urea nitrate, that he would not have known the VOD, and that to answer the inquiry he would have consulted the Encyclopedia. Cooper stated in his OIG interview that he was pretty sure no one from the FBI called him to ask about the VOD of urea nitrate and that if someone had called he would have had to perform research or calculations to determine the VOD.

In addition to the Encyclopedia, our own literature search found only one text setting forth the VOD of urea nitrate (Urbanski, Chemistry and Technology of Explosives 469-70 (1965)), and it contained the same VOD as the Encyclopedia--3400 to 4700 meters per second.

Williams testified at his OIG interview that after the Salameh trial (and before the Rahman trial) [w]e detonated the explosives [the urea nitrate] we made at Eglin and measured the VOD to be 12,100 feet per second. Williams characterized this measured VOD as substantially less than 14,000.

## **(b) Analysis**

Williams' Salameh testimony about the VOD of urea nitrate was, at best, incomplete and, at worst, knowingly incorrect. The Encyclopedia, a standard text in the field of explosives, indicated that urea

nitrate has a VOD of about 11,155 to 15,420 feet per second. Although the applicable page of this text was in Williams' notes and although prior to his testimony he had consulted it, he nevertheless testified, without qualification, that the VOD is 14,000-15,500 feet per second.

Williams claimed in his OIG interview that he based his testimony about the 14,000-15,500 feet per second VOD of urea nitrate on oral statements from persons outside the FBI. The interviews of Dowling, Smith, and Cooper, and the absence of supporting documentation in the case notes, leave us with grave doubts about the veracity of this claim. In any event, these oral opinions allegedly came from persons who had not worked with urea nitrate, and Williams did not know the basis of their opinions. Assuming Williams received such opinions, we conclude that it was inappropriate for him to blindly rely on them and ignore the Encyclopedia. At a minimum, Williams should have told the court he was relying on outside opinions, and he should have supplemented those opinions in court with the information from the Encyclopedia.

Finally, in his August 1996 letter, Williams came up with a completely new reason for his testimony about the VOD of urea nitrate:

One or more of the individuals from Eglin, at the time of our manufacturing of urea nitrate at Eglin, had conducted tests to determine the density of urea nitrate as it was manufactured. If you notice, in the highlighted area from the Encyclopedia of Explosives the density for the different VOD tests are 0.85g/cc and 1.20g/cc. This allows for the extreme variance of VODs as listed in the Encyclopedia. The resulting examination indicated that the density of the urea nitrate that was manufactured in Eglin was near the upper end of that density. I do not specifically recall what those figures were, however, in my conversations with the Eglin folks, they agreed that due to the higher density, not tamped or packed tightly, the VOD would be higher or faster than the low end scale. It was also my opinion at the time of testimony in the trial, that the urea nitrate manufactured for the bombing was homemade, allowed to rest for a period of time and then transported while packaged in the Ryder truck, from New Jersey to New York City. The density of the urea nitrate in this device, in my opinion, was higher thus suggesting that the VOD was faster than the lower end of the 11,155 estimate.

This new explanation for Williams' trial testimony is not helpful to Williams' position. First, we do not find it credible. It is inconsistent with both his trial and OIG testimony, and we think that if this were the real reason for his trial testimony he would have mentioned it at the OIG interview. At the OIG interview Williams mentioned the Encyclopedia but limited his remarks to: I know I definitely looked at the Encyclopedia of Explosives, and I don't recall specifically what it had said at that point. The August 1996 explanation came after we confronted Williams with page U103 from the Encyclopedia, and the new explanation appears contrived to accommodate that text. Second, Williams' trial testimony did not purport to be an estimate of the VOD of the urea nitrate made either at Eglin or by the perpetrators. Rather, it was put forth as the general range for the VOD of urea nitrate. The 14,000 feet per second figure was explicitly limited at the trial to smaller quantities, which would be inapplicable to both Eglin and the perpetrators. Third, density was not the only variable mentioned in the Encyclopedia; the confinement also varied (paper versus steel tube) and may have had as significant an impact on VOD as the density. Thus, Williams' new explanation is based on a misconstruction of the Encyclopedia. Fourth, Williams' statement in the new explanation that he thought the urea nitrate used in the bombing had a high density is speculative. If, as seems

unlikely, the new explanation is the true explanation, Williams should have given the same information in court as he did in his letter--namely, that the VOD for urea nitrate is about 11,155-15,420 feet per second, but that he thought the VOD of the main explosive was at the high end of that range for certain specific reasons. The new explanation reflects adversely on Williams' credibility and competence.

We conclude that the 14,000-15,500 VOD range for urea nitrate that Williams gave at the Salameh trial was clearly too narrow, and appears tailored to correspond to the estimates in his report (14,000 feet per second) and in his testimony (14,000-15,500 feet per second) of the VOD of the main explosive used at the Trade Center. In his trial testimony about the VOD of urea nitrate, Williams failed in his responsibility to provide the court with complete and accurate information.

## (2) The VOD of the Main Explosive

Having told the jury that the VOD of urea nitrate was about 14,000 to 15,500 feet per second, Williams went on to testify as follows to the VOD of the main explosive at the Trade Center:

On the brief two and a half hour walk-through [at the scene of the bombing] I had the opportunity to inspect a lot of [damaged materials]. . . . By putting all of these things together and looking at the size of the hole I estimated that the velocity of detonation was somewhere between 14,000 and about 15,500 feet per second, with a little bit of give on each side of that.[]

We conclude that Williams' VOD opinion lacked a sufficient scientific and empirical foundation.

### (a) Inconsistencies

At the outset we note that Williams has been inconsistent as to his estimate of the VOD of the main charge at the World Trade Center. In his report dated July 1, 1993, he stated that the explosive main charge was a high explosive having a velocity of detonation (VOD) of approximately 14,000 feet per second. In his Salameh testimony in February 1994, he gave a VOD of somewhere between 14,000 and about 15,500 feet per second, with a little bit of give on each side of that. Later, in the Rahman trial in April 1995, Williams testified:

From this walk-around [at the scene of the bombing] I was able to look at the damage and conclude that I was looking at the damage from a[n] explosive that had a velocity of detonation around 14,000 feet per second.

Obviously, without being in there when the bomb went off or seeing what kind of explosive it was, I have to give a bracket on both sides of a couple thousand feet.

In his OIG interviews in February and March 1996 he also stated that his VOD estimate included a 2000 feet per second tolerance on either side of the 14,000-feet-per-second estimate--i.e., a range of 12,000 to 16,000 feet per second. Finally, in a letter to the OIG in August 1996, Williams stated: The other reason that I testified as to the VOD damage in the Trade Center, is that from the damage I witnessed, it appeared to me that the improvised explosive device was faster tha[n] 11,000 and slower than 16,000.

Thus, Williams has given four estimates of the VOD for the main charge: approximately 14,000 feet per second (his report), 14,000 to about 15,500 feet per second with a little give on each side of that (Salameh trial), around 14,000 feet per second with a bracket on both sides of a couple thousand feet (Rahman trial, OIG interviews), and between 11,000 and 16,000 feet per second (letter to the OIG).

