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Commonwealth of Massachusetts

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**Investigation of the Drug Laboratory
at the William A. Hinton State
Laboratory Institute
2002 – 2012**

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Table of Contents

	Executive Summary	1
I.	The Emergence of the Drug Lab Crisis	5
	A. Background	5
	B. Process of the Investigation	7
II.	Drug Lab Situated Within DPH	13
III.	Lack of Resources	15
IV.	Lack of Accreditation	19
V.	Lack of Oversight.....	21
	A. Lack of Knowledgeable Oversight	21
	1. Charles Salemi	21
	2. Julianne Nassif	21
	3. Linda Han.....	22
	4. Other Former BLS Directors	22
	B. Lack of Management	23
	1. No Managerial Presence	23
	2. Nassif’s Relationship with Salemi	23
	C. Lack of Oversight of Chemists	23
	1. Inadequate Supervision of Testing Areas	23
	2. No Performance Evaluations	24
	3. No Oversight of Chemists’ Court Testimony	24
	4. Failure to Check Academic Credentials	25
	5. Failure to Review Discovery Packets	25
VI.	Lack of Training	27
	A. SWGDRUG Training Recommendations	27
	B. New-Chemist Training.....	27
	C. Continuing Education at the Drug Lab	28
	D. Lack of Instruction on Legal Issues	29
	E. Supervisor Training	30
VII.	Lack of Protocols.....	31
	A. SWGDRUG’s Recommended Protocols	31
	B. 2004 <i>Policies and Procedures</i>	31

VIII.	Inconsistent Testing Practices.....	35
A.	Overview of Drug Testing Policies and Procedures	35
1.	The Preliminary Testing Phase	35
2.	The Confirmatory Testing Phase	36
3.	Exceptions to the Two-Chemist System	37
B.	Failure to Adhere to the Two-Chemist System.....	38
1.	The GC/MS Operator Was Different from the Confirmatory Chemist	38
2.	The Primary Chemist Prepared and Operated the GC/MS Instrument for His Own Samples.....	39
3.	The Primary Chemist “Received” His Own Samples into the GC/MS Section	39
4.	More Than One Confirmatory Chemist Involved Due to Multiple GC/MS Runs	39
5.	One Chemist Performed All of the Testing	40
C.	Other Deviations from Drug Lab Testing Protocols.....	40
1.	Incomplete Powder Sheets and Control Cards.....	40
2.	Tuning Reports.....	41
IX.	Ineffective Quality Control Measures.....	43
A.	Internal Quality Control in the Drug Lab	43
1.	Daily Quality Control Measures	43
2.	Monthly Quality Control Measures	44
3.	QC and Quality Assurance (“QA”) Reviewers.....	44
B.	External Quality Control Oversight	45
C.	Dookhan’s Role as a QC Reviewer	46
X.	Lack of Heightened Security.....	49
XI.	Chain-of-Custody Concerns.....	53
A.	Background.....	53
B.	The Drug Lab’s Chain-of-Custody Procedures	53
1.	Submission from Law Enforcement to Evidence Office	54
2.	Transfer from Evidence Office to Chemist.....	54
3.	Transfer from Chemist Back to Evidence Office	56
4.	Transfer from Evidence Office Back to Law Enforcement Agency.....	57
C.	Issues with Chain-of-custody Procedures	57
1.	Logbook Lacking Chemist’s Initials.....	57

2.	Logbook Lacking Evidence Officer’s Initials.....	58
3.	Logbook Lacking Both Chemist’s and Evidence Officer’s Initials.....	58
4.	No Chain of Custody in FoxPro or the Logbook.....	59
D.	Failure to Act Upon Chain-of-Custody Breaches.....	60
E.	Failure to Inventory the Drug Safe.....	61
F.	Lack of Policy for “Found” Drugs.....	61
XII.	Dookhan’s Malfeasance.....	63
A.	Dookhan’s High Testing Volumes.....	63
B.	Other Concerns About Dookhan.....	64
C.	The June Breach.....	66
D.	Management’s Failure to Take Appropriate Action.....	67
E.	Dookhan’s Continued Access to the Drug Lab.....	68
F.	Han and Nassif’s Delayed Report of the June Breach.....	70
G.	DPH’s Response to the June Breach.....	71
XIII.	The May Breach.....	75
XIV.	Failure to Disclose Dookhan’s Conduct in Coverdell Grant Reports.....	79
XV.	Failures of Management that Allowed for Dookhan’s Malfeasance.....	83
XVI.	Sampling Issues in Drug Trafficking Cases.....	87
A.	Introduction.....	87
1.	Law Enforcement Agencies Routinely Submitted Multi-Item Drug Evidence to the Drug Lab.....	88
2.	The Drug Lab Applied Sampling Approaches to Process Multi-Item Drug Cases.....	88
3.	Only Statistical Sampling Approaches Are Appropriate.....	88
4.	Accepted Approaches to Testing and Weighing Multi-Item Submissions.....	89
5.	Chemists Should Report the Method Used and the Limits of any Inferences Made.....	92
B.	The Drug Lab’s Sampling Practices.....	93
1.	The Drug Lab Improperly Used Arbitrary Approaches to Infer the Identity and Estimate the Net Weight of Substances.....	93
2.	Lack of Homogeneity in Sampled Populations.....	94
3.	Lack of Truly Random Sample Selection.....	94
4.	Failure to Fully Analyze Each Selected Item.....	95
5.	The Drug Lab Incorrectly Applied Statistical Approaches.....	95
C.	The OIG Review of the Drug Lab’s Sampling Practices.....	97

1.	Reviewed Multiple-Item Cases that Weighed Within 25% Above the Threshold	98
2.	Number of Samples Reviewed.....	98
3.	Reviewing Chemists’ Sampling Practices	98
D.	The OIG’s Findings Regarding Trafficking Cases	100
1.	Number of Cases Where the Drug Lab Applied a Sampling Approach.....	100
2.	Number of Cases Where the Drug Lab’s Sampling Approaches Are Questionable	100
E.	The Drug Lab’s Use of Arbitrary Sampling Approaches Produced Questionable Results from 2002 to 2012.....	101
1.	Massachusetts Courts Have Approved of the Use of Non-Statistical Sampling Approaches	102
2.	SWGDRUG Requirements for Documenting and Reporting.....	102
3.	The Lab Disclosed the Total Number Tested and the Total Number Used to Calculate the Average Net Weight	103
4.	The Lab Failed to Document and Disclose the Confidence Levels for Their Identity Inferences and Weight Estimates	104
5.	The Lab Failed to Disclose the Weight Spreadsheet	104
6.	The OIG Questions Whether Reweighing Samples Would Resolve any Lingering Questions	104
XVII.	OIG Sample Retesting	107
A.	Failure to Properly Document Multi-Run Samples and Provide Test Results in Criminal Cases	107
B.	Need for Retesting	108
C.	Methodology of Review	108
D.	The OIG’s Findings Regarding Multi-Run Samples	109
E.	Phase One of the OIG’s Retesting	111
XVIII.	Conclusion	113
A.	Findings.....	113
1.	Dookhan Was the Sole Bad Actor	113
2.	Management Failed.....	114
3.	DPH Commissioner Auerbach Failed to Respond Appropriately to the Report of the June Breach.....	115
4.	The Drug Lab Lacked Formal and Uniform Protocols.....	115
5.	Management Did Not Provide Sufficient Training to Chemists.....	115

6.	The Drug Lab Should Have Provided Potentially Exculpatory Evidence to the Parties in Criminal Cases	116
7.	The Drug Lab Lacked Effective Quality Controls.....	116
8.	The Drug Lab Did Not Always Use a Valid Statistical Approach to Multi-Sample Trafficking Cases.....	117
9.	The Drug Lab Lacked Heightened Security	117
B.	Recommendations.....	117
1.	Better Management Practices Are Essential	117
2.	The MSP Is the Correct Agency to Handle the Drug Lab’s Forensic Drug Testing Functions.....	117
3.	All Forensic Laboratories Must be Accredited.....	118
4.	All Chemists Must Be Thoroughly Trained.....	118
5.	Drug Labs Should Provide a Complete Record of the Tests Performed to the Parties in Criminal Cases	119
6.	Drug Labs Must Have Ample Quality Controls	119
7.	Security Measures Are Essential	119
8.	Concerns About Certain Cases	120
C.	Supplemental Report.....	121

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Executive Summary

The Forensic Drug Laboratory at the Hinton State Laboratory Institute (“Drug Lab”) in Jamaica Plain was ordered closed by Governor Deval Patrick on August 30, 2012, after one of the lab’s chemists, Annie Dookhan, admitted to tampering with drug samples, raising serious questions about the integrity of the testing performed at the Drug Lab. In November 2012, at Governor Patrick’s request, the Office of the Inspector General (“OIG”) agreed to conduct an independent, top-to-bottom review of the Drug Lab. The OIG’s mission was to carry out a comprehensive investigation of the operation and management of the Drug Lab from 2002 to 2012, a period in which the Drug Lab was primarily overseen by the Department of Public Health (“DPH”), to determine whether any chemists, supervisors or managers at the Drug Lab committed any misfeasance or malfeasance that may have impacted the reliability of drug testing at the Drug Lab, and to make findings and recommendations following its review.

Over the course of fifteen months, the OIG carefully studied the Drug Lab’s policies and procedures, identifying a number of deficiencies in its practices and protocols. With the support of experts in the field of forensic drug testing, the OIG reviewed more than 200,000 documents including, but not limited to, lab records, testing data and results, emails and internal memoranda. Further, in order to fully understand not only the technical shortcomings of the lab, but also the personal dynamics that led to such a failure, the OIG interviewed more than forty individuals associated with the Drug Lab, most of them under oath.

The OIG’s review found that:

- Dookhan was the sole bad actor at the Drug Lab. Though many of the chemists worked alongside Dookhan for years, the OIG found no evidence that any other chemist at the Drug Lab committed any malfeasance with respect to testing evidence or knowingly aided Dookhan in committing her malfeasance. The OIG found no evidence that Dookhan tampered with any drug samples assigned to another chemist even when she played a role in confirming another chemist’s test results.
- The management failures of DPH lab directors contributed to Dookhan’s ability to commit her acts of malfeasance. The directors were ill-suited to oversee a forensic drug lab, provided almost no supervision, were habitually unresponsive to chemists’ complaints and suspicions, and severely downplayed Dookhan’s major breach in chain-of-custody protocol upon discovering it.
- DPH Commissioner John Auerbach and his staff failed to respond appropriately to the report of Dookhan’s breach of protocol; the investigation DPH conducted was far too narrow and Auerbach and his staff failed to disclose another known act of malfeasance to prosecutors, defendants and other interested parties.
- The Drug Lab lacked formal and uniform protocols with respect to many of its basic operations, including training, chain of custody and testing methods. This lack of direction, caused in part by the Drug Lab’s lack of accreditation, allowed chemists to create their own insufficient, discordant practices.

- The training of chemists at the Drug Lab was wholly inadequate. New chemists' training was limited and lacked uniformity, and DPH offered virtually no continuing education to experienced chemists.
- The Drug Lab failed to provide potentially exculpatory evidence to the parties in criminal cases by not disclosing information about additional, inconsistent testing results. The OIG is in the process of retesting approximately 2,000 of these drug samples to determine whether the results provided to prosecutors and defendants were accurate.
- The Drug Lab failed to uniformly and consistently use a valid statistical approach to estimate the weight of drugs in certain drug trafficking cases.
- The quality control system in place at the Drug Lab, which focused primarily on the functionality of the lab equipment rather than the quality of the chemists' work, was ineffective in detecting malfeasance, incompetence and inaccurate results.
- The security at the Drug Lab was insufficient in that management failed to appreciate the vulnerability of the drug safe, and did not do enough to protect its contents.
- There were no mechanisms in place to document discrepancies in chain-of-custody protocols or inconsistent testing results.

In consideration of the above findings, the OIG recommends that the Commonwealth undertake a number of measures designed to ensure that all parties in the criminal justice system, as well as the general public, can once again have the utmost confidence in the integrity of forensic drug testing performed in the state.

Specifically, the OIG recommends:

1. All state agencies must employ management practices that hold supervisors accountable for their employees. Managers must conduct comprehensive background checks and complete performance evaluations on an annual basis. In forensic drug labs, there must be a system to report deviations from policy, and all managers of forensic labs should be experts in their respective fields.
2. The Massachusetts State Police ("MSP") is the appropriate agency to handle the forensic drug testing that the Drug Lab conducted before its closure. MSP's infrastructure and financial resources, including the accreditation of its drug lab, make it the agency best equipped to handle the forensic drug testing formerly conducted at the Drug Lab.
3. The Legislature should mandate that all forensic laboratories in Massachusetts be accredited and sufficient funding should be appropriated for that purpose.
4. Forensic drug chemists should receive extensive, theory-based training prior to analyzing any drug samples. Additionally, all chemists should take part in expert witness training and a mock trial program prior to testifying in court, and should be provided ethics training to ensure they remain unbiased in their forensic science responsibilities.

5. All forensic drug labs in Massachusetts must make it a practice to provide the results from all analytical tests run on each sample when providing discovery information to interested parties.
6. Quality controls at all forensic drug labs in Massachusetts should focus on both the functionality of equipment and the integrity and accuracy of the chemists' work product.
7. Every employee of a forensic drug lab with access to controlled substances should submit to periodic random drug testing and annual criminal record checks. Further, forensic drug labs should employ and appropriately manage advanced security measures such as biometric devices and closed-circuit televisions.
8. The OIG declines to provide an opinion on how the courts should resolve Drug Lab-related cases; however, based on its thorough review, the OIG can comment as follows:
 - a. all samples in which Dookhan was the primary chemist should be treated as suspect and be subject to careful review;
 - b. the OIG found no evidence to support treating cases in which Dookhan confirmed another chemist's results with any increased suspicion about Dookhan's involvement;
 - c. the OIG found no evidence to support treating cases in which Dookhan had no known interaction with the drug sample in question with any increased level of suspicion related to Dookhan;
 - d. for cases in which multiple tests were run, and the corresponding test results were not provided to the prosecutor or defendant in a criminal case, the OIG respectfully defers to the courts to determine whether such test results were exculpatory and material to the defendant's conviction;
 - e. for trafficking cases in which the estimated weight of samples was determined without using a valid statistical approach and the weight finding is close to the statutory threshold for a trafficking charge, the OIG suggests that the cases be carefully reviewed;
 - f. with respect to cases with samples that the OIG wanted to retest, but which no longer exist, the OIG suggests that the cases be evaluated with increased concern.

Finally, as mentioned above, the OIG, with the assistance of an independent, out-of-state laboratory, is in the process of retesting a number of samples that were found to be potentially problematic. The OIG will detail the results of the samples being retested in a supplemental report.

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I. The Emergence of the Drug Lab Crisis

A. Background

On July 1, 2012, the Massachusetts State Police (“MSP”) took over from the Department of Public Health (“DPH”) the Forensic Drug Laboratory at the William A. Hinton State Laboratory Institute (“Drug Lab”), pursuant to a legislative mandate passed in the prior fiscal year. At the time, the Drug Lab was one of three entities in the Commonwealth that analyzed drug samples in connection with criminal prosecutions.¹ Within days of taking over, on July 3, 2012, a senior chemist and a lab supervisor from the Drug Lab asked the Director of the MSP Forensic Services Group to speak with them in private. The two Drug Lab employees indicated that there were significant issues related to a former chemist at the Drug Lab, Annie Dookhan, which had not been previously disclosed.² Dookhan had resigned from the Drug Lab in March 2012 after Department of Public Health (“DPH”) officials revealed that Dookhan had breached the Drug Lab’s chain-of-custody protocols in June 2011. They informed the MSP Director that there were ethical and technical issues related to Dookhan, and that she had falsified her resume, taken shortcuts while testing, and forged certain lab documents. They also indicated that DPH had been enamored with Dookhan’s productivity, and therefore ignored these issues.

The MSP Director immediately informed the Attorney General’s Office (“AGO”) of this information and a criminal investigation into Dookhan’s conduct ensued. During the course of that investigation, the MSP officials spoke to more than thirty-five individuals, including chemists and evidence officers who worked at the Drug Lab during Dookhan’s employment, employees at the DPH drug lab located in Amherst, and other DPH employees and administrators. The MSP officials spoke directly with Dookhan on August 28, 2012. In response to their questioning, Dookhan admitted to “dry-labbing,” or failing to conduct all of the required tests on drug samples that she analyzed, and also to tampering with drug samples to make negative findings into positives. This confession was the catalyst for what has become one of the biggest criminal justice crises in the Commonwealth’s recent history, threatening to undermine the integrity of criminal drug convictions in both state and federal courts in Massachusetts.

On August 30, 2012, Governor Deval Patrick closed the Drug Lab, and all Drug Lab employees were placed on paid administrative leave.³ The Governor approached the Executive Office of Health and Human Services (“EOHHS”) – the secretariat under which the Drug Lab existed prior to its transfer to the MSP – and asked how the Dookhan situation could have happened. In response, EOHHS, in conjunction with its agency, DPH, produced an “Internal Inquiry” report that outlined its understanding of the “root causes” that may have allowed Dookhan to commit

¹ The other two were the MSP, which primarily analyzed substances seized by the MSP and also served municipal law enforcement entities in Middlesex County (starting in 2009), and the University of Massachusetts Medical School Drugs of Abuse Laboratory, which primarily served municipal public safety entities in Worcester County.

² See Section XII for more detail.

³ By this point, the Drug Lab chemists had already been transferred to the MSP.

her malfeasances.⁴ Within weeks of the Drug Lab’s closure, DPH personnel responsible for the Drug Lab – DPH Commissioner John Auerbach; Director of DPH’s Bureau of Laboratory Sciences (“BLS”), Dr. Linda Han; and Director of the Division of Analytical Chemistry, Julianne Nassif – either were asked to resign or resigned of their own volition.

On September 20, 2012, the Governor established a task force headed by Attorney David Meier (“Task Force”) in an attempt to identify all criminal defendants whose drug samples Dookhan tested during her nine-year tenure at the Drug Lab. Almost immediately, criminal defendants began filing motions for new trials and to withdraw their guilty pleas in courts around eastern Massachusetts, seeking release from incarceration pending a determination of whether Dookhan’s conduct had violated their constitutional rights. In response, in October 2012, the Chief Justice of the Superior Court Department and the Chief Justice of the District Court Department each designated a number of judges throughout the state to sit in special drug lab court sessions to help manage the influx of cases stemming from the Dookhan situation. On November 26, 2012, the Chief Justice of the Superior Court Department appointed five retired Superior Court judges as Special Judicial Magistrates to preside over Drug Lab cases.

Meanwhile, Dookhan was arrested on September 28, 2012, and charged with obstruction of justice and falsely claiming to hold a degree from a college or university. The AGO ultimately indicted Dookhan on twenty-seven counts, including tampering with evidence (seventeen counts), obstruction of justice (eight counts), perjury (one count) and falsely claiming to hold a degree from a college or university (one count). At the outset, the AGO also began the process of conducting a broad investigation into the Drug Lab to determine whether the malfeasance at the Drug Lab had an impact on any other defendants, beyond the ones to be identified by the Task Force.

In the months that followed, the Legislature conducted hearings in a further attempt to answer the Governor’s question of how the Dookhan situation could have happened and to determine the expected financial impact on the criminal justice system and the Commonwealth in general. Public figures – including the Secretary of EOHHS, JudyAnn Bigby, and the Secretary of the Executive Office of Public Safety and Security (“EOPSS”), Mary Elizabeth Heffernan – testified at legislative hearings. In February 2013, the Legislature passed a budget that included the “Hinton Lab Reserve Fund,” consisting of \$30 million to address the anticipated demands on the Massachusetts criminal justice system that would flow from the Dookhan crisis.⁵

In March 2013, the Essex County District Attorney’s Office brought an appeal before the Supreme Judicial Court (“SJC”), challenging the authority of the courts, and particularly the Special Magistrates, to allow a defendant’s motion to stay execution of his sentence pending

⁴ DPH, Hinton Laboratory Drug Lab Internal Inquiry (2012) (“Internal Inquiry”). The Internal Inquiry report found that there were: (1) insufficient safeguards related to the evidence room and drug safe; (2) a need for surveillance cameras to at least deter “grossly inappropriate or negligent activities;” (3) inadequate mechanisms to detect adverse events; (4) inadequate oversight and supervision; (5) inadequate quality control within the Drug Lab; and (6) poor judgment related to the response of protocol violations because the former director of the Drug Lab “did not recognize the significance of the breach and its impact on court cases.” *Id.* at 1.

⁵ The Hinton Reserve Fund became law on February 15, 2013 as part of a supplemental budget that also included other appropriations. *See* 2013 Mass. Acts c. 3, § 2A.

disposition of the defendant's motion for a new trial, among other issues.⁶ In response, the American Civil Liberties Union of Massachusetts ("ACLU") and members of the defense bar argued that the SJC should order the release of all Drug Lab defendants waiting for hearings on their motions for new trials. In January 2014, in a separate appellate case, the ACLU asked the SJC to order prosecutors to notify all Drug Lab defendants whether they intend to re-prosecute them; the ACLU further asked the SJC to vacate with prejudice the convictions of all defendants who the District Attorneys did not notify.⁷

On November 5, 2012, the Governor asked the Office of the Inspector General ("OIG") to conduct an independent, comprehensive review of the Drug Lab. The OIG's agreement to investigate was publicly endorsed by both prosecutors and leaders of the defense bar, including the Committee for Public Counsel Services ("CPCS"), the Massachusetts District Attorneys' Association ("MDAA"), the Massachusetts Bar Association and the ACLU. The OIG determined that its mission was to conduct a comprehensive investigation of the operation and management of the Drug Lab from 2002 to 2012,⁸ to determine whether any chemists, supervisors or managers at the Drug Lab committed any misfeasance or malfeasance that may have impacted the reliability of drug testing at the Drug Lab, and to make findings and recommendations following its review.

B. Process of the Investigation

The OIG's first order of business was to hire the necessary professionals and experts to conduct an investigation of this magnitude. The OIG engaged a consulting firm with litigation support and "e-discovery" experience for purposes of identifying, collecting and preserving potentially relevant electronically stored information ("ESI") and creating a searchable database of all of the potentially relevant documents and electronic data related to the Drug Lab.

After a competitive bidding process, the OIG retained Navigant Consulting, Inc. ("Navigant"), a highly reputable firm that the Commonwealth's Information Technology Department had vetted. Navigant subcontracted with Document Technologies, Inc. ("DTI") to scan and digitize all of the hardcopy documents into a database, with Kensium LLC to categorize the hardcopy documents and capture key information and with RenewData to restore and extract electronic data from backup tapes. Under the direction of the OIG, Navigant and DTI scanned all Drug Lab-related documents stored at the following locations: the Drug Lab, the offices of Nassif and Han (which were also in the building of the William A. Hinton State Laboratory Institute ("SLI"), but outside

⁶ See *Commonwealth v. Charles*, 466 Mass. 63 (2013). On July 22, 2013, the SJC held in *Charles* that Superior Court judges "[i]n exceptional circumstances ... have the authority to allow a defendant's motion to stay the execution of his sentence, then being served, pending disposition of the defendant's motion for a new trial, but a special magistrate ... does not have such authority." *Id.* at 79. Individuals previously incarcerated on drug charges could, therefore, be released from jail while their motions for a new trial were pending based on the SJC's finding that the interests of justice would not be served by the continued imprisonment of a defendant who may be entitled to a new trial.

⁷ Brief for Petitioner at 3, *Bridgeman v. District Attorney for Suffolk County*, SJ-2014-0005 (Mass. Jan. 2014).

⁸ The OIG chose a ten-year time frame to gain a thorough understanding of the practices of the Drug Lab as they evolved over time. The years 2002 through 2012 encompassed, but were not limited to, the years of Dookhan's employment at the Drug Lab.

of the Drug Lab), the AGO,⁹ the MSP and the State Archives. In total, the OIG caused to be scanned approximately 3.5 million pages into the consolidated review database, and thereafter, each document was coded and made searchable to facilitate review. In addition, Navigant collected and processed more than 3,417 gigabytes of ESI. This data, collected from the Drug Lab, DPH and EOHHS, included all available internal and external email communications received and transmitted by Drug Lab employees, as well as structured databases that the Drug Lab used. Navigant also imported drug sample analysis data stored by the lab testing equipment into the consolidated review database. Furthermore, over 1,000 backup tapes of electronic data that DPH and EOHHS had archived were restored and imported into the consolidated review database. Navigant then removed the duplicates of all of the documents and electronic media to make a single, secure, web-based database.

The OIG supervised the creation and maintenance of the consolidated review database (and entered into the contract for services with Navigant), but the end product – the repository of the previously described documents and electronic data – was created for the benefit of the following six entities: (1) DPH; (2) the MSP; (3) the Governor’s legal staff, including the Special Assistant Attorney General appointed to represent DPH and the MSP in Drug Lab discovery matters; (4) the Task Force; (5) EOHHS; and (6) the AGO. The consolidated review database was created in such a way that each agency has its own separate review platform that is secure and protected from being seen by the other entities. At the conclusion of the OIG’s investigation, the OIG will assign the Navigant contract to another government agency, which will be responsible for the contract from that point forward.

In addition to retaining an e-discovery firm, the OIG sought forensic expert services to aid in its investigation. After a separate competitive bidding process, the OIG retained the firm of Marcum LLP. The Marcum team included individuals who were uniquely qualified to advise the OIG in its investigation based on their years of experience and commitment to the integrity of forensic science. The team included Frank Rudewicz, Jack Mario and Michael Wolf.

Rudewicz is a Principal and Counsel for Marcum LLP with a practice area in forensic, investigative and advisory services. He has more than twenty-six years of experience investigating fraud in the public and private sectors. Both federal and state agencies have appointed Rudewicz to conduct independent investigations related to allegations of improper conduct in police departments, public universities, public housing departments and federal agencies, including the Department of Defense.

Mario is a chemist with more than thirty years of experience analyzing seized drugs, including over ten years supervising drug analysts in an accredited crime laboratory in Suffolk County, New York. He has published several papers, and is a recently retired member of the Core Committee of the Scientific Working Group for the Analysis of Seized Drugs (“SWGDRUG”), as well as a member of the Northeastern Association of Forensic Scientists, the American Academy of Forensic Sciences, the American Society for Testing and Materials, and the International Association for Identification. Mario has provided presentations on drug testing to the forensic community for several decades.

⁹ In connection with its criminal investigation of Dookhan, the AGO had seized Dookhan-related documents from the Drug Lab.

Wolf is the former interim Director of Scientific Services for the state of Connecticut, and before that, was a member of the Governor’s Forensic Laboratory Working Group for the state of Connecticut, which developed and implemented constructive reforms following the revocation of the Connecticut Forensic Science Lab’s accreditation. Additionally, Wolf acted as a special investigator for the North Carolina Attorney General’s Office in the investigation of a North Carolina forensic lab that had been the subject of alleged wrongdoing after a defendant’s murder conviction was overturned. Wolf has a long history of public service as a former Assistant Director with the Federal Bureau of Investigation (“FBI”), where he managed large-scale investigations of fraud and other criminal activities, and headed remedial actions that shepherded initial accreditation of the FBI Laboratory by the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (“ASCLD/LAB”).

The OIG started its investigation by embedding itself in the Drug Lab to gain a comprehensive understanding of its layout and inventory. The OIG inventoried all of the equipment, instruments, supplies, books and documents within the Drug Lab. The OIG opened every drawer, cabinet and recycling bin to review their contents. In addition to being scanned into the consolidated review database, documents reflecting a change in protocol or policy were photocopied and set aside for review over the course of the investigation.¹⁰

Over the course of many months, the OIG reviewed over 200,000 documents, including emails, memoranda, policies, personnel records, discovery packets, budgetary materials, security records, chain-of-custody records, chemists’ handwritten notes, lab analysis documents and instrument-generated data.¹¹ The OIG also reviewed numerous transcripts and audio recordings from District and Superior court trials where Drug Lab chemists testified under oath in criminal proceedings.

The OIG followed numerous investigative leads. The OIG sent document requests and summonses to eleven separate entities¹² and conducted numerous field interviews with individuals who were directly or indirectly involved with the operations of the Drug Lab, including DPH employees, employees at the SLI, temporary employees, security personnel, interns, college personnel and police officers.

In October 2013, the OIG began its formal interview process, as provided for under the OIG’s enabling statute, M.G.L. c. 12A. The OIG interviewed twenty-four individuals under oath in “private sessions.” The OIG is grateful to the Comptroller’s Office for its assistance with these

¹⁰ It became apparent at the outset of the investigation that the Drug Lab only had one twenty-four page document from 2004 reflecting its official policies. Drug Lab staff updated many policies and procedures by email and/or memoranda. Sometimes, handwritten notes from internal Drug Lab meetings reflected policy changes.

¹¹ Consistent with its enabling statute, the OIG will only cite to documents that are already in the public domain.

¹² As of March 2014, the OIG continues to receive documents in response to outstanding requests. In fact, despite DPH’s efforts to review the enormous quantity of electronic data from the years 2002 through 2012 to ensure that they are not releasing to the OIG records related to another DPH laboratory or that are subject to its claim of attorney-client privilege, DPH still has over 200,000 electronic documents to review. According to DPH, the documents to be reviewed are extremely unlikely to contain information that is of significance to the OIG’s investigation.

interviews, as the OIG's statute requires a representative from the Inspector General's Council to be present at each session.

From the beginning of the investigation to its conclusion, the OIG made every effort to meet with the numerous stakeholders in the criminal justice community to gather facts and understand different positions, while maintaining its status as an independent neutral fact-finder. The OIG met with members of the judiciary, the MDAA, CPCS, "point prosecutors" from every District Attorney's Office that had cases stemming from the Drug Lab issue, the United States Attorney's Office, the Federal Defender's Office, the ACLU, the Massachusetts Association of Criminal Defense Lawyers, the Massachusetts Bar Association and the Massachusetts Organization of State Engineers & Scientists. In addition, in an effort to coordinate with other agencies, the OIG met with DPH, EOHHS, the MSP, the Executive Office of Administration and Finance, the Information Technology Division, the Governor's Legal Office and members of the Task Force. The OIG also met with a representative from the Texas Forensic Science Commission, an organization that was handling a similar situation related to wrongdoing committed by a forensic chemist in Texas. OIG staff also attended Forensic Science Advisory Board meetings held in Massachusetts.

From the outset of its investigation, the OIG contemplated the possibility of retesting drug samples still in existence (that is, those samples that had not been destroyed by court order when a case was concluded). At the beginning of its investigation, the OIG sent letters to all of the police departments that had drug samples analyzed at the Drug Lab asking them not to destroy the drug samples in their possession pending the OIG's investigation. As will be explained in greater detail in Section XVIII below, the OIG ultimately performed preliminary retesting on certain identified drug samples and has started the process of sending a subset of those samples in need of further testing to an independent, accredited laboratory out of state. When testing is complete, the OIG will issue a supplemental report concerning the results of the retesting.

As the OIG releases this report, the repercussions of Dookhan's malfeasance continue. Drug Lab-related criminal cases are being litigated on a case-by-case basis. In state and federal courts around the Commonwealth, well over 1,000 motions for new trial related to Dookhan's criminal behavior have been filed since September 2012. Approximately 500 defendants have been released, some of whom have reoffended. Certain defendants have been tried or retried on drug cases in which Dookhan was the primary chemist and have been convicted.

The SJC has not yet ruled on, among other things, whether the courts should adopt a global resolution to the Drug Lab cases. Trial court judges have postponed rulings in a large number of cases in anticipation of the SJC's rulings and/or this report. Other post-conviction motions have not yet been brought forward, as CPCS is still attempting to identify all Dookhan-related defendants. Meanwhile, the backlog at the MSP Crime Lab Drug Unit – caused by (1) the substantial volume of cases transferred from the shuttered Drug Lab,¹³ as well as the DPH Drug Lab in Amherst;¹⁴ and (2) retesting due to Dookhan's transgressions – is so high that district

¹³ The MSP inherited 14,228 samples from the Drug Lab. Included in that figure were samples not connected to any case.

¹⁴ On July 1, 2012, all forensic drug labs formerly under DPH were consolidated under the MSP, including the drug lab located in Amherst. In January 2013, Amherst lab chemist Sonja Farak was charged with removing drugs from

courts are routinely dismissing drug cases.¹⁵ Furthermore, as a result of the moratorium on drug destruction, many police department evidence vaults are filled to capacity.

On November 22, 2013, Dookhan pleaded guilty to all twenty-seven counts, and was sentenced to a term of not more than five years, nor less than three years, in state prison, along with two years of probation. Despite the resolution of Dookhan's criminal case, the fallout from the Drug Lab crisis continues to affect the criminal justice system.

the Amherst lab, purportedly for her personal use, and was charged with four counts of theft of a controlled substance from an authorized dispensary, four counts of tampering with evidence and two counts of possession of cocaine. On January 6, 2014, Farak pleaded guilty and was sentenced to 2 ½ years in the house of correction, with eighteen months to serve and the balance suspended for five years.

¹⁵ As of January 24, 2014, there was a backlog of over 15,000 drug cases at the MSP Crime Lab Drug Unit.

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II. Drug Lab Situated Within DPH

As previously mentioned, DPH was one of three entities within the Commonwealth that provided federal, state and local law enforcement agencies with drug testing services and resulting certificates of analysis (“drug certificates”) related to seized controlled substances.¹⁶ Of the three entities, the Drug Lab conducted the majority of drug testing for law enforcement agencies across the Commonwealth, and had been authorized to do so from the early part of the twentieth century.¹⁷ For several decades, the Drug Lab was located at the State Laboratory Institute at 305 South Street in Jamaica Plain (later renamed the “William A. Hinton State Laboratory Institute”), along with seventeen other DPH laboratories. These other laboratories focused on public health issues such as lead poisoning in children, influenza, rabies, tuberculosis and sexually transmitted diseases.