We observe that Williams' adjustment from 14,000 (report) to 14,000-15,500 feet per second (Salameh trial) coincided with his Salameh testimony that the VOD of urea nitrate was 14,000-15,500 feet per second. His change from 14,000-15,500 (Salameh trial) to 12,000-16,000 feet per second (Rahman trial) occurred after Williams discovered that the VOD of the urea nitrate made at Eglin was 12,100 feet per second. His change to 11,000-16,000 feet per second (August 1996 letter) occurred after we pointed out to him that the Encyclopedia gave the VOD range of urea nitrate as about 11,155 to 15,420 feet per second. The circumstances of the four estimates imply that Williams changed his VOD opinion for the main charge in order to maintain a match with the VOD of urea nitrate.

We conclude that Williams' inconsistencies severely undercut the credibility of his VOD opinion for the main charge.

## **(b) Justification for Opinion**

### **(I) World Trade Center**

Williams testified in the Salameh trial that he considered several observations to determine the VOD of the Trade Center bomb:

On the brief two and a half hour walk-through I had the opportunity to inspect a lot of witness vehicles[], concrete, steel-reinforcing rod, steel beams, and other fragments of material in and around the seat of the explosion.



By looking at some of the pieces of steel, for example, that very large piece of steel that was thrown back into the tower room, and where it broke off, recognizing that that part was actually about 12 feet or so away from the seat of the blast, the specific unique breaking of the steel particle and different distances away from the seat of the explosion, I witnessed different types of explosive damage.

By putting all of these things together and looking at the size of the hole I estimated that the velocity of detonation was somewhere between 14,000 and about 15,500 feet per second, with a little bit of give on each side of that.

.....

For example, if we had C4 [a military ordnance] in that World Trade Center basement, a quantity of it, of course the quantity doesn't matter, over a hundred pounds, because the velocity of detonation of the C4 is somewhere around 24,000 feet per second, give or take, that explosive is very brisan[t], brisance meaning that that shock wave comes out real quick. When that shock -- and it doesn't last as long as a slower velocity explosive. So when that brisance hit the target material like steel -- if you recall in the one photograph where it looked like that steel was torn -- we would see a lot more of that tearing, really tremendous tearing damage in some of the heavier materials like the steel.

If, for example, we go to a slower velocity explosive, let's say something around 14,000 feet per second, when that detonates we're going to get more of a pushing, a heaving effect. It's not going to crack it hard. It's going to gradually build up, but still very rapidly take hold of that witness material and give it a push or a shove, and it's not going to crack that material as rapidly.

Q. Is that in fact the type of explosive damage that you saw?

A. The pushing and heaving is exactly what I saw in the World Trade Center.

The problem with this testimony is that Williams never explains how the observations compute to 14,000-15,500 feet per second. That he observed evidence of heaving as opposed to brisance --i.e., the damaged materials appeared to have been pushed rather than shattered --only necessarily excludes military explosives such as C4 with VODs in excess of 18,000 feet per second. Nowhere in his testimony does Williams explain how he narrowed the broad heaving range of high explosives (about 3000 to 18,000 feet per second) to 14,000-15,500 feet per second.

In his OIG testimony Williams elaborated further on his rationale. He stated he considered the damage to the component parts of the suspect vehicle and other witness materials around there, the concrete, the steel, the vehicles, the people. He stated that because he found pitting and cratering within four feet, and evidence of heaving and no tearing within eight and a half feet, of the seat of the explosion, [t]hat put me into an area of somewhere between 12,000 and 16,000 feet per second . . . I didn't find any pitting or cratering eight feet away; but four feet away, I did. He continued:

So by looking at all of these different things, the way the concrete was broken into large pieces as compared to limestone dust within the near proximity as you gradually went away from it, looking at autopsy reports and photographs of victims, by the burning on their bodies or the scorching of the surrounding area, I can roughly get a feel that it was a very hot explosive or a not so hot explosive, a lot of fire ball balls produced, that sort of thing. . . .

By putting all of this together and looking at what I saw in the Trade Center, I was able to say that the velocity of detonation of the explosive main charge was about 14,000 feet per second.

Williams stated he considered a host of other things, including [t]he bodies, the burning. He elaborated:

OIG: Okay. So getting back to your testimony of between 14,000 and 15,500 feet per second, what you viewed on the body, how did that help you determine that the velocity of detonation was between 14,000 and 15,500 feet per second?

That's my question, sir.

AGENT WILLIAMS: Okay. And I cannot answer that a single body could tell me the velocity of detonation. The body along with all of the other environment that I looked at.

OIG: What was it about the body that helped you to get to the conclusion that it was between 14,000 and 15,500 feet per second?

AGENT WILLIAMS: That allowed me to say, well, by looking at one individual body -- they were eating lunch at the time. He had food in his mouth that was still partially chewed.

Another body had fragmentation damage in the eyeball and not in the eyelid, suggesting he

didn't have time to blink by the time he got hit with fragmentation.

I looked at a body that had a mangled arm that was caused by some surrounding area, part of the wall, a cinder block, perhaps, that had ripped the arm off.

OIG: And that couldn't have been done at 18,000 feet per second, you're saying?

AGENT WILLIAMS: Absolutely not.

OIG: And it couldn't --

AGENT WILLIAMS: Not the damage that I saw.

OIG: The damage to the body?

AGENT WILLIAMS: That's correct. I would have expected --

OIG: And you say that based on what, sir?

AGENT WILLIAMS: I know where the bodies were found. I know the damage to the body. I know the debris that was found all around the body. I know where that debris originated before the blast.

Concrete blocks for a cinder block wall, something of that nature; an unopened box of photocopy paper; these items were removed from their original position less than 10 feet away from the seat of the blast and thrown to an area where they finally rested near the body.

The damage to those objects suggested to me that if it was 18,000 feet per second, they would be smaller, they would be torn or ripped like the pipe that's shredded like paper, and the bodies would have had slightly different damage.

OIG: What kind of damage?

AGENT WILLIAMS: They would have been hit with smaller flying objects.

OIG: Would the arm have been ripped off in a different way?

AGENT WILLIAMS: Yes. Their bodies would have shown different physical damage.

If, for example, I had two bombs, one was smokeless powder, and one was C-4; and I had individuals the same distance away, I would expect totally different damage to those bodies.

OIG: Okay. And where did you learn all this from? I mean, is there some literature out there, sir, that tells --

AGENT WILLIAMS: There's a good bit of literature.

OIG: Okay. And that literature would support your statement about the damage to the bodies?

AGENT WILLIAMS: Yes, it would.

OIG: I see. Is there literature out there that supports your ability to estimate a velocity of detonation of between 14,000, 15,500 feet per second based on the explosive damage? Is there literature that indicates that a qualified expert can do that?

AGENT WILLIAMS: I don't know.