As DPH evolved, the inclusion of a forensic drug laboratory with the other DPH labs was somewhat ill-suited. DPH administrators viewed the Drug Lab’s mission as different from DPH’s mission, which is to “prevent illness, assure access to high quality public health . . . and to promote wellness and health equity for all people in the Commonwealth.”¹⁸ As a consequence of this perceived difference, DPH treated the Drug Lab differently from its other laboratories. For example, as of 2012, the Drug Lab was the only one of the eighteen DPH laboratories in the BLS that was not yet accredited by its field’s accrediting body.¹⁹ The employees of the Drug Lab felt neglected by DPH management and considered themselves the orphans of the SLI building. This feeling was exacerbated by the fact that, for years, DPH administrators contemplated transferring the Drug Lab to a “more appropriate agency” when reviewing budgets and balancing demands for limited resources among the laboratories in the SLI building. Indeed, over the course of many years, EOHHS and DPH had ongoing discussions with EOPSS and the MSP regarding a possible transfer.

¹⁶ Drug certificates are notarized documents signed by the chemists who analyze suspected controlled substances and make findings related to the substance’s identity and weight.

¹⁷ 1910 Mass. Acts c. 495, § 1, mandated that the State Board of Health (the predecessor to DPH) “shall make, free of charge, a chemical analysis of . . . [controlled substances] . . . when submitted to it by police authorities . . .”

¹⁸ See <http://www.mass.gov/eohhs/gov/departments/dph/welcomewel2.html>.

¹⁹ Two other laboratories under the BLS were also not accredited: the Rabies Laboratory and BioWatch. However, neither field of science had an available external accrediting body.

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III. Lack of Resources

A lack of resources hindered the Drug Lab's ability to fulfill its statutory duty to analyze controlled substances free of charge for most municipalities throughout the Commonwealth of Massachusetts.²⁰ The Drug Lab was funded for the most part through DPH's State Laboratory and Communicable Disease Control Services Account. This account provided funding for the administration of the Center for Laboratory and Communicable Disease Control, including the Division of Communicable Venereal Diseases, the Division of Tuberculosis Control and the State Laboratory Institute ("SLI"). From this account, the director of the Bureau of Laboratory Sciences ("Director of the BLS"), who oversaw the SLI, decided how much funding to provide to each of the eighteen DPH labs, including the Drug Lab. From fiscal year ("FY") 2008 through FY12, the director of BLS authorized \$930,550, \$815,594, \$1,036,268, \$1,024,497, and \$1,021,064, respectively, to the Drug Lab.²¹ Beginning in FY02 and continuing to FY12, language in this account mandated that DPH give "priority to the analysis of samples used in the prosecution of offenses involving controlled substances," that is, to the Drug Lab.²² DPH appeared to comply with that mandate.

In addition, the Drug Lab received funding from other sources. In 1989, the Legislature established the Drug Analysis Fund,²³ which provided up to \$100,000 annually to the Drug Lab to help cover costs associated with drug analysis, such as training, equipment and overtime. Court fees assessed against criminal defendants in drug cases financed this fund. In 2003, the Legislature abolished the Drug Analysis Fund and redirected those fees to the general fund.

Federal grants became a funding source for the Drug Lab in 2009. The Drug Lab received some funding from the federal government through a Project Safe Neighborhood ("PSN") grant. The PSN grant provided the Drug Lab with \$10,000 in FY10 and \$20,000 in FY11 for overtime to reduce the backlog and expedite sample analysis for federal cases. More significant was the Paul Coverdell Forensic Sciences Improvement Grant, which provided much-needed federal funding to the Drug Lab and is addressed in detail in Section XIV of this report.

Financial constraints over the years limited the Drug Lab's ability to keep pace with the increasing number of illicit drugs submitted for testing, as well as the complexity in the types of drugs submitted. In 2006, the Drug Lab tested 43,092 samples, an increase of 29% since 1995. Often, staffing vacancies were not timely filled, resulting in a reduction in the number of chemists available for sample analysis. The growth in sample submissions and the need for more complex and time-consuming analyses on more complicated drug submissions, coupled with a stagnant level of staff, resulted in a growing backlog of samples to be analyzed and an ever-increasing turn-around time. At the same time, during the financial recession starting in 2008,

²⁰ See M.G.L. c. 111, §12 (repealed 2012).

²¹ In FY08 through FY12 the SLI was funded the amounts of \$6,502,149, \$6,534,838, \$5,510,785, \$5,147,031, and \$5,232,557 respectively.

²² Han worked with Grace Connolly, Director of Administration and Finance for the Bureau of Laboratory Sciences, to try to protect the Drug Lab from funding reductions.

²³ See M.G. L. c. 10, § 51 (repealed 2012).

DPH was confronted with increasingly difficult decisions about which programs to reduce or eliminate.²⁴

Limited financial resources further impacted the Drug Lab's ability to purchase new laboratory instruments or to upgrade or repair existing instruments. Chemists reported taking time away from testing in order to repair instruments, including printers and other hardware. The Director of the Division of Analytical Chemistry, Julianne Nassif, kept a "wish list" of equipment to be purchased in the event that funding became available on short notice. At one point in 2009, three out of five of the chemical fume ventilation hoods in the Drug Lab were out of service, with one hood inoperable for several years because it was too costly to repair. In June 2007, the evidence safe used to secure samples was filled beyond capacity; it became a safety hazard for evidence officers trying to maneuver within the safe to access samples for assignment or return to police departments. Following this, Nassif acquired the shelving materials and labor necessary to renovate the evidence safe into a more efficient and organized storage space.

The lack of financial resources meant that there was little overtime available to pay chemists who were willing to work extra hours to reduce the backlog of samples. The overtime policy at the Drug Lab required the presence of three chemists in the Drug Lab as a safety precaution. Overtime money was not allocated to the Drug Lab until April or May of each fiscal year, when a determination was made that the funds were not needed to cover other costs throughout all of the SLI laboratories. Since the state's fiscal year runs from July 1 to June 30, this meant that no overtime money was available throughout most of the year to address the Drug Lab backlog.

The impact of these limited financial resources became more glaring after the United States Supreme Court case of *Melendez-Diaz v. Massachusetts*,²⁵ in which the Court held that the admission of drug certificates for drug samples without supporting testimony from the chemists violates the Confrontation Clause of the Sixth Amendment to the United States Constitution.²⁶ As a result of the Court's ruling, chemists spent time away from analyzing samples to testify in court and to collect the data and paperwork to provide to the parties in the criminal cases for samples they analyzed.

The Drug Lab implemented several strategies to lessen the impact of *Melendez-Diaz*. Samples were assigned to chemists based on geographic location to shorten travel time for chemists going to testify in court. The Drug Lab stopped performing analyses on undercover and probable cause buys and Evidence Office Supervisor Elisabeth O'Brien maintained open lines of communication with District Attorneys' Offices in an attempt to identify cases that had been resolved before trial so the samples did not need to be tested. Some samples were also transferred to the UMass and the MSP laboratories for analysis.

²⁴ The DPH drug testing lab in Amherst faced closure in 2009 and 2011, but was never closed by DPH.

²⁵ See *Melendez-Diaz v. Massachusetts*, 557 U.S. 305 (2009).

²⁶ The Sixth Amendment provides in relevant part that "[i]n all criminal prosecutions, the accused shall enjoy the right . . . to be confronted with the witnesses against him . . ." U.S. Const. amend. VI.

After *Melendez-Diaz*, Nassif repeatedly advocated for additional resources for the Drug Lab in discussions with both Director of the BLS Linda Han and DPH Commissioner John Auerbach, and at meetings of the Forensic Science Advisory Board (“FSAB”).²⁷

Auerbach was aware of the need for additional resources in the Drug Lab from his meetings with Han, during which they frequently discussed the backlog and turn-around time for drug analysis. Han also prepared written budget proposals for Auerbach each year beginning in October, expressing the need for additional resources and voicing concern about the impact of likely budget cuts. This was especially true during the recession of 2008 when 9C budget cuts²⁸ were implemented outside of the normal budget process. Auerbach’s response to the growing backlog and turn-around time at the Drug Lab was to advocate for its transfer to EOPSS. EOHHS Secretary JudyAnn Bigby joined Auerbach in supporting the Drug Lab’s transfer. Both Bigby and Auerbach believed it was the right move given DPH’s inability to provide resources comparable to those available at the Executive Office of Public Safety and Security and their belief that drug testing for forensic purposes was not a public health function.²⁹ While situated under DPH, the Drug Lab remained underfunded, understaffed and unable to adequately fulfill its mission of delivering free-of-charge forensic analysis of samples submitted by law enforcement agencies in the Commonwealth.

²⁷ The FSAB was established by M.G.L. c. 6, § 184A, to “advise the secretary of EOPSS on all aspects of the administration and delivery of forensic sciences in the Commonwealth.”

²⁸ M.G.L. c. 29, § 9C, allows the Governor to make cuts to the budget during the course of the fiscal year based on the financial condition of the state.

²⁹ During Bigby’s time as Secretary, the number of employees at EOHHS shrank from 22,000 to roughly 19,000 due to the recession and subsequent budget constraints. Though Bigby did not specifically monitor the Drug Lab, she was aware of its backlog and need for additional resources.

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IV. *Lack of Accreditation*

One of the Drug Lab's greatest drawbacks was its lack of accreditation.

Laboratory accreditation provides a means for continuous quality assurance and improvement through periodic reviews performed by an external and independent accrediting body.³⁰ Accrediting bodies review a laboratory's management, operations, personnel, procedures, equipment, physical plant, security and health and safety procedures to assure that a laboratory is complying with established best practices in the industry.³¹ Accreditation also provides a benchmark for measuring and maintaining a laboratory's competence.³² Though a voluntary process, a laboratory seeks accreditation to assure all stakeholders that it produces reliable and accurate data.³³

The State Laboratory Institute housed the various DPH laboratories, the large majority of which were accredited by an independent accrediting body. In fact, by the time the Drug Lab was transferred to MSP in 2012, it was the only DPH lab not accredited that had an external accrediting body available to do so.³⁴ The lack of accreditation caused the Drug Lab to be isolated from its peers in the forensic community, making it difficult for the Drug Lab to improve its practices and respond to new developments in forensic analysis of seized drug evidence.

A call for the Drug Lab to gain accreditation was by no means a recent development. In 2004, a report released by the Governor's Commission on Criminal Justice Innovation ("Governor's Commission") recommended the accreditation of the Drug Lab, citing a national trend in forensic science towards accreditation of forensic laboratories.³⁵ The Governor's Commission also found that accreditation would allow the Drug Lab greater access to federal grants.³⁶ Without accreditation, the Governor's Commission noted, the results the Drug Lab produced could be undermined and criticized in court, adding an extra hurdle to the prosecution of drug cases.³⁷

Following the Governor's Commission's report, the Drug Lab's management discussed accreditation as a long-term goal; however, little was done to achieve this goal. The Governor's

³⁰ ASCLD/LAB, *How to Become an Accredited Lab*, available at <http://www.ascl-d-lab.org/how-to-become-accredited> (last visited February 10, 2014).

³¹ ASCLD/LAB, *Program Description* (2008), available at http://www.ascl-d-lab.org/documents/legacy_overview.pdf.

³² International Laboratory Accreditation Cooperation, *Why Become an Accredited Laboratory?* (2011), available at <http://www.ascl-d-lab.org/wp-content/uploads/2013/05/Why-become-an-accredited-lab.pdf>.

³³ ASCLD/LAB, *supra* note 31.

³⁴ EOHHS Secretary Bigby and DPH Commissioner Auerbach did not know the Drug Lab lacked accreditation until the Drug Lab was closed in 2012.

³⁵ Governor's Commission on Criminal Justice Innovation, *Final Report*, 42 (2004).

³⁶ *Id.*

³⁷ *Id.*

Commission's report estimated it would cost between \$10,000 and \$25,000 annually to gain and maintain accreditation.³⁸ A substantial investment in personnel, training and equipment also would have been necessary. Although the Drug Lab updated protocols through memoranda, emails and meetings, it would have had to invest a significant amount of time to formally update procedures and policies to meet accreditation requirements.

The budget was consistently cited by Drug Lab employees as one of the main reasons the Drug Lab failed to move towards accreditation. In addition, the Drug Lab's Supervisor II, Charles Salemi, failed to appreciate and understand the benefits that would have come from accreditation, and stopped pushing for accreditation over the years. Drug Lab management was also too busy with the ever-burgeoning caseload to consider devoting substantial time to it. During the financial crisis and recession in 2008, when the state budget underwent severe cuts, accreditation remained only an idea and a long-term goal. When the Drug Lab closed in 2012, management had yet to take any significant steps toward initiating the process for accreditation.

³⁸ *Id.* at 43.

V. *Lack of Oversight*

A. **Lack of Knowledgeable Oversight**

One issue that significantly contributed to the problems in the Drug Lab was the lack of engaged and effective supervisory oversight.

1. **Charles Salemi**

From 2003 to 2012, Charles Salemi served as supervisor of the Drug Lab. Having worked in the Drug Lab since 1982, Salemi possessed an advanced understanding of forensic science, and of drug analysis in particular. Nevertheless, he generally operated as a “hands-off” supervisor. Salemi believed in allowing chemists to work independently and at their own pace, rarely questioning the amount or type of substances that individual chemists tested. For instance, a number of chemists tested only certain types of drugs based on their individual preferences. Furthermore, Salemi did not believe in monitoring chemists’ productivity in terms of the number of samples tested or the percentage of each chemist’s findings that were negative.³⁹

Salemi’s staff viewed him as a poor communicator who was uncomfortable with confrontation. Formal protocols were lacking and changes in practices were sometimes disseminated ineffectively. Often, procedures in the Drug Lab evolved and Salemi ultimately approved of such changes after the fact. Salemi tended to blame miscommunications in the Drug Lab on personality issues, when in reality, he could have prevented many of the conflicts that arose had he provided the chemists with clearer directives. Further, when Salemi had concerns about the quality of the work that certain chemists produced, his solution was to limit their responsibilities rather than require more training or additional supervision of their work.

Chemists in the Drug Lab understood that Salemi’s primary focus was with the quality of the testing being performed at the Drug Lab. Nevertheless, he did little to actively monitor that testing. Instead, he trusted that chemists performed all tests accurately and honestly.

2. **Julianne Nassif**

From 2006 to 2012, Julianne Nassif was the Director of the Division of Analytical Chemistry, which was responsible for overseeing several labs in DPH’s Bureau of Laboratory Sciences (“BLS”), including the Drug Lab, the Childhood Lead Screening Lab, the Chemical Terrorism Response Lab, the Environmental Chemistry Lab and the Forensic Drug Lab in Amherst. Nassif had no academic or work experience in forensic chemistry prior to becoming the director. Nassif

³⁹ A review of chemists’ negative findings indicates that they ranged from 2.2% to 8.5% (for a chemist who mainly analyzed pharmaceuticals, which have a higher prevalence of counterfeit drugs). Notably, Dookhan’s negative findings fell in the middle of the range of the nineteen chemists who worked in the Drug Lab between 2002 and 2012, with eight chemists producing lower percentages of negatives and ten chemists producing higher percentages of negatives. Dookhan found 3.8% of her samples to be negative.

holds a Bachelor of Arts degree in Environmental Health from Quinnipiac University (1981) and a Master of Science degree in Environmental Science from the University of Massachusetts at Boston (1990). Nassif began working for DPH in 1984 as an analytical chemist in the Environmental Chemistry Lab. In 1986, she was appointed supervisor of the Organics Lab, and in 1990, she became the director of the Environmental Chemistry Lab. In 2006, Nassif was promoted to Director of the Division of Analytical Chemistry, a position she held until 2012.

The Drug Lab employees universally believed that Nassif had no interest in supervising the Drug Lab, nor interest in learning about the Drug Lab's functions. Even after becoming director of the division that oversaw the Drug Lab, there was no evidence that Nassif participated in any training or took any continuing education courses in forensic chemistry or forensic drug testing. Throughout her career, Nassif was actively involved in at least six professional associations, none of which were related to forensic chemistry or forensic science.

3. Linda Han

Dr. Linda Han was the Director of the BLS from 2009 to 2012. As Director, Han oversaw the eighteen distinct laboratories making up the BLS, including the Drug Lab. Like Nassif, Han had little relevant background to qualify her to oversee a forensic drug lab. Han earned multiple degrees, including a Bachelor of Science degree in Molecular Biology from Princeton University (1988), a Medical Doctor degree from Harvard Medical School (1992) and a Master of Public Health degree from the Harvard School of Public Health (2003). Upon graduating from medical school, Han spent roughly twenty years working in clinical pediatrics. In fact, while the director of the BLS, Han continued to work one overnight shift per week as a pediatrician at South Shore Hospital until June 2011.

Han began working at DPH in 2003 as a contractor working on tuberculosis drug-resistance research. After spending approximately one year as a contractor, Han began working full-time at DPH in 2004 as the director of the Microbiology Division. Han remained in that position until 2009 when she became the interim director of the BLS, before officially being appointed the director in 2010.

4. Other Former BLS Directors

Han's lack of forensic background was not unique among those who had held the BLS Director position in the past. Between 2002 and 2009, directors Ralph Timperi,⁴⁰ Dr. Alfred DeMaria and Dr. Mary Gilchrist all had public health and medical backgrounds. None had any significant experience with forensic sciences, including drug analysis.

⁴⁰ In 2003, DPH was involved in a scandal when Ralph Timperi acknowledged that he had obtained a doctorate degree from an online university, reportedly for \$500, which turned out to be a hoax. There is no evidence that he suffered any consequence from this gaffe.