The thrust of Williams' OIG testimony is that he considered numerous factors bearing on VOD, which he then filtered through his experience to produce his VOD estimate. We find Williams' application of his methodology flawed, because it is essentially an unscientific, unverifiable process of intuition. This is apparent from some of the language Williams used to describe his method of determining the VOD and weight of the explosive: I can roughly get a feel that it was a very hot explosive or not (emphasis added); [w]hat caused me to guess a velocity of detonation (emphasis added); [t]hese things produced an impression on me (emphasis added).

The application of the methodology is one of rough[] . . . feel[ings], guess[es], and impression[s]. There was a complete absence of empirical data to support any of the inferences Williams made from the various factors he identified. For example, Williams emphasized that the pitting and cratering within a radius of 4 feet from the seat of the explosion, when combined with only heaving without pitting and cratering within 8.5 feet, showed a velocity of detonation of 12,000-16,000 feet per second. But neither Williams nor the FBI has data to support that thesis. Moreover, in the Oklahoma City case (see Part Three, Section G, *infra*) Williams found pitting and cratering 12 feet from the seat

but nevertheless estimated the VOD to be 13,000 feet per second in that case, effectively undercutting the primary basis he claimed for his VOD opinion in the World Trade Center case.

The same could be said for the conclusions he drew from observing certain victims' bodies--e.g., the way in which an arm was severed, an eye injury. Williams and the FBI have no data or other basis for concluding that the nature of those injuries meant the VOD was 14,000-15,500 feet per second.

## **(ii) Oklahoma City**

Williams' attempt to justify a specific VOD estimate in the Oklahoma City case is similarly unpersuasive and supports our view of the inappropriateness of attempting to fix a narrow VOD range from an assessment of the blast damage. In his Oklahoma City report, Williams estimated the VOD of the main charge to be 13,000 feet per second. Williams explained in his OIG interview that he reached his VOD opinion by considering the explosive damage at the crime scene in light of his experience. He cited approximately fifteen different factors that contributed to his opinion--such as, the damage to the vehicle containing the bomb, the size of the crater, the lip of the crater, evidence of heaving, the damage to the concrete, the size of the vehicle fragments, pitting and cratering, the movement of parked cars, and the damage to parking signs. As in the World Trade Center case, however, the difficulty arose when Williams attempted to explain how he got from the observed damage to the specific VOD. For example, he contended that the size of the fragments contributed to his opinion. But neither Williams nor the FBI can cite any empirical studies linking specific sized fragments to specific VODs. Williams stated in his Oklahoma City interview that he had no documentation or experimentation to support his premises regarding the various factors and that he relied solely on his memory of explosive experiences spanning 10 to 15 years. We conclude that this is an inadequate basis for rendering a specific VOD opinion from observations of blast damage.

## **(iii) General Discussion**

Agent Thurman, the current EU Unit Chief, stated in his OIG interview that normally an EU examiner will only determine from the damage whether the explosive was high or low, heaving or brisant. With the exception of differentiating between a high explosive and a low explosive, the arbitrary, we do not, as a rule, go in the reports and state that it's 'X' number of feet per second. Indeed, Thurman, who has been in the EU for about 14 years, has never himself opined a specific VOD from a damage assessment, but has limited himself to opinions about high versus low, brisant versus heaving, explosives. In fact, Williams is the only examiner Thurman is aware of who has attempted to find a specific VOD from a damage assessment, and attempting to make such findings is not part of the EU training. Williams also believes he is the only EU examiner to have rendered a specific VOD opinion from the explosive damage. Furthermore, as noted above, Williams is unaware of any literature stating that an explosives expert properly may render such a VOD opinion. We also are unaware of any such literature. It thus appears that Williams may be unique, both within the FBI and within the community of explosives experts generally, in his willingness to render such specific VOD opinions.

We have no doubt that an experienced explosives examiner may properly draw certain inferences

from observations at a crime scene. For example, an experienced expert will be able to discern the difference between the damage left by a high versus a low explosive, and can differentiate the damage caused by a heaving high explosive (like most commercial products) versus a brisant (like most military explosives) high explosive. Similarly, an observation of pitting and cratering will tell an experienced expert that the explosive used was a high explosive with a VOD typically in excess of about 10,000 feet per second. All of this involves the use of experience to recognize certain distinctive characteristics of explosive damage.

Going further, however, and attempting to infer from the damage a specific VOD is a process that appears to have no precedent either in the literature or at the FBI. We believe it is unprecedented and unjustifiable because the differences in damage caused by explosives with different specific VODs are insufficiently distinctive to allow an experienced expert to say that certain damage will only result from an explosive with a particular VOD.

No database exists at the FBI that correlates specific VODs with particular damage or with the many other variables identified by Williams. We conclude that Williams in fact has no objective basis for estimating a specific VOD from an inspection of the crime scene.

Accordingly, we conclude that Williams' specific VOD opinion of 14,000-15,500 feet per second for the main charge at the World Trade Center lacked an adequate scientific and empirical basis.

## **b. Identification of the Main Charge**

Having testified that the VOD of the Trade Center explosive was 14,000 to 15,500 feet per second, Williams went on to testify about the type of explosives that fit that range. We will first summarize that testimony and then analyze it.

### **(1) Williams' Testimony**

On direct examination, Williams testified as follows:

Q. Based on the damage and your estimated velocity of detonation, did you form a conclusion as to what type of explosive was used?

A. Yes. Immediately because of that type of damage without doing any type or having any knowledge of chemical residue analysis, the type of explosives that fit in that bracket are very limited. . . .

So within that parameter of 14,000 to 15,500 feet per second we're limited to the

fertilizer-based explosive such as ammonium nitrate, and also, certain dynamites, the ammonium-nitrate type dynamites. Perhaps on one end of the spectrum or the other end of the spectrum we may find something like water gels, a slurry or an emulsion. Each of these kind of explosives are commercially available and do specific damage, but their velocity of detonation are just a tad on either side of that parameter of detonation.

Williams further testified that he was able to rule out quite a bit of the slurries, water gels and emulsions because of the failure to find microballoons or tipper ties among the debris at the scene. Williams testified that microballoons are tiny glass balloons that are included in some emulsions to add air space, and tipper ties are the wire ends of water gels. He testified that he would have expected to find microballoons if the explosive at the Trade Center had been an emulsion and find tipper ties if it had been a water gel. He then concluded by identifying urea nitrate as within the category of a fertilizer-based explosive that would have that velocity of detonation consistent with the damage that [he] saw.

On cross-examination, one of the defense counsel (Mr. Campriello) attempted to recapitulate Williams' earlier testimony but misstated it, leading to the following:

Q. . . . In other words, you said that this was basically a bomb, if I understand, made of urea nitrate and this substance and that substance.

MR. ABDELLAH [another defense counsel]: Objection. That's not what he said.

THE COURT: I think he's -- I don't think you're limiting yourself. Is that what you're saying? You think?

MR. CAMPRIELLO: That's all I'm saying.

THE COURT: Go ahead.

A. Yes I do. I believe urea nitrate was the bulk of the constituent in that bomb with other explosive materials; yes.

Q. And have you concluded that that is the only possible bomb that could have caused this kind of damage based on everything you know or are there other possibilities as well?

A. Within the World Trade Center?

Q. Yes.

A. There was only one bomb in the World Trade Center.

Q. No, no. That, I understand to be your testimony.

What I'm saying is was whatever caused it just this one possibility or were there other possible bombs as well, not two bombs or three bombs, but you described a bomb?

A. Yes, okay.

Q. Could it have been another kind of bomb or no?

A. Not likely. As I said, the bulk of the explosive material could have been urea nitrate with other things such as ammonium nitrate dynamite and certainly there was some type of initiator, but the bulk of the explosive was, in my opinion, urea nitrate.

Q. I guess it's the could have been part that gives me pause.

THE COURT: Could it be ANFO [ammonium nitrate and fuel oil]?

MR. CAMPRIELLO: I didn't hear you, Judge.

THE COURT: Could it be ANFO?

THE WITNESS: Yes, it could be.

THE COURT: In other words, there could have been an ANFO bomb sitting there, and if that exploded, it would have caused the same kind of damage?

THE WITNESS: That's correct.



## (2) Analysis

### (a) Direct Examination

First, Williams testified on direct examination that because of that type of damage . . . the type of explosives that fit in that bracket are very limited. Assuming the VOD testified to at the Salameh trial--14,000-15,500 feet per second--there are many different explosives that fit in that bracket. Using the VOD testified to in the Rahman trial--12,000-16,000 feet per second--there are even more that qualify. Williams testified in his OIG interview that a lot of different explosives meet the 14,000-15,500 feet per second VOD range. For example, the 1980 Dupont Blasters' Handbook ( Dupont ) lists six prill products, four water gels, and two dynamites with a VOD within the 14,000-15,500 feet per second range, and more within the 12,000-16,000 feet per second range. The 1968 Canadian Industries Limited Blasters' Handbook lists three products with velocities in the 14,000-15,500 feet per second range. The 1995 Dyno Nobel Inc. Explosives Engineers Guide ( Dyno ) lists twenty-seven products with velocities in the 14,000-15,500 range.

Williams' testimony about the very limited type of explosives that fit in the 14,000-15,500 feet per second bracket was literally correct, because the many commercial products within that range fall into certain categories or types--namely, dynamites, water gels, emulsions, and fertilizer (e.g., ANFO) products. We are concerned, however, that the court may not have understood that within each type there are numerous commercial products meeting the 14,000-15,500 feet per second range.

Second, Williams testified that the VOD of water gels and emulsions are just a tad on either side of that parameter of detonation [14,000-15,500 feet per second]. This testimony was incorrect. There are several commercially available water gels and emulsions with VODs within the 14,000-15,500 feet per second bracket. See Dupont at 71; Dyno at 1-2.

Third, Williams testified at trial that he could rule out some of the explosives that met the range--namely, the emulsions and the water gels because of a failure to find microballoons and tipper ties in the debris. Williams contradicted this testimony at his OIG interview.

As for the microballoons, if used they may have been made of resin and likely consumed in the blast. More fundamentally, however, any microballoons used would have constituted only about five percent of the total explosive mixture. No residue of the main explosive was recovered at the Trade Center. If residue of the component constituting ninety-five percent of the charge was not recovered, it should be no surprise that remains of the five percent component were not found. Williams conceded at his OIG interview that the failure to find the microballoons meant only that it's possible that they were not there. Williams added, I couldn't eliminate them, because we didn't find anything.

Similarly, the failure to find tipper ties did not rule out water gels. Williams testified at his OIG interview as follows:

OIG: Just because you didn't find tipper ties does not really rule out those explosives, did it?

AGENT WILLIAMS: No, it does not. It would not rule it out.

If the explosives were shucked of all of their wrappers, completely shucked of the wrappers, I would not have found anything.[]

In his OIG interview, Williams told us: Because I did not find any evidence of any of the other commercial explosives does not necessarily mean that they were not used. Accordingly, we conclude that Williams should not have testified at trial that he could rule out the slurries, water gels, and emulsions.

Fourth, in his OIG interview Williams stated that, based on his assessment of the damage at the scene, he really could not make any type of identification of the explosive used at the Trade Center:

OIG: And I take it from your answer, that based on your assessment of the explosive damage that you observed and was made known to you, you could not have rendered an opinion that the bulk of the explosives in this case was urea nitrate; is that correct?

AGENT WILLIAMS: . . . . If I just had to work with that crime scene, there's no way I could have called any kind of explosive.

OIG: Because it could have been ANFO?

AGENT WILLIAMS: It could have been emulsions.

OIG: Could have been emulsions.

AGENT WILLIAMS: It could have been anything.

(Emphasis added). Williams' acknowledgment at the OIG interview that, based on the crime scene, the main explosive could have been anything differs significantly from the opinions he rendered at the Salameh trial. At the trial Williams testified that his observations at the scene enabled him to help the court determine the explosive that may have been used in the blast. Now he has admitted that there's no way I could have called any kind of explosive. In light of Williams' OIG testimony, we are deeply troubled that his testimony on direct examination may have misled the court.

In sum, we conclude that Williams' direct examination was inaccurate and misleading, and suggested too strongly that a fertilizer-based explosive like ammonium nitrate or urea nitrate was used in the Trade Center bomb.

### **(b) Cross-Examination**

Even more troubling than Williams' direct examination was a part of his cross-examination in which he rendered an incriminating opinion based on speculation beyond his scientific expertise. On direct, Williams identified a category of explosives that fit the VOD and damage that he observed at the post-blast scene. This category included but was not limited to urea nitrate. At his OIG interview (as discussed above), Williams was emphatic that he could not identify a specific explosive based on his observations at the crime scene.

Nevertheless, Williams testified on cross-examination that the bulk of the explosive was, in my opinion, urea nitrate. See also on the same page of cross-examination: I believe urea nitrate was the bulk of the constituent in that bomb with other explosive materials. At his interview we asked Williams how he could render such an opinion, and he answered: the reason I was able to do that in testimony was because I had the benefit of the search sites, the storage sites, the bomb factory and, of course, viewing the evidence from the crime scene. Williams continued:

OIG: And I take it from your answer, that based on your assessment of the explosive damage that you observed and was made known to you, you could not have rendered an opinion that the bulk of the explosives in this case was urea nitrate; is that correct?

AGENT WILLIAMS: If I had no benefit of auxiliary searches and materials, that's absolutely correct. If I just had to work with that crime scene, there's no way I could have called any kind of explosive.[]

Williams' use of the auxiliary searches to render an opinion that the bulk of the main charge was urea nitrate was improper for two independent reasons.

First, Williams improperly based his expert opinion that urea nitrate was the main charge on the fact that urea nitrate and other materials had been associated with the defendants. This error is analogous to the one Rudolph made in Psinakis when he relied on the fact that stripped detonating cord had been found outside the defendant's house as a basis for his identification of PETN on a knife. See

Part Three, Section A, supra. By basing his opinion on the collateral evidence associated with the defendants, Williams improperly engaged in speculation beyond his scientific expertise.