B. Lack of Management

1. No Managerial Presence

Both Han and Nassif failed to regularly visit and interact with the employees of the Drug Lab. During her time as director, Nassif rarely scheduled meetings with Drug Lab supervisors, and even when she did, she often ended up canceling them. Furthermore, Nassif rarely took the time to meet with chemists, many of whom viewed her as disinterested and unresponsive. Han had almost no interaction with employees of the Drug Lab to the point that some employees did not know who she was until the meeting when she announced the transfer of the Drug Lab to the MSP.

In fact, Nassif and Han typically only visited the Drug Lab when giving tours to DPH, EOPSS, or other state officials. Though the Drug Lab aimed to have monthly staff meetings to address changes in the protocols or other concerns, these meetings occurred far less frequently once Nassif became the director. In short, Nassif acted in a way that suggested that the Drug Lab was not a priority for her.

2. Nassif's Relationship with Salemi

As supervisor of the Drug Lab, Salemi reported to Nassif. Despite the fact that Salemi and Nassif supposedly had a very good relationship before she took over as director, their relationship quickly deteriorated when Nassif became Salemi's direct supervisor.

Many in the Drug Lab recognized that there was a communication breakdown between Nassif and Salemi. More specifically, several chemists felt that Nassif ignored and marginalized Salemi, causing him to gradually withdraw from his position of leadership and to be less willing to make meaningful decisions. This rift caused certain people in the lab to question to whom they reported – Salemi or Nassif. Salemi ended up handling the Drug Lab's technical issues and Nassif handled the personnel issues, creating a disconnect in the lab. As a result, chemists tended to bypass Salemi, instead bringing their concerns directly to the habitually unresponsive Nassif. Many of the Drug Lab's communication issues can be attributed to the vacuum in leadership created by this dynamic.

C. Lack of Oversight of Chemists

1. Inadequate Supervision of Testing Areas

Due to its physical layout, chemists performed preliminary tests in a number of different rooms throughout the Drug Lab. Typically, a testing room accommodated up to three chemists, one of whom was a Chemist III and the *de facto* team leader of that room. Team leaders were experienced chemists available to answer questions and offer advice to the less experienced chemists in their room. However, the team leaders' priority was not to supervise the work of the other chemists in their room, but rather to complete their own work. Once a new chemist

completed training, he was expected to conduct preliminary tests independently. Aside from Salemi's limited quality control checks, no supervisor or peer reviewed the chemists' work.

In 2008, the team leader in Dookhan's testing room, Elisabeth O'Brien, was promoted to Supervisor I of the evidence office. Once O'Brien transitioned out of the testing room, her position as team leader was never filled, leaving Dookhan and another chemist alone for years. Many in the Drug Lab were troubled by the fact that there was no team leader present during testing in that room. Despite the noticeable lack of supervision in the room, Salemi rejected an offer from Della Saunders, a Chemist III and team leader in the room next to Dookhan's, to monitor that room as well. Later, toward the end of Dookhan's time in the Drug Lab, Nassif rejected Salemi's suggestion that he place Michael Lawler, also a Chemist III, in the room as team leader.

2. No Performance Evaluations

Prior to 2007, chemists had regular Human Resources Division Employee Performance Review System ("EPRS") evaluations that their supervisors completed. EPRS evaluations assisted supervisors in making decisions regarding: salary and step increases, employee development needs, promotions, transfers, discipline and other personnel matters. Furthermore, every state agency, including DPH, requires EPRS evaluations and the chemists' collective bargaining agreement required them as well. However, after Nassif became director, the practice of completing EPRS evaluations ceased, a change of which DPH Commissioner Auerbach was unaware.

3. No Oversight of Chemists' Court Testimony

Despite the regularity with which chemists were called to testify after *Melendez-Diaz*,⁴¹ supervisors did not attend trials to assess and critique chemists' testimony. This lapse in oversight likely contributed to the inconsistent and sometimes inaccurate testimony by the various chemists. For instance, multiple chemists testified to being 95% confident that their analytical results were correct in situations in which there was no statistical support for those statements. Chemists also described significant aspects of the testing process differently from one another and often in ways that the forensic drug analysis community would not support.

Though there were issues with the testimony many of the chemists gave, Dookhan's was by far the most troubling. For example, Dookhan fabricated her credentials in a number of ways, testifying on multiple occasions to having received specialized training from the Drug Enforcement Administration ("DEA"), Food and Drug Administration, FBI and Homeland Security. Dookhan also testified that the Drug Lab purchased certain drug standards used in the testing process directly from the DEA – a statement that appears to be false. These are the types of false statements under oath that a supervisor would have caught and questioned had he been present in the courtroom or reviewed testimony transcripts after the fact.

⁴¹ *Melendez-Diaz v. Massachusetts*, 557 U.S. 305 (2009).

4. Failure to Check Academic Credentials

During its investigation, the OIG reviewed the application materials and curriculum vita (“CVs”) of all chemists employed by the Drug Lab. The OIG found that during the hiring process, the Drug Lab failed to confirm the academic credentials of applicants, but rather relied on the representations on an applicant’s CV and Drug Lab employment application. If management had taken steps to confirm credentials, they would have uncovered that: (1) chemist Kate Corbett did not earn a Bachelor of Science degree in Chemistry; and (2) chemist Annie Dookhan had never entered into a Master’s Degree program in Chemistry.

a. Kate Corbett’s Credentials

The OIG’s review and verification of chemists’ education credentials revealed a discrepancy with chemist Kate Corbett’s CV. Corbett indicated on her CV and application that she earned a Bachelor of Arts degree in Sociology from Merrimack College in May 2001, as well as an additional Bachelor of Science degree in Chemistry from Merrimack College in May 2003. Corbett had in fact only earned a Bachelor of Arts degree in Sociology from Merrimack College on May 20, 2001. Upon further investigation, the OIG found that while Corbett took all required coursework to complete a major in Chemistry, she was not awarded a second Bachelor’s degree in chemistry in 2003.

b. Annie Dookhan’s Credentials

In 2003, when Dookhan first applied to work at the Drug Lab, she represented on her CV and during an interview that she was attending the University of Massachusetts at Boston (“UMass Boston”) in pursuit of a Master of Science degree in Chemistry.⁴²

In January 2012, Drug Lab employees reported to Salemi (who reported to Nassif) that Dookhan maintained two different CVs – one representing that she had earned her Master’s degree, and another representing that her Master’s degree coursework was in progress. Ultimately, the MSP’s investigation of Dookhan revealed that she had never enrolled in or taken part in a Master of Science program at UMass Boston.

Dookhan not only misrepresented her academic credentials on her CV that she regularly provided to prosecutors for use as discovery in drug cases, she also testified under oath in court proceedings to holding a Master’s degree in Chemistry.

5. Failure to Review Discovery Packets

Further, after *Melendez-Diaz*, Salemi found it impossible to enforce his own policy, instituted in 2003, which required that a supervisor or team leader review all discovery packets before being

⁴² When Dookhan was hired, chemists did not need a chemistry or science degree; they only needed to meet the civil service requirements. It was not until 2005 that the Drug Lab required newly-hired chemists to have taken courses in analytical chemistry.

sent to an outside agency.⁴³ Had Salemi kept up with this policy, he or another senior chemist likely would have noticed that Dookhan had been sending out two different CVs.

⁴³ A discovery packet consisted of Drug Lab documents that were provided to prosecutors for use in criminal cases.

VI. Lack of Training

The Drug Lab provided its chemists with inadequate training. These deficiencies in training related to the initial chemist training, continuing education requirements, courtroom testimony and supervisor training.

A. SWGDRUG Training Recommendations

In 1997, the DEA and the Office of National Drug Control Policy formed the Technical Working Group for the Analysis of Seized Drugs – later renamed the Scientific Working Group for the Analysis of Seized Drugs (“SWGDRUG”). The SWGDRUG mission is “to recommend the minimum standards for the forensic examination of seized drugs.”⁴⁴ SWGDRUG, with input from the forensic science community around the world, has developed the accepted minimum standards of educational and professional development, quality assurance and drug identification methods for forensic drug analysis practitioners. Between 2002 and 2012, the Drug Lab did not comply with many of these SWGDRUG recommendations.

According to SWGDRUG training recommendations, drug labs must have a documented training program approved by lab management.⁴⁵ Training should focus on “the development of theoretical and practical knowledge, skills and abilities necessary to examine seized drug samples and related materials.”⁴⁶ The training program should include a period of supervised casework, and the individuals leading the training should have demonstrated competence in the analytical methods the laboratory uses and should be trained in the delivery of training.⁴⁷

Additionally, SWGDRUG emphasizes that all forensic chemists have an ongoing responsibility to remain current in their forensic science field and that laboratories should provide support and opportunities for continuing professional education.⁴⁸ More specifically, SWGDRUG recommends that chemists attend twenty hours of training every year and that continuing education be documented.⁴⁹

B. New-Chemist Training

At the Drug Lab, training for new chemists lasted approximately six to eight weeks. Chemists received individual training, typically by the Drug Lab’s Supervisor II, Charles Salemi, and a Chemist III or team leader⁵⁰ in the new chemist’s bench area⁵¹ of the Drug Lab. Each new

⁴⁴ SWGDRUG Recommendations, *Introduction*, vii. (2011), available at http://www.swgdrug.org/Archived/SWGDRUG%20Recommendations_070711.pdf.

⁴⁵ SWGDRUG Recommendations, *Part II: Education and Training*, § 4.2 (2003).

⁴⁶ *Id.*

⁴⁷ *Id.* §§ 4.2.3, 4.4.

⁴⁸ *Id.* § 3.1.

⁴⁹ *Id.* § 3.1.1.

⁵⁰ The team leader was the highest-level chemist, typically a Chemist III, in each work room of the Drug Lab.

chemist was taught about the sample submission process and evidence office procedures. After 2005, new chemists also received a copy of training guidelines; however, as will be discussed in Section VII, the training guidelines were never officially approved and therefore remained in “draft” form.⁵² Additional training included observing the work of another more experienced chemist, although the Drug Lab did not provide any training to experienced chemists on how to train new chemists.

Before new chemists completed their training, the Drug Lab required them to pass a written exam to ensure that they understood the initial chemical analysis testing process. Finally, the Drug Lab required new chemists to initial a training checklist found in the back of the training guidelines acknowledging that their instructor had covered each topic in the training process. Salemi kept records of the new chemists’ written exams and the training checklists; however, it is unclear if he did so for all chemists, as the OIG was unable to find records for the majority of chemists at the Drug Lab.

In general, the initial training of chemists at the Drug Lab was relatively brief, overly focused on the preliminary testing process, lacked sufficient emphasis on chemical theory and failed to instruct new chemists on many techniques used at the Drug Lab. For instance, the initial training did not expose new chemists to the Gas Chromatography and Mass Spectrometry (“GC/MS”) instrument⁵³ which was used on many samples tested at the Drug Lab. Prior to working in the GC/MS section of the Drug Lab, chemists needed to complete a separate GC/MS training.⁵⁴ Following the initial training, it remains unclear whether new chemists had restrictions on which types of samples they were allowed to test independently. Some chemists started out analyzing only marijuana samples, while others tested all types of samples (other than samples involved in trafficking cases)⁵⁵ once they completed their training. If a new chemist had a question related to the testing process, he was instructed to ask a senior chemist for guidance. Regardless, a senior chemist was supposed to check all the work that a new chemist conducted for only two to three weeks after their training had ended.

C. Continuing Education at the Drug Lab

Also, contrary to SWGDRUG recommendations, the Drug Lab did not have continuing education requirements or provide internal trainings. Occasionally, Salemi provided chemists with forensic journal articles by placing copies near employee time sheets with the expectation

⁵¹ A bench area refers to an individual work station where a chemist conducted preliminary testing.

⁵² Attached to the training guidelines as Addendum A was a copy of the SWGDRUG Code of Professional Practice for Drug Analysts; however, it was unclear whether the Drug Lab taught the SWGDRUG Code of Professional Practice during new-chemist training or promoted it throughout the Drug Lab.

⁵³ The Drug Lab used the GC/MS instrument to confirm the identity of substances tested at the lab. GC/MS analysis is a two-stage process that separates a sample into its molecular components; this structural information is then compared to a reference database or library. Identification of a drug was based on comparison of the chromatographic retention time and mass spectra of a case sample to that of a drug standard run contemporaneously.

⁵⁴ The lack of exposure to the GC/MS instrument in their initial training affected the chemists’ understanding of the total process of analyzing a sample and their ability to adequately testify in court.

⁵⁵ See Section XVI regarding trafficking cases.

that chemists would read the articles at their leisure. At times, Salemi required chemists to acknowledge that they had received and read the documents, but this practice occurred sporadically.

The Drug Lab did not require chemists to become members of forensic professional organizations that provide continuing education opportunities, and neither DPH nor the Drug Lab paid for membership dues. Still, some chemists joined forensic professional organizations of their own volition and at their own expense. Salemi encouraged all chemists to join the Northeastern Association of Forensic Scientists (“NEAFS”), but of the five chemists who joined NEAFS, few actually attended meetings or otherwise actively participated. Some chemists also joined other professional groups including the American Chemical Society, the International Association of Forensic Toxicologists, and the New England Microscopy Association.

Due to financial constraints, chemists’ requests for funding to attend external meetings and trainings were repeatedly denied. Commonly, when a chemist attended an outside training, the training was free or the chemist paid for it at his or her own expense. After the Drug Lab started to receive federal Coverdell grant funding in 2009, it sent some chemists to a DEA forensic chemist training each year. Many chemists wanted to attend this training, but the Drug Lab did not have enough funding to pay for flights and hotel rooms for every interested chemist. Several chemists attended the DEA training using Coverdell grant funding, and in one instance, a chemist paid for her own expenses to attend this training. In short, the Drug Lab did not comply with the SWGDRUG recommendation that chemists attend twenty hours of training each year.

D. Lack of Instruction on Legal Issues

When there were changes to state or federal laws related to the Drug Lab’s work, the Drug Lab did not seek assistance from DPH counsel or experienced criminal law practitioners to help explain the impact of the changes to the chemists at the Drug Lab. On occasion, the Attorney General’s Office sent legal updates to EOPSS, which would eventually forward the updates to the MSP and the Drug Lab. However, Salemi and other Drug Lab supervisors took it upon themselves to stay current on the law and to interpret changes to laws.

The Drug Lab’s leadership, however, failed to adequately communicate to chemists how changes in the law should impact Drug Lab practices. For example, after Massachusetts decriminalized the possession of less than one ounce of marijuana in January 2009, Salemi circulated an internal memorandum addressing how chemists were supposed to weigh marijuana samples. According to several chemists, after the law had changed, there was confusion about whether they were expected to weigh up to one ounce of marijuana or use a sampling approach to determine if the net weight of the sample exceeded one ounce of marijuana.

The Drug Lab failed to provide adequate training on how to testify in court. Few chemists had a mock trial training opportunity to help them to prepare to testify. Several chemists attended a mandatory expert witness training between 2001 and 2003. Additionally, in 2007 or 2008, a few chemists sought out a free courtroom testimony training offered by the federally funded High Intensity Drug Trafficking Area program. However, after *Melendez-Diaz* in 2009, DPH did not provide expert-witness training to the chemists in the Drug Lab despite the increased likelihood that chemists would be required to testify at trial regarding their procedures and results. Prior to

Melendez-Diaz, chemists rarely testified at trial, but after the Court’s decision, chemists began to testify on a frequent basis. Because DPH did not provide expert witness training or guidelines, individual chemists began drafting their own sample courtroom questions and instructions on how to prepare for a court appearance. As a result, chemists testified inconsistently and, at times, chemist testimony revealed an insufficient understanding of the preliminary testing process and other techniques used at the Drug Lab. For example, the OIG uncovered instances of chemists bolstering testimony by providing statistical support for preliminary testing results when no such statistical support existed. The OIG found that chemist testimony demonstrated a failure to appreciate the chemical theory behind forensic drug analysis as a result of inadequate chemist training.

E. Supervisor Training

Once a chemist was promoted to supervisor, the Drug Lab did not provide any training on the role and responsibilities of a supervisor. DPH provided free monthly supervisor trainings, but due to the extensive backlog at the Drug Lab, new supervisors did not have the opportunity to attend.

VII. *Lack of Protocols*

When the Drug Lab closed in 2012, its most current standard operating procedures manual, *Policies and Procedures – Drug Analysis Laboratories*, was dated September 29, 2004 (the “2004 *Policies and Procedures*” or “2004 policy manual”). This twenty-four page document addressed: (1) the submittal of evidence; (2) chain of custody; (3) analysis procedures; (4) drug certificates; and (5) testimony.⁵⁶ There were no other formal documents to supplement the 2004 *Policies and Procedures*, and this document alone lacked specific directives and uniform protocols for the Drug Lab staff to follow.

A. **SWGDRUG’s Recommended Protocols**⁵⁷

According to the 2003 SWGDRUG recommendations that were in effect before the creation of the Drug Lab’s 2004 policy manual, drug labs were supposed to have written analytical procedures.⁵⁸ A laboratory’s analytical procedures were supposed to include protocols for the sampling of evidence,⁵⁹ work practices that prevent contamination,⁶⁰ criteria for the acceptance and interpretation of data⁶¹ and casework documentation.⁶² They were also supposed to have a documented quality management system that was established and maintained by “the highest level of management concerning laboratory policy.”⁶³ This documented quality management system was supposed to “cover all procedures and reports associated with drug analysis.”⁶⁴ Laboratories were also supposed to have and to follow a documented evidence control system to ensure the integrity of physical evidence.⁶⁵

Between 2002 and 2012, the Drug Lab did not comply with the majority of these SWGDRUG recommendations.