Williams portrayed himself as a scientist and rendered opinions as an explosives expert. As such, he should have limited himself to conclusions that logically followed from the underlying data and the scientific analyses performed. Here, Williams' scientific analysis of the cause of the explosion rested on an examination of the damage at the post-blast scene. He should not have based his opinions, in whole or in part, on evidence that was collateral to his scientific examinations, even if that evidence was somehow connected to the defendants. For Williams to identify the main charge as urea nitrate based on evidence that the defendants had or could make that compound is comparable to a firearms expert identifying the caliber of a spent bullet based on the mere fact that a suspect had a handgun of a particular caliber.

Earlier in the cross-examination Williams rejected defense counsel's suggestion that Williams was trying to infer that the items seized at the locations associated with the defendants must have been the items that were used in the World Trade Center (emphasis added). Williams testified then that he was only saying that the items seized could have been used in the Trade Center explosion. This was a valid scientific assessment of the defendants' capability and an appropriate rejection of the suggestion that the cause of the explosion could be determined scientifically from the evidence associated with the defendants. Williams should have maintained this approach throughout his cross-examination.

Evidence associated with the defendants is logically relevant to the blast's cause only under the following chain of reasoning:

- (1) Urea nitrate crystals and ingredients were found at locations associated with the defendants.
- (2) Defendants committed the World Trade Center bombing.
- (3) When defendants committed the crime, they must have used what was available to them, which was urea nitrate.
- (4) Hence, urea nitrate must have been used at the Trade Center.

This chain of reasoning is objectionable because it is not scientific and because it uses a presumption or inference of guilt (point two) as a building block in the analysis. The question of the defendants' guilt is the ultimate issue. It should not be presumed as a foundation for further analysis. By basing his urea nitrate opinion on the collateral evidence, Williams implicitly accepted as a premise the

prosecution's theory of guilt. This was improper.

Moreover, even assuming defendants committed the bombing and had the capacity to make a urea nitrate bomb, that did not necessarily mean urea nitrate was used at the Trade Center: the defendants, for example, may have disposed of the urea nitrate elsewhere and used another explosive in the bomb, or they may have converted the urea nitrate to nitro urea and used that explosive. Williams' opinion based on the collateral evidence was thus not only unscientific but also speculative, and it therefore fell well below the minimum standards required of competent forensic scientists.

Finally, because Williams failed to reveal that his urea nitrate opinion was based not on his independent scientific examination but on speculation from the mere fact that defendants could have made urea nitrate, the court was unable to put the opinion in its proper perspective, and a danger arose that the opinion would be given undue weight in support of the prosecution's case.

Second, the context of the questioning that led to Williams' identification of urea nitrate appears limited to an opinion based only on Williams' assessment of the damage at the crime scene. On direct examination Williams' opinion regarding the type of explosive used was explicitly [b]ased on the damage and [his] estimated velocity of detonation. It is obvious that the applicable cross-examination was an attempt to get Williams to repeat what he said on direct examination, which defense counsel misunderstood. See, e.g.: Correct me if I'm wrong. If I understood you correctly, you indicated . . . . Moreover, defense counsel, in the applicable cross-examination, explicitly asked about the possible bomb that could have caused this kind of damage. . . . [W]as whatever caused it [the damage] just this one possibility or were there other possible bombs as well . . . ? The court's questions about ANFO, moreover, make clear that the court believed the applicable examination related to Williams' assessment of the damage at the scene. Further, Williams' ready affirmative answer to the court's question Could it be ANFO? suggests Williams understood that the inquiry related to the damage at the scene.

It must be remembered that establishing that the explosive used at the World Trade Center was urea nitrate was extremely damaging to the defendants' case. Evidence linked the defendants to a bomb factory and storage facility containing evidence of urea nitrate or the ingredients for urea nitrate, an explosive rarely used in a criminal device. Williams' testimony on cross-examination, therefore, that the bulk of the explosive was, in my opinion, urea nitrate was very incriminating.

In this context, it was unprofessional and misleading for Williams, without explanation, to base such an incriminating opinion on a factor (the auxiliary searches) so different from the factors previously relied on (VOD and damage at the scene).

In sum, when Mr. Campriello asked Williams, Could it have been another kind of bomb or no? , the question, reasonably interpreted, meant: Could it have been another kind of bomb or no, based on your expert analysis of the damage at the crime scene? In any event, even if the questioning was inept, Williams had an obligation to restrict his opinions to his scientific analysis and to refrain from speculating about what the main charge must have been based on the defendants' capacity to manufacture a particular explosive. Williams' answer to Campriello's question should have been

compatible with the answer he gave us: [The main explosive] could have been anything. We conclude that by answering instead, [T]he bulk of the explosive was, in my opinion, urea nitrate, Williams failed in his responsibility to provide the court with an objective, unbiased expert opinion.

### c. Weight of the Explosive

Williams testified at the Salameh trial as follows concerning the weight of the explosive used in the Trade Center bomb:

Q. And based on your conclusion concerning the type of explosive did you estimate the quantity of explosive that was necessary to do the damage that you saw at the World Trade Center?

A. Yes, I did. And that kind of an analysis, once you recognize the velocity of detonation of the explosive, and you recognize the amount of damage that was created, you're able to kind of estimate how much explosive it would cause in a given environment to create that kind of damage. My initial estimate was somewhere between a thousand and 1500 pounds. That was within a day or two after. And that's about what I estimated, somewhere within that range. As a ballpark figure, about 1200 pounds.

If you recall, one of the variables, and why I'm such a large bracket, if you recall last Thursday I showed you some of the charts that showed configuration of explosives with the arrows going off at right angles and the Monroe effect with the shaped charge. The Monroe effect is how the shaped charges work and cut the steel with opposing angles. Without knowing the configuration of the explosive that's why we have such a tremendous variation.

In his OIG interview he explained further:

OIG: . . . [W]hat is it that gets you to between 1,000 and 1,500? What is it about the damage that leads [you to] that conclusion?

AGENT WILLIAMS: Well, after looking at the -- and estimating a velocity of detonation, I'm able to estimate the type of explosives that could have been used.

And in looking at the same or similar type properties of what caused me to guess a velocity of detonation -- the size of the crater, damage to surrounding vehicles, the distance from the scene of the explosion where different materials were damaged and how they were damaged at those areas -- these things caused me to come up with that conclusion.

.....

These things produced an impression on me that, where the charge was and how it came apart and comparing it with other tests that I have done with somewhat smaller charges and what I could assume I would find with something with about 1,000-pound charge.

Some of the same considerations that apply to Williams' testimony about VOD apply here. First, his analysis is intuitive, unscientific, and imprecise: you're able to kind of estimate how much explosive (emphasis added); Williams testified on cross-examination that he was speculating about the weight of the explosive; [t]hese things produced an impression on me. Second, the weight estimate was dependent on the VOD estimate ( If you vary one, of course, you have to vary the other ), and as discussed above the VOD estimate was itself speculative.

Third, EU examiners normally do not estimate the quantity of explosives because the placement and confinement of the explosive has such a significant effect on the amount of damage. As EU Chief Thurman told us:

We do not, on a routine basis, say that the damage in the area, with the exception of, you know, of the components, now, with the exception of the components, that the area has been destroyed with a particular type of explosive, or, more importantly, the quantity of explosives, because the placement of the device, the physical confines or lack of confines that the device is exploded in and around, was significantly impede -- or go into the determination of how much explosives were used and, in some cases, what type of explosive was used.

And we try to show this actually during our training in that you can't say that, as example, three cartridges of dynamite were used in this explosion in the ground because we can put three cartridges of dynamite on top of the ground, shoot that, take three cartridges of dynamite and dig a hole and put them in a hole and then we can take three cartridges and put them in a hole and cover it up, and you'll have vastly differing damages there.

On the other hand, Williams' estimate of the quantity of explosives was quite broad: 1000-1500 pounds, with 1200 pounds as a ballpark figure. The thrust of his trial testimony about quantity was that it was a rough estimate: you're able to kind of estimate how much explosive. Viewing agent Williams' estimate of weight in that light, we conclude that it was within his expertise to render such an opinion.

### **C. Williams' Testimony Regarding the Attempt to Modify Whitehurst's Dictation**

Whitehurst alleges that Williams gave inaccurate testimony regarding an attempt by Williams to

modify a report (dictation) written by Whitehurst. The evidence supports Whitehurst's claim.

On June 15, 1993, Whitehurst submitted dictation to Williams for inclusion in the official reports of the case. The dictation included the following language:

Solid probe mass spectrometry was also utilized to analyze specimen Q15 for the presence of residues of urea nitrate. The results of this analysis were consistent with the presence of urea and nitric acid. *However these materials are also found from this analytical method following analysis of other materials such as extracts of urine and fertilizer. Therefore without a confirmation of the presence of trace amounts of urea nitrate, a conclusion can not be rendered concerning the presence of this material on the evidence. Such a confirmation technique is not known to this examiner at this time. . . .*

Specimen Q23 was also analyzed with solid probe mass spectrometry to determine the presence of residues of urea nitrate. The results of this analysis were consistent with the presence of urea and nitric acid. *However, these materials are also found from this analytical method following analysis of other materials such as extracts of urine and fertilizer. Therefore without a confirmation of the presence of trace amounts of urea nitrate, a conclusion can not be rendered concerning the presence of this material on the evidence. Such a confirmation technique is not known to this examiner at this time.*

(Italics added.)

After receiving Whitehurst's dictation, Williams asked James Corby, Whitehurst's Unit Chief, whether the sections of the dictation that are italicized above could be removed. According to Corby, Williams wanted those things deleted. Corby refused to alter the dictation. A meeting was held with James Kearney, the chief of the SAS, Alan Robillard, the Assistant SAS Chief, Corby, and Williams. Kearney and Robillard decided to leave the dictation substantially unchanged, and Williams agreed to this decision.

Regarding the passages Williams wanted taken out, Williams told us at the OIG interview:

I felt that was fluff, that wasn't necessary. . . . And the fact that he's putting in any possibility of where this material could have come from was bullshit.

The only thing -- if he was going to go into where these chemicals could have originated from, why didn't he make an opinion that this Trade Center could have been damaged by an act of God or lightning?



At the Salameh trial, Williams testified as follows:

Q. Now, early on in this investigation, because you're the case agent, you reviewed many of the reports that were written by the other chemists. Am I correct?

A. That's right.

Q. And you were dissatisfied with some of those reports because you didn't like the phraseology of the language. Am I correct?

A. Not the phraseology, the format.

Q. The format.

And when we talk about format, the specific part of the format that you didn't like is when those opinions gave alternate reasons for finding some residue. Am I correct?

A. That's not correct.

Q. Well, when they said that, say like for urea nitrate, in those reports when it said, urea nitrate could have come from sewage, you were dissatisfied with those kinds of conclusions; weren't you?

A. No, I was not.

Williams went on to testify about making some innocuous changes in the format of a report other than Whitehurst's June 15, 1993, dictation quoted above.

Although defense counsel's questions lack precision, we think a fair construction of them implicated Williams' attempt to modify Whitehurst's June 15, 1993, dictation. The sections Williams wanted deleted from that dictation provided innocent explanations for the residue results as alternatives to a more incriminating explanation--e.g., urine and fertilizer as alternatives to urea nitrate. Accordingly, when counsel asked Williams, And when we talk about format, the specific part of the format that you didn't like is when those opinions gave alternate reasons for finding some residue. Am I correct?

, Williams erred when he answered, That's not correct. Similarly, when counsel asked, Well, when they said that, say like for urea nitrate, in those reports when it said, urea nitrate could have come from sewage, you were dissatisfied with those kinds of conclusions; weren't you? , Williams again erred when he answered, No, I was not. We conclude that Williams' answers to these questions were, at a minimum, misleading.

#### **D. Other Allegations**

In his January 8, 1996, letter to the OIG, Whitehurst made numerous other allegations concerning Williams' testimony in Salameh.

1. In his testimony Williams attempted to distinguish high from low explosives by saying that the velocity of high explosives is above, and the velocity of low explosives below, 3000 feet per second. This is technically incorrect (see Attachment C, infra), but a common error, which was harmless here.
2. Whitehurst criticizes Williams' general testimony about dynamite. We find Williams' testimony substantially accurate and within his area of expertise. Any technical errors (e.g., what is or is not carbonaceous ) were harmless and insignificant.
3. Williams was technically incorrect when he testified urea nitrate which is urea and nitric acid, or nitro urea, urea with sulfuric acid. Urea nitrate does not consist of urea and nitric acid; urea and nitric acid when mixed form a new substance, urea nitrate. Nitrourea is made by mixing urea nitrate with sulfuric acid. Although these errors are inconsequential, it may have been preferable for a chemist to testify to these matters.
4. Williams' attempts to explain how nitroglycerin will precipitate from a methanol solution and how nitroglycerine decomposes were poor. A knowledgeable chemist could have provided better explanations. Nevertheless, Williams was asked the questions, and he no doubt did his best to answer them accurately. Williams should have told the prosecutor ahead of time that these matters would be best left to another witness.
5. Williams was asked what the components of urea nitrate are, and he said, urea and nitric acid. We think the answer was a fair response to the question. Urea and nitric acid are the ingredients, which when mixed form a new substance, urea nitrate. One definition of component is ingredient. Webster's Ninth New Collegiate Dictionary 270 (1990).
6. Whitehurst claims that Williams testified falsely that he (Williams) researched the use of urea nitrate in the United States. This claim is apparently based on the fact that Whitehurst did research on the subject. That Whitehurst did some research does not mean Williams did not. Williams insists that he did some research. Accordingly, we conclude that Whitehurst's claim is unfounded.