B. **2004 *Policies and Procedures***

Most concerning, the 2004 *Policies and Procedures* failed to provide detailed and documented procedures related to analytical testing, with the exception of a brief section on pharmaceuticals

⁵⁶ There was a total of six pages addressing the submittal of evidence, three pages addressing chain of custody, eight pages of analysis procedures (five pages were appendices addressing the defense analysis procedures and SWGDRUG recommendations, respectively), and two pages addressing certificate reports and testimony.

⁵⁷ SWGDRUG is an organization that recommends minimum standards for the forensic examination of seized drugs.

⁵⁸ SWGDRUG Recommendations, *Part IV: Quality Assurance/General Practices*, § 5.1.1 (2003).

⁵⁹ *Id.* § 5.1.2.

⁶⁰ *Id.* § 5.1.3.

⁶¹ *Id.* § 5.1.5.

⁶² *Id.* § 8.1.

⁶³ *Id.* § 1.1.

⁶⁴ *Id.* § 1.1.1.

⁶⁵ *Id.* § 4.

and representative sampling.⁶⁶ The “Analysis Procedures” section of the 2004 *Policies and Procedures* states that “[t]he Laboratory has established policies and guidelines to standardize analytical testing,”⁶⁷ and asserts that the Drug Lab follows SWGDRUG’s 2003 recommendations for the methods used in the identification of seized drugs. The Drug Lab attached a copy of these SWGDRUG recommendations to the 2004 *Policies and Procedures* as an appendix. The SWGDRUG recommendations are the minimum standards for drug analysis, but are not themselves established procedures. In fact, the SWGDRUG *Method of Analysis* section attached to the 2004 *Policies and Procedures* recognized that “it is up to the individual laboratory’s management to determine which combination of analytical techniques best satisfies the requirements of its jurisdiction.”⁶⁸

Even though the Drug Lab did not update the 2004 *Policies and Procedures* document after September 29, 2004, in practice, the protocols at the Drug Lab appeared to change and evolve over time. Chemists regularly received internal memoranda and emails, and attended internal meetings, in which their supervisors updated laboratory protocol. However, the additional policies that the Drug Lab management disseminated over the years through email, memoranda and meetings were never added to the 2004 policy manual as addenda, nor did the supervisors keep the updates in one centralized location for Drug Lab personnel to review or consult when needed. Additionally, GC/MS Supervisor Peter Piro developed written procedures for the GC/MS instrument but it is not clear whether Salemi or Nassif ever approved them. Furthermore, some procedures, related to documentation or testing practices, were developed and adopted by the chemists and then presented to Salemi for his approval.

At times, Nassif, Salemi and some of the chemists cited another Drug Lab document, the *Training Guidelines for New Chemists* (“*Training Guidelines*”),⁶⁹ as the main source of laboratory protocols.⁷⁰ However, no one at DPH had ever adopted or approved the *Training Guidelines* as the Drug Lab protocol for drug analysis. The *Training Guidelines* remained in draft form until the Drug Lab closed in 2012. Notably, the first page of the 2009 version of the document specifically indicates that it is not the Drug Lab protocol.

In July 2009, Nassif acknowledged that the Drug Lab did not have documented standard operating procedures and recognized the need to produce and regularly review written protocols. Over the next three years, Nassif attempted to create standard operating procedures, relying on text from the Drug Lab’s training manuals and copies of the standard operating procedures from the MSP and the Drugs of Abuse Laboratory at UMass Medical School. Ultimately, in July 2011, Nassif enlisted Dookhan’s help to draft the Drug Lab’s standard operating procedures after

⁶⁶ See Section VIII below addressing the use of visual identification of pharmaceuticals. Also see Section XVI related to the Drug Lab’s use of representative sampling.

⁶⁷ *Policies and Procedures – Drug Analysis Laboratories*, updated Sept. 29, 2004.

⁶⁸ *Policies and Procedures*, Appendix IV, at pp. 21-22.

⁶⁹ There were two drafts of *Training Guidelines for New Chemists*; one from 2005 and another from 2009.

⁷⁰ When asked by prosecutors, the defense bar and other external agencies for a copy of the Drug Lab’s standard operating procedures, Nassif, Salemi and the other chemists commonly responded that either: (1) the Drug Lab followed SWGDRUG recommendations for the analysis of seized drugs; or (2) the specific Drug Lab protocols could be found in the various training materials circulated throughout the Drug Lab.

Nassif removed Dookhan from most of her testing responsibilities due to her breach in chain-of-custody protocols the previous month.

In short, from July 2009 until its closure in August 2012, the Drug Lab failed to update its written standard operating procedures. The failure of the Drug Lab's management to have formal, updated policies and procedures allowed for inconsistencies among the chemists' practices, including with regard to sample analysis. Furthermore, the lack of formal protocols demonstrates a lack of leadership and professionalism in the Drug Lab.

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VIII. Inconsistent Testing Practices

During the period of the OIG's review, 2002 to 2012, the Drug Lab had a practice for testing drug samples, referred to as the "two-chemist system," in which a "primary chemist" conducted preliminary bench tests and a "confirmatory chemist" received the sample into the GC/MS section, operated a GC/MS testing instrument and confirmed the preliminary finding on the GC/MS testing instrument. The OIG found, however, that chemists often deviated from that practice. These deviations included instances in which: (1) a chemist other than the confirmatory chemist operated the GC/MS instrument, thereby involving three chemists in the process; (2) the primary chemist operated the GC/MS instrument; (3) the primary chemist "received" his own sample into the GC/MS section; (4) multiple confirmatory chemists were involved in the analysis of a sample because the first GC/MS run failed to confirm the primary chemist's preliminary finding; and (5) the primary chemist was also the confirmatory chemist – analyzing the GC/MS results – for his own sample.

In addition, chemists failed to follow the Drug Lab's practices by failing to consistently complete documentation on powder sheets and by failing to have two chemists properly initial tune sheets.

A. Overview of Drug Testing Policies and Procedures

The Drug Lab used a variety of common forensic drug identification techniques to determine whether a given sample contained a controlled substance, as defined by M.G.L. c. 94C. With some exceptions, drug-testing protocols at the Drug Lab surpassed SWGDRUG's minimum standards of drug-testing methods for identification, in that the Drug Lab conducted more than two independent and validated tests for most samples.⁷¹ To accomplish SWGDRUG's recommendations for forensic drug analysis, the Drug Lab used a two-chemist system.

1. The Preliminary Testing Phase

The role of the primary chemist was to conduct a series of preliminary tests to establish a presumptive identification of an unknown substance. According to practices at the Drug Lab, the primary chemist first needed to determine the net weight of the sample. Then, the chemist would complete preliminary bench tests – also known as screening tests – such as color tests, microcrystalline tests, gas chromatography, infrared spectroscopy, ultraviolet spectroscopy, and macroscopic and microscopic examinations.

The primary chemist was supposed to test one sample at a time. As each preliminary test was performed, the primary chemist was expected to manually record the test results on one or two standardized documents – either a "powder sheet" or a "pharmaceutical analysis sheet" – and, if possible, make a preliminary identification of the substance. On each powder sheet and pharmaceutical analysis sheet, the primary chemist was required to record a sample's identifying

⁷¹ According to SWGDRUG, the use of the GC/MS instrument alone is sufficient to determine whether a tested substance is a particular controlled substance when a chemist uses the Gas Chromatography and the Mass Spectrometry as two independent and validated methods. In addition to the GC/MS instrument, the Drug Lab chemists used preliminary bench tests.

information, physical condition, gross and net weights, the results of each preliminary test, the preliminary identification and, ultimately, the final GC/MS results. The primary chemist was also required to write the preliminary identification of the sample on the control card.⁷²

Once the primary chemist documented a preliminary identification of an unknown substance, he next prepared an “aliquot” for GC/MS analysis. An aliquot is a small portion of a sample (3 to 5 mg) that the chemist places in a small glass vial (1.8 to 2.0 ml) and dissolves in a solvent such as methanol, ethanol or methylene chloride. The primary chemist was supposed to label the vial with the corresponding sample number and then fill out a “GC/MS control sheet.” The GC/MS control sheet listed the samples submitted to the GC/MS section and served as the Drug Lab’s primary means of both conveying the primary chemist’s preliminary findings to the chemists in the GC/MS section and tracking drug samples through the confirmatory testing phase.⁷³ The primary chemist was then supposed to transfer the aliquot, the GC/MS control sheet and the control card to the GC/MS section. The primary chemist maintained custody of the sample in the locker next to his testing space during the confirmatory testing phase, when the primary chemist sent the aliquot to the GC/MS section.

2. The Confirmatory Testing Phase

The confirmatory testing phase involved three steps. First, a confirmatory chemist “received” the vials directly from a primary chemist and confirmed that the numbers on each vial matched the numbers on the accompanying control card and GC/MS control sheet. This receiving chemist then dated and initialed the GC/MS control sheet to acknowledge receipt of the vials submitted for confirmatory testing. Finally, the receiving chemist placed the vials on a rack in the GC/MS section in anticipation of GC/MS analysis.

The next step in the confirmatory testing phase involved the use of a GC/MS instrument. Chemists were assigned weekly rotations to work in the GC/MS section. Drug Lab practice provided that a chemist would be assigned to a specific GC/MS instrument, and that chemist was responsible for quality checks and test preparation for each run on that instrument.

GC/MS test preparation required the confirmatory chemist to set up a GC/MS run by placing the aliquots, blanks,⁷⁴ a QC standard mix⁷⁵ and standards⁷⁶ into the appropriate positions on the

⁷² Each sample had a control card that the chemists used to record information about the sample as it went through the analytical process. The information included the sample’s analytical results, net weight, and the identities of the primary and confirmatory chemists.

⁷³ The primary chemist was responsible for completing the first portion of the GC/MS control sheet by indicating the following: the date and the “Drug Lab Assignee” (the primary chemist); a list of samples submitted in numerical order; the submitting police department; the preliminary findings; and any comments that could inform or help the confirmatory chemist with his analysis (*e.g.*, requesting that the confirmatory chemist run a sample on a specific GC/MS method or an indication that a sample had particularly weak preliminary test results).

⁷⁴ A blank is run between vials (both standards and samples) to ensure that there is no contamination during a GC/MS run. The blank is typically made up of the solvent that the sample is dissolved in. In the case of a sample with multiple subsamples, Drug Lab practice was for a blank to be inserted after every fifth sample.

⁷⁵ A QC standard mix is a prepared vial consisting of a codeine and cocaine mix used to ensure that the GC/MS instrument is working properly.

autosampler of the GC/MS instrument.⁷⁷ To aid this process, the GC/MS operator would complete an internal handwritten document called a “batch sheet,” which was numbered from one to 100, with the numbers representing vial locations on the autosampler. The confirmatory chemist used the batch sheet to record the location of each sample, blank and standard to confirm that he placed each sample in the correct vial location in the GC/MS instrument.

Additionally, the GC/MS operator was required to ensure that the instrument was “qualified,” or fit for operation. For the GC/MS operator to consider the instrument qualified, he was responsible for: tuning the instrument to ensure the mass spectrometer was working properly; confirming that the GC/MS instrument properly identified the QC standard mix as codeine and cocaine; and ensuring that the first few blanks and standards produced satisfactory GC/MS data. If the GC/MS instrument was not fit for operation, the GC/MS operator was required to terminate the GC/MS run and restart the GC/MS analysis.

In the final step of the confirmatory testing process, the confirmatory chemist reviewed all the GC/MS data for the entire GC/MS run, and if possible, made a final identification of the samples based on his interpretation of the GC/MS data – the retention times⁷⁸ and mass spectral fragmentations patterns.⁷⁹ If the retention time of the sample matched within 1.5% of the corresponding standard, the identity of the sample could be confirmed. Additionally, the confirmatory chemist needed to make sure that each blank was free of carryover from prior GC/MS runs to ensure there was no cross-contamination. If the confirmatory chemist made an identification, he manually wrote the findings on the front of the control card and also on the GC/MS control sheet. When there was an inconsistency between the primary testing results and the confirmatory testing results, the confirmatory chemist returned the vial, the control card and the GC/MS control sheet to the primary chemist for further analysis (*e.g.*, microcrystalline tests) or the preparation of a new aliquot.

3. Exceptions to the Two-Chemist System

For certain types of substances, the Drug Lab did not use a two-chemist system. When testing most Class E pharmaceutical samples that had been commercially produced by a licensed manufacturer, a single chemist could identify the substance by conducting a visual inspection of the sample’s appearance and labeling.⁸⁰ Similarly, for marijuana samples, a single primary

⁷⁶ A standard is an aliquot of a known controlled substance and is used to provide a base retention time and spectrum for comparison with unknown substances that are tested on the same GC/MS run. Tested samples were bracketed by standards to ensure that the GC/MS instrument was operating properly at the beginning, middle and end of the testing sequence. At the Drug Lab, standards were used after every tenth sample when possible.

⁷⁷ The GC/MS instrument has an autosampler that holds the vials during a GC/MS run and is programmed by a computer to make an injection into a vial in a specific location in the autosampler’s vial tray.

⁷⁸ The retention time is the time it takes the molecules of a substance to travel through the column in the gas chromatography part of the instrument.

⁷⁹ A mass spectral pattern is a two dimensional mass of ions produced by a substance processed by a mass spectrometer. It looks like a series of peaks.

⁸⁰ According to SWGDRUG recommendations, identification of an unknown substance based solely on pharmaceutical identifiers does not satisfy minimum standards for forensic identification.

chemist could identify the substance using macroscopic and microscopic inspections and a positive marijuana chemical test (referred to as a Modified Duquenois-Levine test). Outside of these limited exceptions, all other samples tested at the Drug Lab were supposed to comply with the two-chemist system.

In 2012, due to the demands of court appearances imposed by *Melendez-Diaz*, the Drug Lab gradually transitioned from a two-chemist system to a “single chemist system” for all samples, regardless of the type of substance in question, so that only one chemist had to testify.

B. Failure to Adhere to the Two-Chemist System

Chemists in the Drug Lab consistently represented that the Drug Lab utilized the two-chemist system. However, the chemists did not view the two-chemist system as a requirement. As a result, the testing process at the Drug Lab operated as a “two-phase system,” involving four distinct steps. The first phase of this two-phase system included the entire preliminary testing phase, in which a single primary chemist completed screening tests and made a preliminary identification of an unknown sample. The second, confirmatory phase involved three separate steps: (1) the receipt of samples into the GC/MS section; (2) the operation of the GC/MS instrument; and (3) the analysis of the GC/MS data and confirmatory identification of the tested sample. Even though the Drug Lab held itself out as having a two-chemist system, the OIG found that oftentimes more than one chemist participated in the three-step confirmatory phase. Also, on rare occasions, a single chemist completed both the preliminary and the entire confirmatory phases.

1. The GC/MS Operator Was Different from the Confirmatory Chemist

It was common practice in the Drug Lab for one chemist to complete the first two steps of the confirmatory phase by receiving the sample into the GC/MS section and running the samples through the GC/MS instrument while another chemist completed the third step by interpreting the GC/MS data. Chemists at the Drug Lab did not consider it a requirement that the GC/MS operator and the confirmatory chemist be the same person. They believed that as long as the confirmatory chemist actually viewed the location of the vials in the GC/MS autosampler, any chemist assigned to the GC/MS section could confirm the results, provided he was not analyzing a sample for which he had served as the primary chemist.

In November 2011, GC/MS Supervisor Peter Piro created a policy requiring GC/MS operators to use the GC/MS instrument only for the samples they intended to analyze; the policy cited the logistical problems that were created by having shared responsibilities among the GC/MS operator and the confirmatory chemist. Even after Piro disseminated this policy, it still happened that the GC/MS operator would be different from the chemist who confirmed the GC/MS data.

On occasion, a Drug Lab confirmatory chemist testified at trial that he had completed every step of the confirmatory testing phase even when the sample’s underlying documents indicated that another chemist had received the samples into the GC/MS section and/or had served as the GC/MS operator.

2. The Primary Chemist Prepared and Operated the GC/MS Instrument for His Own Samples

A related deviation from the two-chemist system involved the regularly occurring situation in which the primary chemist also operated the GC/MS runs for his own samples. Generally, when this occurred, a separate GC/MS chemist analyzed the GC/MS data and made a final identification of the substance. In fact, chemists appeared to believe that it was acceptable for primary chemists to be the GC/MS operator for their own samples in a two-chemist system, provided that the primary chemists did not conduct the final analysis of the GC/MS data for these samples.

3. The Primary Chemist “Received” His Own Samples into the GC/MS Section

Furthermore, there were instances in which a primary chemist “received” his own samples into the GC/MS section for confirmatory testing. By doing so, the primary chemist eliminated the quality assurance mechanism of having a separate chemist confirming that the number on each vial matched the number on the accompanying control card and the control sheet.