7. Whitehurst criticizes Williams' testimony about the possible explosive uses of certain materials. Generally, we have no problem with Williams' testimony on this subject, and believe it was within his area of expertise. Williams can be second-guessed on certain matters (e.g., the discussion of phenol ), but any errors were harmless and insignificant.
8. Whitehurst's claim that Williams cannot consider the results of a chemist's analysis in rendering Williams' own opinion is frivolous.
9. Whitehurst criticizes Williams' description of nitrocellulose. We think that Williams' description was accurate for one form or type of nitrocellulose, but was not a good generic description.
10. Despite Whitehurst's criticism, we find that Williams' testimony about the use of smokeless powder and lead azide as initiators is substantially correct.
11. Despite Whitehurst's criticism, we are not concerned with Williams' testimony that when he arrives at a blast scene he look[s] for structural damage to see what repairs have to be done. Obviously, an EU examiner will not himself direct the repairs, which will be handled by appropriate experts.
12. Contrary to Whitehurst's claim, it is within an explosives examiner's expertise to identify explosive damage on metal.
13. Whitehurst complains that Williams testified outside his area of expertise when he discussed the matching of two pieces of tape. Williams has only been qualified in the FBI Laboratory in the areas of explosives and toolmarks. In the testimony challenged by Whitehurst, however, all Williams did was describe the measurements and observations he made, which was merely a factual description. This testimony was given without objection. We think it was permissible for Williams to answer the questions asked.
14. Whitehurst criticizes Williams' testimony about blast damage to portions of a truck. Although Williams is not a metallurgist, we think it was within his area of expertise to testify that he observed blast damage to the truck.
15. Whitehurst criticizes Williams' testimony about freezing and frozen nitroglycerine. We, however, find no contradiction in saying that the process of freezing nitroglycerine is dangerous, but that frozen nitroglycerine is stable.

16. We disagree with Whitehurst's assertion that because some of the pieces of debris were the size of toothpicks the main charge at the Trade Center could not have been a heaving explosive.

17. Finally, Whitehurst complains that some of Williams' testimony did not meet the test of Daubert v. Merrell Dow, 113 S. Ct. 2786 (1993), because Williams did not use the scientific method, which involves the testing of hypotheses. Although evidentiary questions are beyond the scope of this Report, we note that the discussion of expert testimony in Daubert was limited to scientific . . . knowledge and not technical, or other specialized knowledge. 113 S. Ct. at 2795 & n.8. Much of Williams' testimony could be viewed as based on technical or other specialized knowledge within the meaning of Daubert.

### III. Pre-Trial Issues

Several controversies occurred, and were resolved to Whitehurst's satisfaction, before the trials in the World Trade Center case.

#### A. Specimen Q23

Immediately after the Trade Center bombing, the chemists in the FBI Laboratory specializing in explosives residue analysis (MAU chemists Whitehurst and Burmeister), went to New York City to conduct examinations at the blast scene. That left no chemists specializing in explosives residue analysis at the laboratory in Washington. When specimens were sent back to the laboratory for examination, the examinations were conducted by chemists in the CTU, Unit Chief Roger Martz and Lynn Lasswell.

Specimen Q23 was a tire fragment recovered from the crime scene. Lasswell analyzed it with solid probe mass spectrometry and concluded that urea nitrate was detected on the specimen. Martz as unit chief approved Lasswell's conclusion, which was incorporated in an official report and distributed April 12, 1993. This conclusion would have been extremely helpful to the prosecution because it would have tended to establish that urea nitrate was used in the Trade Center bomb.

Whitehurst and Burmeister disagreed with Lasswell's conclusion on the ground that the instrumental results only really showed the presence of urea and nitric acid, which could have originated from substances other than urea nitrate--e.g., urine, fertilizer, car exhausts, or ice melter. Whitehurst's and Burmeister's objections, however, were overruled.

Whitehurst and Burmeister then prepared a blind test for Martz by submitting to him specimens they claimed were from the Trade Center evidence. In reality, Whitehurst and Burmeister prepared one sample from Whitehurst's urine and another by mixing ammonium nitrate fertilizer and urea. According to Burmeister, the results were close enough that you wouldn't be able to tell the difference from running a sample of urea nitrate. (Martz insists he never rendered an opinion that

these samples were urea nitrate, but said only that the instrument detected urea and nitric acid.) With the blind test results, Whitehurst and Burmeister went to Assistant Section Chief Robillard, who scolded them for making the blind test.

Eventually, Corby directed Whitehurst to make a review of Lasswell's results and to write a new dictation. Whitehurst made the review and wrote the dictation. Whitehurst's dictation was incorporated into a new official report amending the April 12, 1993, report. The new report is dated July 1, 1993. At the Salameh trial, Burmeister testified in accordance with Whitehurst's dictation. Martz told the OIG in 1996 that he no longer agrees with Lasswell's original dictation because the results could have been produced by urea and nitrates rather than urea nitrate.

Ultimately, the FBI Laboratory correctly resolved the controversy concerning Q23, although the resolution procedure ( blind tests, etc.) was flawed. Moreover, the chemist who examined Q23 should have been trained in the explosives residue protocol.

## **B. Specimen Q65**

The Barringer Ion Mobility Spectrometer (IMS) tests for the presence of particular molecules. When a sample is introduced, a graph is produced with peaks. Certain substances have distinctive graphs or peaks. If a distinctive peak is produced, an inference can be drawn that a particular substance is present. The manufacturer programs the memory of the instrument to identify common explosives such as nitroglycerine. The user of the instrument can also program the memory to identify certain peaks.

Lasswell introduced a urea nitrate sample in the IMS and produced a particular peak. He then programmed the memory of the instrument to indicate the presence of urea nitrate whenever that peak reappeared. When specimen Q65 was submitted to the IMS, a graph was produced, and the machine automatically identified one of the peaks as urea nitrate.

When Whitehurst reviewed Lasswell's instrumental results to prepare the dictation that went into the July 1, 1993, official report, he examined the IMS graph for Q65. Whitehurst took the position that the peak was not for urea nitrate specifically, but was just a nitrate peak that would be produced by certain nitrates, including but not limited to urea nitrate. Based on this, Whitehurst took issue with Lasswell's decision to program the memory of the IMS to identify the particular peak as urea nitrate. He wrote the OIG (in one of his first submissions to us) as follows:

We [Whitehurst and Burmeister] pointed out that Mr. Lasswell had altered the output of one instrument to reflect information that would have, if presented in its altered manner, been scientific fraud, unethical, wrong and very damning to the defense position in this matter.

Whitehurst stated in a letter to the OIG that the analytical output was purposely altered to read '<urea nitrate' in order to deceive the innocent reader of the computer printout. This claim is grossly overstated and without merit.

Both Lasswell and Martz insist that the IMS was used only as a screening mechanism to determine whether urea nitrate was possibly in the specimen. Lasswell asserted that when he identified the presence of urea nitrate in Q65 in his original dictation, he relied on instruments other than the IMS.