These situations were a natural outgrowth of the lack of any written protocol or consistently followed procedures for the transfer of aliquots to the GC/MS section. Primary chemists would hand their GC/MS aliquots to any available chemist who was a trained GC/MS operator, regardless of whether they were assigned to (or physically sitting in) the GC/MS section. If the receiving chemist was working outside the GC/MS section, the primary chemist would have the receiving chemist sign the “vials received” portion of the GC/MS control sheet. Then, either the receiving chemist would bring the vials to the GC/MS section, or sometimes the primary chemist would deliver his own samples to the GC/MS section. Some primary chemists would physically observe the receiving chemist complete his review of the sample numbers and acknowledge receipt of the samples on the control sheet, while others would hand over their vials and do nothing more.

4. More Than One Confirmatory Chemist Involved Due to Multiple GC/MS Runs

Another deviation from the two-chemist system involved having multiple confirmatory chemists run the same sample through the GC/MS instrument. In these instances, a primary chemist completed the preliminary testing phase and a GC/MS chemist conducted the confirmatory testing phase. If the GC/MS operator reviewed the GC/MS data and made a subjective determination that the retention time and mass spectra were insufficient to confirm the sample’s identity, he would return the aliquot to the primary chemist. The primary chemist, relying on the first GC/MS operator’s notes, might strengthen or dilute the concentration of the aliquot or conduct additional preliminary tests. The primary chemist would then return the vial to the GC/MS section for further analysis. At that point, it was often the case that another GC/MS chemist would complete the second GC/MS data analysis, thereby involving additional chemists in the process.

In these instances, the Drug Lab rarely, if ever, disclosed the involvement of all three chemists to the parties in the criminal case. Rather, the drug certificate listed only the names of the primary chemist and the GC/MS chemist who made the final identification.

5. One Chemist Performed All of the Testing

The OIG found unexplained examples in which the primary chemist improperly conducted each step of both the preliminary testing phase and the confirmatory testing phase.

This deviation from the two chemist system would sometimes occur when the samples were “expedited” for analysis or were resubmitted to the Drug Lab for additional testing.⁸¹ There is no evidence, however, of any policy that would allow a single chemist to conduct the entire analysis in these circumstances.

In addition, there were instances in which the primary chemist acted as a single chemist when analyzing Class B, C and D pharmaceuticals by either: (1) viewing label and appearance alone and without a GC/MS analysis conducted by a second chemist;⁸² or (2) conducting both the preliminary testing phase and the confirmatory testing phase, violating the “two-chemist” protocol.

Finally, at times, a single, primary chemist tested steroids. Chemists believed that a single chemist could test steroids because steroids were considered particularly challenging to identify and only a few chemists were trained to analyze the GC/MS data for steroid samples.

C. Other Deviations from Drug Lab Testing Protocols

1. Incomplete Powder Sheets and Control Cards

As noted above, a primary chemist was expected to record his bench notes contemporaneously on a powder sheet or pharmaceutical analysis sheet. The primary chemist was to include on these documents: (1) a physical description of the sample; (2) the results of each separate preliminary test conducted on the sample; (3) gross and net weights of the sample; (4) the presumptive identification of the sample; and (5) the ultimate GC/MS results. The OIG investigation found inconsistent use of powder sheets and pharmaceutical analysis sheets among the chemists at the Drug Lab. In some instances, a sample’s powder sheet contained incomplete information; still others were left entirely blank without any notations or preliminary test results.

⁸¹ Resubmitted samples were samples that law enforcement agencies returned to the Drug Lab for additional testing. They were assigned a new evidence control number, which was the original evidence control number plus the letter “R.”

⁸² In 2005, the new chemist training guidelines referenced the use of GC/MS analysis for pharmaceutical samples preliminarily identified as containing a Class A or B substances. Additionally, the chemists needed to chemically analyze a representative sampling of Class C pharmaceuticals if a sample contained thirty or more specimens. According to the 2005 training guidelines, a single chemist could identify Class D or E substances using the appearance and labeling technique. In 2009, the Drug Lab changed its training guidelines, now referencing the use of a GC/MS analysis for all Class A, B, C and D pharmaceuticals; a single chemist could identify only Class E pharmaceuticals using the appearance and labeling technique. For drug classes, *see* M.G.L. c. 94C, § 31.

At times, chemists would record their bench notes on the control card itself rather than using the required powder sheet or pharmaceutical analysis sheet.

Furthermore, the primary chemist did not always write the sample's preliminary identification on the control card. Additionally, there were instances when a primary chemist would cross out and change a preliminary identification after a GC/MS result found an inconsistent result.

2. Tuning Reports

The Drug Lab policy required the GC/MS operator to complete a tune test of the GC/MS instrument before every run of the instrument. The purpose of the tune test was to ensure that the GC/MS instrument's mass spectrometer was working properly. If the tune test was satisfactory, the Drug Lab policy required the GC/MS operator and a second chemist assigned to the GC/MS section to fill out a Drug Laboratory GC/MS daily QC check form ("QC check form") by placing a check mark on the form and initialing the bottom of the form. According to Piro's GC/MS policy, the GC/MS operator had to report an unsatisfactory tune report to Piro. In 2012, this policy changed to require the GC/MS operator and Piro to complete the QC check form.

Despite these policies, on occasion only one chemist recorded that the GC/MS instrument was properly tuned by initialing the QC check forms. Other times, chemists would start a GC/MS run before a second chemist had both reviewed the tune report and initialed the QC check form.

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IX. Ineffective Quality Control Measures

Between 2002 and 2012, the Drug Lab had numerous quality control (“QC”) measures in place to locate problems, defects and other instances where quality might be lacking.⁸³ However, many of the Drug Lab’s quality control measures were limited in their effectiveness because supervisors simply signed a form filled in by a chemist attesting that the chemist had performed a necessary quality control task. The supervisors did not typically review objective data to confirm that the chemist had in fact performed the task, or had performed it correctly. Furthermore, most of the quality control measures focused on whether the instruments were working properly as opposed to focusing on the accuracy of the chemists’ testing.

A. Internal Quality Control in the Drug Lab

1. Daily Quality Control Measures

Each chemist in the Drug Lab was responsible for certain daily quality control measures. For primary chemists, the Drug Lab required them to check their balances⁸⁴ and conduct negative control tests on their reagents.⁸⁵ The chemists recorded their compliance with these measures on various records where they handwrote either checkmarks or the weight obtained from their balance checks. The chemists performed these quality control checks independently, without supervisor or peer oversight.

The Drug Lab also required GC/MS operators to conduct daily quality control measures, including tuning the GC/MS instruments⁸⁶ and running a QC standard mix⁸⁷ on each GC/MS run. The GC/MS operators recorded their compliance with instrument tuning with their signature along with a second chemist’s signature on the tune results printed from the instruments. For the QC standard mix, the GC/MS operators would handwrite the details of the cocaine and codeine results on a form called the “GC/MS Daily Injector/Column Check.”

Additionally, GC/MS operators recorded their compliance with the QC standard mix and the GC/MS tunes on a form called the “GC/MS Daily Quality Control Check” form. On this form, chemists wrote checkmarks indicating the date and instrument which they tuned and on which

⁸³Quality control focuses on finding problems and defects. Quality control does not ensure quality; it is designed to find instances where quality is lacking. It is a reactive process.

⁸⁴ A balance is a scale. The chemists used the balances to weigh samples.

⁸⁵ A reagent is a substance or compound used in tests that chemists perform to preliminarily identify substances. Chemists conduct negative control tests by applying a reagent to a non-controlled substance; if the reagent reacts, it is no longer effective and cannot be used. Negative control tests help prevent false positives.

⁸⁶ A tune ensures that the GC/MS instrument is operating within acceptable parameters. The OIG reviewed tune reports from 2009 to 2012. The OIG did not locate any tune reports indicating that the GC/MS instrument was not operating within parameters. However, the OIG found that occasionally, a second chemist did not sign the tune report and in many instances, the second chemist signed the tune report days after the instrument was tuned.

⁸⁷ The QC standard mix is a combination of cocaine and codeine, which chemists run through the GC/MS instrument to ensure it can acceptably distinguish between two compounds.

they ran a QC standard mix. As with the primary chemist, the GC/MS operator was not observed or supervised while completing these tasks.⁸⁸

2. Monthly Quality Control Measures

The Drug Lab also had monthly quality control measures, including balance checks and the review of records related to the reagent preparation book, the standard preparation book,⁸⁹ and the GC instrument and GC/MS instrument maintenance books. Moreover, Salemi conducted monthly random quality control audits of previously analyzed samples to evaluate the accuracy of chemists' test results and the completeness of their paperwork. Salemi would tell chemists which samples he intended to audit before he removed them from the safe. Salemi then had the chemist preliminarily re-analyze the samples in his presence. With the exception of the control sheet, Salemi did not routinely review the GC/MS data from the chemist's original analysis and did not note whether the chemist ran the sample more than once on the GC/MS instrument. Salemi handwrote the results of his audits on a form.

Salemi "audited" between five and ten samples per month, less than one percent of the total number of samples the Drug Lab analyzed each month. For instance, chemists analyzed 23,322 samples in 2009, an average of 1,943 samples per month. Based on the OIG's review of the records, Salemi "audited" sixty-one samples in 2009, an average of five samples per month.

Notably, without any review of confirmatory GC/MS test data, Salemi could not uncover multiple GC/MS runs or any discrepancies between the primary chemists' preliminary findings and the confirmatory chemist's associated GC/MS findings, rendering his monthly audits largely ineffective.⁹⁰

3. QC and Quality Assurance ("QA")⁹¹ Reviewers

Most of the quality control forms had a space for the signature of a "QC Reviewer" and a "QA Reviewer." The QC Reviewer's job was to collect the quality control records from the chemists and various areas of the lab, ensure that the chemists had filled in the records, sign them, and

⁸⁸ In March 2012, the Drug Lab instituted a "technical review" process. In a "technical review," a reviewer checked copies of documents for each sample related to the chain of custody, preliminary and confirmatory testing, quality control and reporting, among other things. For example, the "technical reviewer" checked the data for the GC/MS run, including the tune report and the QC standard mix report.

⁸⁹ A drug standard is a controlled substance against which a chemist compares a submitted sample. For instance, when a chemist tested a sample that was suspected to be cocaine, he would also run a standard of cocaine (*i.e.*, a product known to be cocaine) through the GC/MS instrument. He could then compare the two results to help identify the submitted sample.

⁹⁰ The OIG found that certain of the samples that Salemi reviewed during his monthly audits were run multiple times on the GC/MS instrument as a result of inconsistencies among testing results. *See* Section XVII for more information on samples run multiple times on the GC/MS instrument.

⁹¹ Quality Assurance refers to a set of policies that focus on preventing quality problems and defects before they develop rather than identifying them after the fact.

present them to the QA Reviewer. QA/QC Technical Supervisor Peter Piro,⁹² or in the alternative, Dookhan, signed the forms as QC Reviewer. Nassif signed records as QA Reviewer. Han also signed monthly QA reporting cover sheets for the quality control records.

The QC and QA Reviewers' signatures were practically meaningless in attesting to the validity of the quality control process. Their signatures only documented that the reviewer had looked at a list of checkmarks on a completed form created by a chemist indicating he or she had performed one of the necessary quality control tasks. In addition, supervisors did not witness chemists performing the quality control measures, nor did the Drug Lab require peers to observe each other when performing these tasks. Similarly, supervisors did not routinely review underlying objectively reviewable data. Instead, the Drug Lab only required chemists to note that they performed quality control tasks on a form, in a book, or on their powder sheets.

B. External Quality Control Oversight

Until 2007, the Drug Lab was subject to at least some form of external quality control oversight. Every DPH laboratory in the State Laboratory Institute ("SLI"), including the Drug Lab, was required to participate in a quality control and quality assurance group ("QA/QC Group" or "Group").

The Group was responsible for overseeing all quality assurance and quality control protocols and methods for all eighteen DPH laboratories at the SLI. One specific function of the QA/QC Group was to ensure that all the DPH laboratories complied with their respective accrediting bodies' requirements and the recommendations from periodic audit findings. Almost all of the other DPH laboratories at the SLI were accredited and went through routine audits with their accrediting bodies.⁹³ After those audits, the Group would help them implement any necessary changes. But because the Drug Lab was not accredited and did not undergo routine audits, the Group had difficulty structuring a suitable quality control plan for the Drug Lab. For the Drug Lab, all the Group could do was to require it to produce its quality control records on a monthly basis, discuss defects or issues detected and propose changes and improvements. Ultimately, the Group's oversight was ineffective because it did not conduct any independent audits of chemists' test results and did not ensure that the Drug Lab was meeting SWGDRUG's minimum recommendations for seized drug analysis.⁹⁴

Due to budget restraints, DPH dissolved the QA/QC Group in 2007 and delegated the oversight of the Drug Lab's quality control functions to Nassif. Nassif did not make quality control at the Drug Lab a priority. As a result, after the Group dissolved, the Drug Lab no longer had routine monthly quality control meetings. Nassif cancelled the monthly meetings with Piro so often that within a few months, Piro began leaving the quality control records on Nassif's desk. She signed

⁹² In addition to the position of GC/MS Supervisor, Piro was appointed the QA/QC Technical Supervisor in approximately 2007.

⁹³ See Section IV for information regarding accreditation of the Drug Lab.

⁹⁴ See, e.g., Section XVI.

them at a later date, sometimes weeks or months later.⁹⁵ In most instances, Nassif did not review the underlying records, such as the QC standard mix reports, before signing off on quality control; she merely reviewed a list of checkmarks or handwritten notations on a form.

Nassif also gave quality control cover sheets to Han, who sometimes signed them months later. In one instance, Han signed a cover sheet six months after Piro had signed it. Further, even though Han approved these cover sheets, she was not involved in either creating or performing the underlying quality control procedures. She also did not review the underlying quality control records. Rather, Han reviewed lists of checkmarks or other handwritten forms indicating that each aspect of the Drug Lab's quality control records was acceptable, a review that lacked any meaning. When news of Dookhan's confession to evidence tampering reached Han in August 2012, she expressed shock that nothing in the quality control reports she received had raised any red flags that there were problems in the Drug Lab. It is unclear how she thought she would have been able to detect any problems from the face of the check-marked QA cover sheets.

C. Dookhan's Role as a QC Reviewer

Between June 2011 and September 2011, Dookhan regularly signed QC reports – such as the GC/MS Daily QC Checks and Salemi's monthly random quality control audits – as the QC Reviewer. This means that even after her supervisors knew she had breached chain-of-custody protocols and they had removed her from most testing responsibilities, Dookhan continued to sign Salemi's audits and other quality control records. Further, in her role as a QC Reviewer, Dookhan signed off on audits that included her own samples. In other words, she “approved” the accuracy of her supervisor's audits of her own work, thereby negating the purpose of an audit.

Additionally, between May 10, 2011 and May 14, 2011, Dookhan falsified four days of quality control records for QC standard mix runs on the GC/MS instruments. The GC/MS reports for the four days indicate that the QC standard mix found that no drugs were present when it should have found the presence of cocaine and codeine. Yet Dookhan filled out the “GC/MS Daily Injector/Column Check” as if the instrument had performed adequately, and had found cocaine and codeine.

Even more egregious is the fact that Dookhan signed her own falsified QC standard mix records as the “QC Reviewer,” indicating that she had reviewed and approved her own falsified quality control tests.⁹⁶ Nassif then signed the falsified QC standard mix records, indicating that she approved the records. Had Nassif reviewed the underlying GC/MS spectra, she likely would have discovered Dookhan's false records.

⁹⁵ Nassif resumed the quality control meetings with Piro only after Dookhan resigned, in March 2012, six months before the MSP took over the Drug Lab. After Dookhan's resignation, Nassif also began a more timely review of quality control records and making notes and comments about aspects of the records.

⁹⁶ After uncovering Dookhan's QC standard mix malfeasance, the OIG reviewed 3,930 QC standard mix results between 2005 (when the practice was implemented) and 2012. The OIG did not find any additional falsified records or evidence of any other wrongdoing with respect to the QC standard mixes.

In sum, the QC measures in place at the Drug Lab were insufficient to detect any malfeasance or issues related to chemist errors in drug analysis. Han and Nassif's approach to quality control highlights their disinterest in, and lack of oversight of, the Drug Lab.

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X. Lack of Heightened Security

Management at the Drug Lab failed to implement and maintain a system of heightened security in the Drug Lab, especially given the contents of the evidence safe. Despite the systems that were in place, such as an alarm system and biometric hand readers, supervisors did not properly manage or fully utilize the security resources. Supervision of keys and the alarm system lacked appropriate oversight, security policies were unenforced, and the evidence office database was accessible to individuals other than evidence officers.

The building housing the State Laboratory Institute (“SLI”) had many layers of security through the years. The SLI building required that every visitor enter through the front entrance of the building, which was monitored by a guard and camera surveillance twenty-four hours a day. The guard verified the visitor’s identity and required that an SLI building employee escort the visitor at all times. Originally, employees needed an identification card to gain access to the building. However, the SLI building’s security was eventually upgraded to an electronic access system that required employees to swipe a pre-programmed proximity card⁹⁷ at a turnstile at the reception area of the main entrance. After passing through the turnstile, Drug Lab employees could take the elevator or the stairs to the third floor and swipe their proximity card to open the double doors that led to the west wing, where the Drug Lab was located.

The Drug Lab was responsible for its own security, separate from the SLI building security. For years, Charles Salemi, as the Drug Lab supervisor, oversaw all aspects of a security system he inherited from the former Drug Lab supervisor, Kevin McCarthy. Even after Julianne Nassif took over as the director of Analytical Chemistry in 2006, she did not involve herself in security matters; instead, she let Salemi maintain responsibility for this area.⁹⁸ Salemi’s efforts, however, evidenced a lack of sufficient concern for potential threats to the Drug Lab’s security. As a result, he failed to monitor which doors each key could access,⁹⁹ failed to require that the chemists use the hand readers, and failed to monitor the use of alarm codes. Furthermore, Salemi did not make a practice of updating the alarm codes and key locks in response to changes in personnel.

The double doors to the Drug Lab wing led to a hallway with two main secured areas: the evidence office and the chemists’ testing area. Both the evidence office and the testing area were secured by a biometric hand reader, key lock and alarm system. The evidence safe, where drug samples were stored, was a separately secured room accessible from inside the evidence office. This safe could be opened with either a numeric punch code or a key.

⁹⁷ A proximity card is a plastic identification card that the user holds to an electronic reader unit affixed to the wall; the unit reads the card, produces an audible beep and unlocks the door.

⁹⁸ Nassif got involved in security policies and procedures in December 2011, six months after Dookhan breached chain-of-custody protocols as discussed in Section XII.

⁹⁹ Salemi never conducted a key audit. It was not until just prior to the transfer of the Drug Lab to the MSP in July 2012 that Linda Han, Director of Bureau of Laboratory Sciences, suggested a building-wide key inventory and requested that staff return keys that were no longer in use.

To access the chemist testing areas, there was a biometric hand reader, which required a unique four-digit identification number to be entered on the keypad and a hand to be placed at the base of the reader. The reader scanned the hand, compared it to the image in the system, and unlocked the door if there was a match.¹⁰⁰ The hand reader automatically downloaded and stored information memorializing who had accessed the secured area in a computer database.¹⁰¹ Despite the biometric hand reader's utility as a security device to monitor who entered the secured testing areas at any given time, it was ineffective as all chemists were also provided with metal keys and were allowed to use the key instead of the hand reader to open the door.

In addition, an alarm system secured the door to the chemist testing area. The Drug Lab staff understood that only supervisors and Chemist IIIs were authorized to have the alarm code, and only for purposes of arming and disarming the door to the testing area at the beginning and end of a day. However, the OIG determined that at least three Chemist IIs Dookhan, Daniel Renczkowski and Mai Tran – also possessed the alarm code to the testing area. In addition, all of the chemists who had alarm access shared the same numerical code, so there was no way to definitively determine who had disarmed the alarm on any given day. Similarly, chemists shared the same verbal password¹⁰² used to give notice to the alarm company that chemists would be working outside of normal work hours, making it impossible for Salemi to monitor who had accessed the testing areas off hours. The alarm company's authorized user list for the alarm system at the time of the Drug Lab's closure did not reflect which chemists actually possessed the alarm code. Drug Lab supervisors did not make a practice of updating the alarm company when they granted a new Drug Lab employee authority to use the alarm code.

Adjacent to each chemist's testing surface were individual drug lockers in which chemists secured their drug samples during testing. Chemists believed that drug lockers were only accessible by the individual chemist whose locker it was and Salemi. During the OIG's investigation, however, the OIG tested all of the chemists' locker keys that the MSP had in its possession and discovered that multiple keys could open some of the lockers. For instance, six different keys opened one locker in Room 362, where Dookhan and chemist Daniela Frasca had worked. Five keys opened another two lockers in Room 363 in which chemists Della Saunders, Lisa Glazer and Kate Corbett had worked.¹⁰³

There was also a safety policy in place for the chemist testing areas that had security implications. Specifically, for safety purposes, three chemists had to be present when chemists were conducting drug analysis outside of normal work hours.¹⁰⁴ However, there was no policy to prohibit a Drug Lab employee from being in the lab alone. In fact, it appears that Dookhan

¹⁰⁰ The hand reader utilized infrared light to capture a three-dimensional image of the hand; the reader then converted the image and stored it in a database.

¹⁰¹ Due to a computer malfunction, the Drug Lab's computer system lost all hand reader logs documenting who had gained access to both the evidence office and the testing areas. The only hand reader records that the OIG was able to obtain were directly from the hand readers themselves, which only went back to June 2012.

¹⁰² The alarm company required the verbal password so the operator in the call center could authenticate the affiliation of the individual over the telephone.

¹⁰³ It is unknown whether the chemists used these particular lockers to secure drug samples.

¹⁰⁴ With authorization, chemists could work at night, weekends, or holidays.

obtained access to the chemist testing area on Saturday, October 1, 2011 by herself, months after she was supposedly removed from most testing responsibilities following her breach of chain-of-custody protocols for ninety samples in June 2011 (“June Breach”).¹⁰⁵ Evidence suggests that Dookhan was gathering documents to provide to prosecutors in criminal cases on that date.

Much like the secured chemist testing area; a hand reader and an alarm secured the evidence office door, but it had the added security of a deadbolt. The only keys that worked in the evidence office deadbolt belonged to Evidence Office Supervisor Elisabeth O’Brien, Evidence Officer Shirley Sprague, Evidence Officer Gloria Phillips and Administrative Assistant Janice Zanolli. Salemi’s key was not available for testing; however, evidence supports the conclusion that he had a master key that would have opened the deadbolt. The alarm for the evidence office was disarmed using a different code from the alarm designated for the testing area, but it was still a single code shared among those who possessed it. Even though chemists could access the evidence office with the hand reader, lab policy prohibited them from going inside the evidence office unless an evidence officer was present. When an evidence officer left the evidence office, they were supposed to deadbolt the door preventing access by a chemist or anyone else. Despite the policy, chemists occasionally entered the evidence office and found themselves alone because the evidence officer failed to secure the deadbolt. There were also instances in which an evidence officer specifically requested that the chemist stay alone in the evidence office (or the adjoining small office, which was open to the evidence office), while the evidence officer briefly stepped out.

The evidence office safe was used to secure storage of drug samples. Drug Lab staff understood the policy that only evidence officers were authorized to enter the safe to retrieve samples. However, despite this policy, there was an instance when Dookhan entered the safe unaccompanied to get a shelf item while evidence officers continued their work in the evidence office.¹⁰⁶ O’Brien allowed Dookhan to enter the safe alone to retrieve the shelf item and told others that it was not an issue. Evidence suggests that Dookhan also gained unauthorized access to the safe when she committed the June Breach.¹⁰⁷

In December 2011, six months after the June Breach, supervisors discovered that Dookhan’s key to the testing area could also open the evidence safe. This was a surprise to Salemi, who had neither inventoried the keys, nor determined which locks each key could open. Soon after discovering the capabilities of Dookhan’s key, supervisors changed the evidence safe lock and combination, limiting access to only evidence office personnel and Salemi. The OIG tested all

¹⁰⁵ The OIG relied on proximity card records and payroll records which support a finding that Dookhan was the only person in the Drug Lab on that date, besides security and janitorial staff. In addition, alarm records show that on the prior night, a person identifying herself as “Annie” called to authorize access for follow day. Furthermore, records show that right after Dookhan used her proximity card to open the double doors to the Drug Lab, the alarm to the chemist testing area was disarmed.

¹⁰⁶ A “shelf item” is an item that is too big to be stored in the chemists’ locker, and therefore is secured in the safe.

¹⁰⁷ Report of Interview by Detective Lieutenant Robert Irwin, Commanding MSP-AGO Detective Unit & Detective Captain Joseph Mason, of Annie Dookhan, Chemist (Aug. 28, 2012).

of the available chemists' keys¹⁰⁸ on the original drug safe lock and discovered that all available keys could open the lock.

In April 2012, nearly three months after supervisors changed the safe lock, Nassif changed the evidence office protocol as follows: first, only evidence office staff and the lab supervisor could access the evidence office; second, rare visitors to the evidence office, including the laboratory director, maintenance and computer technicians, were required to sign a bound logbook noting the date, time and purpose of their visit and be escorted by an authorized individual at all times; and third, chemists were required to receive and return samples for analysis through the evidence office window during designated times or by appointment.

The Drug Lab's evidence database, FoxPro, which evidence officers used to manage information pertaining to chain of custody and drug test results, also lacked appropriate security, in that it was accessible by Dookhan and other chemists. Dookhan could access FoxPro to obtain sample-related information for herself and other chemists upon request. Certain chemists were also allowed, on occasion, to enter control card information into FoxPro.

Security of the FoxPro database was lacking in an additional way. If a user attempted to edit any of the information pertaining to a locked sample record, such as information entered from the drug receipt or the control card (including test results), a warning appeared on the computer screen that read "Only a supervisor after making a log entry can continue." The OIG found that to edit data, the user simply needed to press "Yes" to continue; the warning did not actually present a hurdle that required an override or a password; nor was there a record of when these warnings were triggered.

Finally, DPH's security was lacking because the agency did not run regular criminal background checks, or CORI checks,¹⁰⁹ on Drug Lab employees after their initial hiring or required regular drug testing. DPH believed that it could not conduct such CORI checks based on the collective bargaining agreement in place with the chemists' union.

¹⁰⁸ The OIG tested all available keys in the MSP's possession. As noted in footnote 99 above, the MSP had a number of keys that were not designated as belonging to a particular employee. The OIG did not have access to all keys that were designated as belonging to Chemist Daniel Renczkowski, Evidence Officer Gloria Phillips and Chemist Mai Tran.

¹⁰⁹ CORI stands for Criminal Offender Record Information.

XI. Chain-of-Custody Concerns

A. Background

Based on a review of the Drug Lab’s chain-of-custody records for the years 2006 through 2012, the OIG found a variety of deviations from established chain-of-custody practices and inadequacies in the system that the evidence office used to assign, track and document samples as they moved through the Drug Lab.

Chain of custody refers to tracking the location and transfer of a piece of evidence from the moment the Drug Lab received it until the moment the Drug Lab transferred it back to the submitting law enforcement agency. An unbroken chain of custody for a piece of forensic evidence verified that the Drug Lab restricted access to the evidence to only appropriate, authorized individuals and limited the likelihood that the evidence was compromised or altered.

The Drug Lab’s 2004 *Policies and Procedures* state broadly that “written records of the chain of custody of a sample are maintained from the time the evidence is received into the laboratory through the time the evidence is returned to the submitting agency.”¹¹⁰ The protocols further state, without specifics, that “a record is kept of all transfers of evidence within the laboratory, as well as all transfers between the laboratory and the submitting agency.”¹¹¹

The Drug Lab’s evidence office was the initial intake point for a high volume of substances submitted by law enforcement agencies for chemical analysis. The evidence office lacked a sufficient number of employees in the evidence office to manage the approximately 50,000 drug samples submitted to the Drug Lab each year. For most of the time between 2002 and 2012, the Drug Lab’s evidence office was staffed by either two or three evidence officers with only one evidence officer present on some days. Often, there were lines of police officers at the evidence office window waiting to submit samples. Evidence officers closed the evidence office window for a two-hour time period in the middle of the day and an hour at the end of the day to complete all other evidence office tasks, including creating chain-of-custody records for the intake of samples, assigning samples to chemists, performing data entry of analysis results, and receiving and storing samples that chemists returned to the evidence office.

B. The Drug Lab’s Chain-of-Custody Procedures

The evidence office was responsible for documenting the transfer of custody for each sample that entered the Drug Lab. The Drug Lab used two systems to document transfers of custody: an evidence logbook filled out by hand and FoxPro, a computerized database into which data was manually entered or scanned in with a barcode-scanning device. Specifically, transfer of custody occurred at four points: (1) from law enforcement to the evidence office (in FoxPro, called “Sample to Safe”); (2) from the evidence office to a chemist in the Drug Lab (in FoxPro, called “Sample to Lab”); (3) from the chemist in the Drug Lab back to the evidence office (in FoxPro,

¹¹⁰ *Policies and Procedures – Drug Analysis Laboratories*, updated Sept. 29, 2004, at 8.

¹¹¹ *Id.* at 9.

called “Sample to Safe”); and (4) from the evidence office back to the submitting law enforcement agency (in FoxPro, called “Sample to External Location”). FoxPro recorded all transfers in custody; the evidence logbook recorded only internal transfers of samples to and from chemists.

1. Submission from Law Enforcement to Evidence Office

The initial transfer of evidence from a law enforcement agency to the evidence office followed strict submittal procedures that were documented both in FoxPro and with a hard copy of a completed drug receipt. Chain-of-custody practices for the submission of drug samples from law enforcement agencies to the evidence office appeared to have been consistently followed.

Upon receipt of evidence, an evidence officer weighed and examined each item in the presence of the submitting officer to ensure the proper packaging, labeling and submission procedures had been followed.¹¹² The evidence officer affixed a barcode sticker on a manila evidence envelope with a pre-generated unique identifier known as an “evidence control number” or “sample number” and placed the sample in the envelope. The evidence officer recorded the sample number on the drug receipt. The evidence officer then initialed and dated the drug receipt, keeping the original receipt and providing a copy to the submitting agency.

Next, the evidence officer entered the data from the handwritten drug receipt into the computer database, FoxPro, creating the first electronic chain-of-custody record and generating a “control card” from the data on the receipt. The evidence officer then placed a control card for each sample in the corresponding manila evidence envelope and stored the envelope in the evidence safe until the sample was assigned to a chemist for analysis. The control card stayed with the sample throughout both testing phases and the chemists used it to record the sample’s analytical results.

2. Transfer from Evidence Office to Chemist

The chemists and evidence officers generally understood the protocols related to the transfer of samples from the evidence office to the chemists and back, but they did not uniformly adhere to them. When chemists received samples from the evidence office, both the chemists and evidence office staff understood that they had to document the transfer in both FoxPro and the evidence logbook. Evidence officers created a FoxPro chain-of-custody record by scanning the sample barcode and selecting a chemist’s name from a dropdown menu. Scanning the samples memorialized in FoxPro their transfer to the selected chemist and also created a printed document that was known as a “batch sheet.” This chain-of-custody batch sheet was similar to a receipt; its heading read “Samples to Lab” and it consisted of a list of all the assigned sample numbers, the assigning evidence officer’s initials, the assigned chemist’s initials and the date. The evidence officer gave the batch sheet to the chemist when the chemist picked up his samples from the evidence office. There was no policy for retaining the batch sheet; the Drug Lab did

¹¹² The Drug Lab would not accept items that were not properly packaged. However, packaging deficiencies would be remedied at the time of submission if possible.

not keep them as part of the formal chain-of-custody record. Sometimes chemists kept them for their own records, but more often they were discarded.

The evidence officer and the chemist were also supposed to make evidence logbook entries for each sample being transferred to a chemist. The evidence officer was supposed to record his initials, the date and the initials of the chemist to whom he was transferring the sample next to the corresponding sample number in the logbook before the samples left the evidence office with the designated chemist. The chemist was supposed to enter his initials next to the evidence officer's initials to acknowledge his receipt of the samples. Because multiple samples were stored within a single manila evidence envelope, the chemist was supposed to initial the logbook only after examining each sample inside the envelope to ensure that all the samples were intact, accounted for and properly signed out in the logbook. As will be set forth below, chemists did not consistently follow the practice of ensuring that they were signing for all samples they received.

The Drug Lab did not have a policy outlining how chemists should request samples from the evidence office, how frequently they could request samples or how many samples they could receive at one time. Chemists requested more samples whenever they were ready for them through informal methods of communication. This included the use of verbal requests or handwritten notes on scraps of paper or cut-up manila envelopes, which the evidence office threw away after fulfilling the request. In general, chemists set their own pace and specified how many samples they wanted to take and how frequently to take them. Despite the fact that FoxPro had the capability to generate reports detailing which chemist had which samples, neither the evidence office nor the Drug Lab supervisors kept track of which samples or how many samples each chemist had in his or her possession at any given time. Most chemists requested twenty-five samples at a time. However, based on Dookhan's requests, the evidence office often assigned her between sixty and eighty samples at a time, and as many as 119 samples per day. In June 2011, the evidence office assigned Dookhan eighty-three samples and then three days later, she was assigned eighty-four more.

When the chemists brought the samples to their bench space in the Drug Lab, they stored them in their own secure locker in their work area. After the complete analysis of a sample – including the preliminary and confirmatory phases – the chemist brought the control card back to the evidence office for data entry. The evidence officer would input the information from the control card into FoxPro, including the date of analysis, the identity of the confirmatory chemist, the net weight of the sample and the drug analysis results.

The evidence officer would not need to re-enter the name of the primary chemist at this point, as FoxPro would already contain that information if the evidence officer had properly scanned out the sample to a chemist. If the name of the primary chemist was missing at this point, it was a clear indication that the evidence officer had not properly scanned out the sample to the chemist. This happened repeatedly over the years, but there was no policy or practice for investigating or even documenting the discrepancy.¹¹³ The evidence office supervisor, on the assumption that it

¹¹³ The OIG did discover one five-page notebook that documented evidence office discrepancies from 2006 through 2012. The twenty-five entries in that notebook related to issues such as incorrect drug certificates or samples returned to the wrong police department, but did not include any entries related to breaches of chain-of-custody protocols within the Drug Lab.

must be caused by a computer glitch, instructed the evidence officers to input the primary chemist's name when this occurred and move on.