Whitehurst acknowledged in his OIG interview that the IMS could properly be used as a screening device for urea nitrate. Moreover, in his own dictation for Q65, Whitehurst stated as follows:

White crystalline material adhering to specimen Q65 was analyzed with Fourier transform infrared spectrophotometry, IMS and sol[i]d probe/triple quadrapole mass spectrometry. These analyses identified the presence of urea nitrate.

(Emphasis added). When Whitehurst was asked at his OIG interview whether he was saying that Lasswell intentionally tried to create false information, Whitehurst stated, No, no.

We conclude that the implication in Whitehurst's assertion--that Lasswell engaged in something like scientific fraud, [which was] unethical, wrong and very damning to the defense position in this matter --is unfounded. Although labeling the peak on the IMS graph as a urea nitrate peak was potentially misleading (because the peak could be caused by other nitrates), the IMS could properly be used as a screening device for urea nitrate. Accordingly, we find that Lasswell engaged in no misconduct in his work with the IMS.

### **C. Other Matters Involving Williams**

At one point in the Trade Center investigation the government was preparing affidavits for search warrants and wanted to use an examination by Whitehurst that found nitroglycerine on a specimen. Although Whitehurst found nitroglycerine, he refused to make a positive identification because of the possibility of contamination by a bomb technician. Instead, he was only prepared to say that the results were consistent with the presence of nitroglycerine on the specimen. Williams argued strongly for Whitehurst to make a definite assessment. Whitehurst considered this argument to constitute undue pressure to get me to change the wording in my report.

Although we do not know the exact words Williams used, we find no impropriety in Williams discussing the matter with Whitehurst to determine whether a more definite conclusion could be reached. Ultimately, the report was not changed.

Additionally, Williams changed the format of one of Whitehurst's dictations when Williams issued one of the official reports. With a series of specimens, Whitehurst set forth each instrument he used to examine each specimen. Williams made a list of all the instruments and said one or more was used with each specimen, and then just set forth the results with respect to each specimen. Williams also replaced the language None of these explosives were detected on the specimens with Analysis was conducted with negative results. Whitehurst protested the changes, and a new report was issued containing his dictation verbatim.

We consider the changes in format innocuous. One of the reasons Williams gave for the changes, however, is troubling. In referring to Whitehurst's habit of always setting forth, at length, the technical examinations made, Williams stated: [I]f I've got to retype this there's always the possibility of a typographical error and it's a pain in my neck to do it everytime.

A principal examiner (PE) is supposed to include verbatim in the official report the dictation of an auxiliary examiner (AE) unless the AE and the AE's Unit Chief agree to the change. In the Trade Center case Williams was the PE and Whitehurst an AE. The verbatim-inclusion rule is fundamental and should not be broken at any time. The burden of retyping a lengthy or technical dictation is an inadequate reason for violating the rule.

#### **D. Allegation Concerning SSA Haldimann**

In December 1993 Whitehurst submitted a memorandum to the OIG concerning a conversation he had with SSA Don Haldimann on December 15, 1993. According to Whitehurst, Haldimann stated that the Assistant United States Attorneys (AUSAs) in the Trade Center case had grave concerns about the complexity of Whitehurst's dictation and thought the information in the dictation could be damaging to the case. Whitehurst further asserted that Haldimann said that the U.S. Attorney's Office had inquired into means of circumventing my testimony in this matter and is displeased with my expert opinion as it is stated because it offers strength to the defense side in this matter. Whitehurst characterized Haldimann's statements as indicating possible suppressions of evidence by the U.S. Attorney's office . . . [which] can be deemed to be fraudulent and unethical.

At the Rahman trial, Whitehurst testified that after the December 15, 1993, conversation he met with the prosecutors in the World Trade Center case and felt no pressure from the lawyers on the prosecution team. He testified further, however, that in the December 15, 1993, conversation he felt pressure from Haldimann to take out the qualifying statements in his dictation. Whitehurst acknowledged that the conversation with Haldimann occurred at a Christmas party.

In his OIG interview Haldimann stated that the conversation on December 15, 1993, was a personal conversation at a Christmas party and lasted about 10 or 15 minutes. Haldimann stated that in the conversation Haldimann was merely giving his opinion that the dictation was confusing and included superfluous information and that simpler reports would be better. Haldimann insisted in the interview that he was in no way asking or attempting to influence Whitehurst to change the reports ; the reports had already been provided to the defense attorney in discovery, and therefore the point was moot. Haldimann stated in the interview that it was his impression that the AUSAs in the case

were distressed about Whitehurst's dictation, and he did tell Whitehurst that the AUSAs did not want to put Whitehurst on the stand. Finally, Haldimann stated in the interview that no one directed him to talk to Whitehurst.

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Whitehurst did not change his dictation as a result of the Haldimann conversation, and Whitehurst was agreeable to having Burmeister testify at the Trade Center trials.

Although we are unable to determine the specific words used in the December 15, 1993, Christmas party conversation, we think Whitehurst grossly overstated the matter in his memorandum. Whatever was said in this brief conversation does not constitute or evince suppressions of evidence . . . [which] can be deemed to be fraudulent and unethical. Although both Whitehurst and Haldimann may have raised their voices during this conversation, ultimately it signified nothing.

#### **IV. Conclusion**

We are profoundly disturbed by Williams' testimony in the Salameh trial. We conclude that Williams (1) gave inaccurate testimony regarding his role in the manufacture of urea nitrate and regarding whether the urea nitrate was made pursuant to Arabic formulas from bomb-making books; (2) testified beyond his expertise regarding the defendants' capacity to make urea nitrate and in a way that made the testimony appear tailored to the most incriminating result; (3) gave incomplete testimony concerning the VOD of urea nitrate; (4) gave an invalid opinion regarding the VOD of the main charge; (5) gave invalid and misleading opinions on direct examination concerning the explosives that may have been used in the bombing; (6) regarding his identification of the main charge on cross examination, gave an opinion that was based on speculation beyond his scientific expertise and that appears tailored to the most incriminating result; and (7) gave misleading testimony concerning his attempt to modify Whitehurst's dictation. In short, the testimony lacked the objectivity, credibility, and competence demanded of examiners in the FBI Laboratory.

Williams' testimony also suggests the need for certain improvements in Laboratory procedure that we discuss in detail in Part Six of this Report. For example, Williams' testimony about a specific VOD had no precedent in the FBI, and we found it to be scientifically unjustifiable. This error would have been avoided had Williams followed the ASCLD/LAB requirement that new procedures be validated before they are used in casework. Similarly, the need for complete case notes was exemplified by the absence of any notes supporting Williams' claim that he determined the VOD of urea nitrate from conversations with persons outside the Laboratory. Further, Williams' lack of a scientific background may have been the cause of his difficulty with the stoichiometric calculations. Finally, clear guidelines regarding what is within an EU examiner's expertise may have helped Williams avoid other problems identified in this section.

The pre-trial issues present relatively minor matters, but exemplify the need to follow applicable protocols and to have an orderly dispute-resolution procedure within the Laboratory.

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