Entry of a sample's analytical results into FoxPro generated a printed drug certificate¹¹⁴ for the primary and confirmatory chemists to sign in the presence of a notary public. Once the drug certificate was signed, the primary chemist placed it back in the corresponding sample's envelope and returned the envelope to the evidence office.

3. Transfer from Chemist Back to Evidence Office

After analysis, primary chemists could return their samples to the evidence office whenever it was convenient for them, as long as an evidence officer was present to ensure that samples were not left unattended.¹¹⁵ Further, chemists were not required to document the transfer of samples back to the evidence office in any way. Rather, chemists simply dropped off their bin of samples in the evidence office and left.¹¹⁶ Furthermore, until June 2011, the evidence officers were not expected to examine the contents of the evidence envelopes being returned by chemists to confirm that the samples inside corresponded to the sample numbers affixed to the outside of the evidence envelopes.¹¹⁷ Throughout the years, however, the evidence officers were expected to record the transfer of samples from the chemists back to the evidence office both in FoxPro, by scanning the samples' barcodes, and in the evidence logbook.

Despite this expectation, some evidence officers would bypass the evidence logbook and only scan samples directly into FoxPro. The decision whether to fill in the "return to safe" column in the logbook appeared to depend on how busy an evidence officer was. Sometimes evidence officers would go back to the logbook and update the return column after they had already put the samples in the safe. Further, the OIG also found that evidence officers often did not process samples as soon as the chemists returned them; rather, the evidence officers would leave the samples out in the evidence office and check them back in when they had time.

FoxPro's chain-of-custody record feature was set up so that the evidence officers had to transfer a sample to and from the safe and throughout the lab in sequential order. Once the evidence officer received a sample into the evidence office and documented it in FoxPro as being in the safe, the next transfer for that sample had to be to a location outside of the safe (*e.g.*, to a chemist in the lab); a safe-to-safe transaction was not possible in FoxPro.

¹¹⁴ A drug certificate is a notarized document that reports and certifies the analytical results of a sample.

¹¹⁵ The OIG discovered one occasion when an evidence officer returned to the evidence office to find a bin of samples left unattended.

¹¹⁶ This policy changed in 2012 when chemists were then required to return samples through the evidence office window directly to an evidence officer, rather than enter the evidence office to drop off their samples.

¹¹⁷ This policy changed in mid-June 2011 in response to an incident when a sample was sent back to the wrong police department; the new policy required chemists to get a member of the evidence office to verify and sign for each sample the chemist brought back to the evidence office.

4. Transfer from Evidence Office Back to Law Enforcement Agency

FoxPro recorded the transfer of custody back to the submitting law enforcement agency when the evidence officer scanned the samples, creating a “Police Pickup” sheet. The sheet listed the sample numbers, the submitting agency, the law enforcement officer picking up the samples, the evidence officer and the date. The evidence office printed two copies of this sheet, both were signed by the evidence officer and the police officer, and the evidence office retained one as part of the formal chain-of-custody record in the Drug Lab.

C. Issues with Chain-of-custody Procedures

In its review, the OIG found multiple instances of missing or inaccurate chain-of-custody records as well as deviations from the Drug Lab’s chain-of-custody procedures. The OIG also found that there was no mechanism in place for detecting, documenting and addressing chain-of-custody errors.

The OIG reviewed the evidence logbook entries for the years 2006 through 2012 to detect samples that lacked chain-of-custody documentation. The OIG then cross-referenced any samples that lacked transfer initials in the evidence logbook with FoxPro’s chain-of-custody records and the sample’s drug analysis documents to verify that a chemist had custody of the sample at some point.

Based on this review, the OIG found four types of circumstances in which the Drug Lab lacked chain-of-custody records: (1) situations in which the chain of custody was complete in FoxPro, but the logbook lacked the chemist’s initials signifying receipt of the samples; (2) situations in which the chain of custody was complete in FoxPro, but the logbook lacked the evidence officer’s initials signifying the transfer of the samples to a chemist; (3) situations in which the chain of custody was complete in FoxPro, but the logbook lacked both the evidence officer’s and chemist’s initials signifying transfer of the samples to the chemist; and (4) situations in which there were no entries in FoxPro and no chain-of-custody documentation in the logbook. In all cases in which chain-of-custody records were found to be lacking, the sample in fact did leave the evidence office, was tested by a chemist, was returned to the safe, and then was returned to the police department.

1. Logbook Lacking Chemist’s Initials

The OIG found that chemists occasionally failed to initial the evidence logbook. Chemists often failed to contemporaneously record their receipt of a sample and would take their sample from the evidence office without writing their initials next to the sample’s control number in the logbook.¹¹⁸ Between 2006 and 2012, there were 769 samples which had proper FoxPro chain-of-custody entries but for which there were no chemists’ initials in the evidence logbook. Some of these deviations were a result of the chemist taking samples with the intention of coming back

¹¹⁸ On one occasion the evidence office did not have a logbook. During that timeframe, the evidence office kept copies of all “samples to lab” and “samples to safe” batch sheets to fill in the logbooks once the Drug Lab received a shipment of new logbooks.

later to fill in the logbook, despite the Drug Lab's policy of checking each sample at the time of transfer to ensure that the control number on the sample matched the control number in the evidence logbook. In other instances it appears that a chemist missed signing out one or two samples as a result of overlooking the very first or very last sample number in a long list of sample numbers.

In an effort to detect instances in which chemists' initials were missing, Evidence Officer Shirley Sprague would occasionally review the logbook. She would place a Post-it note on the page with the missing initials as a reminder to the chemist to sign the book after the fact. There was no policy requiring Sprague to conduct this review, to record her findings in any way or to report the deviations to a supervisor. In addition, Sprague performed this review sporadically, and only when she had downtime or happened to notice a blank place in the logbook. Besides that one informal check, there was no mechanism in place to detect logbook errors.

2. Logbook Lacking Evidence Officer's Initials

There were also instances when evidence officers failed to initial the appropriate place in the logbook to record their assignment of a sample to a chemist, even though the chemist placed his initials in the appropriate place in the logbook. The OIG found that, between 2006 and 2012, there were 294 samples that had proper FoxPro chain-of-custody records but were missing the evidence officer's initials in the evidence logbook. In certain instances, it is clear that these were transcription errors when the evidence officer initialed the wrong section (for example, the evidence officer filled out BXX-X1345 through BXX-X1350 instead of BXX-X2345 through BXX-X2350). Also, much like with the chemists, the lack of an evidence officer's initials may have been due to the evidence officer inadvertently skipping one or two samples in a large batch of samples (for example, the very first or very last number in a long list of samples). Another plausible explanation for the lack of an evidence officer's initials derives from the practice in which evidence officers would scan the samples out in FoxPro, then leave the samples out in a bin in the evidence office for a chemist to pick up. In certain instances, when the office was busy, an evidence officer would allow a chemist to sign for and take samples before the evidence officer properly initialed the logbook. It is possible that in some of these instances the evidence officer failed to go back and add her initials to the logbook.

Regardless of how these situations occurred, there was, again, no mechanism in place to detect the lack of evidence officer initials, to investigate the reason for its occurrence and to document the failure in the chain of custody.¹¹⁹ Further, despite an expectation that the chemist would alert the evidence officer when his initials were missing, this did not always occur.

3. Logbook Lacking Both Chemist's and Evidence Officer's Initials

The OIG found that between 2006 and 2012, there were eighty-one samples in which FoxPro contained the proper chain-of-custody records, but neither the chemist nor the evidence officer had initialed the logbook. In general, this situation applied to one or two samples in a batch and

¹¹⁹ Again, as noted in footnote 113, there was a discrepancy notebook in the evidence office but it was only used to document issues with drug certificates or the transfer of samples sent to police departments.

likely resulted from the evidence officer failing to initial every sample in an assigned batch and then the chemist signing for only the samples the evidence officer initialed. This is contrary to the Drug Lab's protocol, which required the chemist to check each sample in the evidence envelopes against the sample numbers in the logbook.

However, the OIG also found instances when neither the evidence officer nor the chemist recorded the transfer of larger quantities of samples in the logbook. The OIG found that in 2008, an evidence officer properly recorded FoxPro chain-of-custody records for a batch of seventeen samples transferred to a chemist, but both the evidence officer and the chemist failed to record the transfer in the evidence logbook. And in 2009, the same failure occurred for a batch of fifteen samples. Also in 2009, the evidence officer properly recorded chain-of-custody records in FoxPro for a batch of seven samples transferred to a chemist, but both the evidence officer and the chemist failed to record the transfer in the evidence logbook.

It is not clear why both the chemist and evidence officer would have failed to initial the logbook in instances involving large batches of samples. Additionally, as with all other deviations from chain-of-custody protocols, there was no documentation or reporting mechanism in place that would have triggered an investigation of or repercussions for these errors.

4. No Chain of Custody in FoxPro or the Logbook

The most egregious situations that the OIG uncovered were instances in which no chain-of-custody records existed in either FoxPro or the evidence logbook to indicate that the evidence officer had assigned samples to a chemist for analysis or that the chemist had returned them to the evidence office, despite the fact that the sample was analyzed. In FoxPro, these samples only had entries for a Sample to Safe (reflecting the receipt of the sample from the law enforcement agency) and a Sample to External Location entry (reflecting the transfer of the sample back to the law enforcement agency), without any entry for Sample to Lab (reflecting the transfer of the sample to the chemist) or Sample to Safe (reflecting the transfer of the sample from the chemist back to the evidence office). As will be set forth further in Sections XII and XIII, this very issue led to the discovery of Dookhan's acts of malfeasance; that is, Drug Lab personnel discovered that there were no chain-of-custody records in the logbook or FoxPro for ninety samples that Dookhan had custody of for testing in June 2011 ("June Breach"). In reviewing records for the years 2006 through 2012, the OIG found 196 samples that were missing every form of chain-of-custody documentation, including the June Breach¹²⁰ and the thirty samples that Dookhan took from the evidence office in May 2011 ("May Breach").¹²¹ By reviewing the evidence logbooks and FoxPro, the OIG found an additional seventy-six samples that lacked chain-of-custody records, including samples for both Dookhan and other chemists.

With respect to the June Breach, all of the evidence suggests (and Dookhan did not deny) that she removed the samples from the safe without the assistance or knowledge of any evidence

¹²⁰ See Section XII.

¹²¹ See Section XIII.

officer.¹²² In other cases, however, the chain-of-custody records may have been missing in the logbook and in FoxPro because the evidence officer failed to properly scan all of the samples' evidence envelope barcodes. As a consequence, the resulting batch sheet would not have included all of the samples transferred to the chemist. The chemists would have detected such errors had they compared the sample numbers in the evidence envelopes with the samples signed out to them in the logbook. In practice, however, many of the chemists compared the sample numbers on the "Samples to Lab" batch sheet with the sample numbers in the logbook, creating a situation in which the chemist could receive samples that were not documented in FoxPro or the logbook.

When there was no chain-of-custody documentation in the logbook or FoxPro, it usually occurred with one or two samples at a time. This suggests that the problem occurred because the chemist had referenced a batch sheet to fill in the logbook as described above. However, the OIG found instances, in addition to Dookhan's May and June Breaches, in which Dookhan had larger groups of samples with no chain-of-custody records. Between mid-March and mid-April of 2010, Dookhan analyzed a total of twenty-four samples that had not been signed out of the evidence office in either FoxPro or in the logbook. There is no way of knowing if all twenty-four samples left the evidence office at the same time (as there are no chain-of-custody records for them), or if the samples left the evidence office in smaller groups over the course of the month-long timeframe. On three different days, however, Dookhan tested a group of five samples, six samples, and nine samples, respectively, suggesting at the very least that each of these groups of samples left the evidence office together.

In addition to the June Breach and the May Breach, Dookhan analyzed fifteen samples that lacked chain-of-custody records in 2011. The dates of analysis for these samples spanned mid-February through May 2011. Again, there is no way to know when these fifteen samples left the evidence office as there are no chain-of-custody records for them.

D. Failure to Act Upon Chain-of-Custody Breaches

When evidence officers used FoxPro, there were two points in time when they should have noticed breaches in proper chain-of-custody procedures: (1) when the evidence officer entered a sample's analytical results from the control card into FoxPro and the primary chemist's name did not automatically appear in FoxPro; and (2) when the chemist returned the sample to the evidence office and the evidence officer was unable to scan the sample back to the safe because FoxPro indicated that the sample was still in the safe and not yet assigned to a chemist.

The OIG found evidence that on several occasions, evidence officers entered control card results, noticed that FoxPro had no designation for the primary chemist, and brought the situation to Evidence Office Supervisor Elisabeth O'Brien's attention. Each time, O'Brien responded that it must be a computer glitch. There is no evidence that O'Brien took any steps to investigate the reasons for the missing information. The evidence officer would then manually enter the primary chemist's name for each of the control cards being entered into FoxPro.

¹²² Such evidence includes the fact that Dookhan had previously requested Quincy samples from Sprague, who had denied the request, and the fact that Dookhan returned the samples from the June Breach in an evidence safe storage bin that was not used to transfer samples.

With respect to the second instance in which FoxPro would not allow an evidence officer to scan samples back into the safe, sometimes evidence officers assumed (because FoxPro showed that the sample was in the safe), that an evidence officer had already scanned the sample back in. The OIG did not find any evidence that evidence officers made further inquiries when this occurred; rather, the OIG found that the evidence officers would simply place the samples back in the safe to await pick-up from law enforcement.

In either of these instances, there was no mechanism for documenting the deviations from the chain-of-custody protocols. Nor is there any evidence that the Drug Lab reviewed its scanner to ensure that each time an evidence officer used it, FoxPro reflected the transfer of custody. There was no policy for routine review of chain-of-custody records at any time.

E. Failure to Inventory the Drug Safe

The OIG found that between 2002 and June 2012, the Drug Lab did not conduct inventories of the samples in the evidence safe. When the MSP took over the Drug Lab in the summer of 2012, eight members of the MSP Crime Lab Drug Unit, three Lieutenants from the MSP Narcotics Unit and two employees of the Drug Lab conducted an inventory of the safe. The audit inventory revealed that 157 samples were “missing” from the evidence safe, as FoxPro’s chain-of-custody records listed the samples as still being in the safe.¹²³

F. Lack of Policy for “Found” Drugs

The Drug Lab had no policy or protocol for handling those rare occasions when chemists would find loose items of drug evidence, such as a pill, in the Drug Lab. The practice for “found drugs” was to report them to a supervisor, who would secure the item and attempt to determine where it came from. This resulted in a number of miscellaneous items being stored in the evidence safe or in drawers or lockers within the Drug Lab without being associated with a particular case.

* * *

The various breaches in chain-of-custody policies and procedures at the Drug Lab led to many incomplete chain-of-custody records. These breaches were largely due to human error, lack of oversight, and inadequate mechanisms for detecting and preventing mistakes or malfeasance. When evidence officers detected instances of mistakes or malfeasance, however, there were insufficient protocols for addressing them. Many of the chain-of-custody errors were a product of the sheer volume of samples entering the evidence office. Nevertheless, gaps in policies and procedures, as well as failures to follow policies and procedures that were in place, allowed for such errors to go undetected and uncorrected.

¹²³ The evidence office called law enforcement agencies to determine whether the samples had, in fact, been returned. For most of the 157 samples, the police departments confirmed that the samples had been returned to them. When the Drug Lab closed in August 2012, however, the evidence office had not concluded making those calls.

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XII. Dookhan's Malfeasance

The issue that prompted the current criminal justice situation in Massachusetts stemmed from the malfeasance of one chemist – Annie Dookhan. Dookhan's malfeasance began to surface on June 16, 2011, when the Drug Lab's evidence office discovered that Dookhan had removed ninety samples from the office without following the Drug Lab's chain-of-custody protocols ("June Breach"). The June Breach consisted of ninety samples from Quincy police department and Wellesley police department.

A. Dookhan's High Testing Volumes

Before that time, however, Dookhan's activities were garnering increasing suspicion, beginning with her high testing volumes. From the start of her employment with the Drug Lab, Dookhan was testing (as the primary chemist) a larger than average number of samples compared to her peers. In 2004 and 2005, Dookhan's first two full years of employment, Dookhan analyzed 8,391 and 8,777 samples per year respectively, approximately 700 samples per month. Although certain chemists during that timeframe had months of high productivity (*e.g.*, 595 samples for a particular month),¹²⁴ the next highest-producing chemist analyzed an average of 3,640 samples per year.

Dookhan's high numbers became more apparent after *Melendez-Diaz*, when she was regularly called to testify in court proceedings and had much less time in the Drug Lab to complete her casework.¹²⁵ After *Melendez-Diaz*, the productivity of all of the chemists at the Drug Lab precipitously declined. However, unlike the other chemists, after a short period of declining productivity, Dookhan's numbers rebounded and again reached nearly twice that of the next highest-producing chemist. Specifically, during the first six months of 2009, before the Supreme Court issued *Melendez-Diaz* in June of that year, Dookhan tested 2,586 samples,¹²⁶ while the next highest-producing chemist for the same time period tested 1,584 samples. During the second half of 2009, after *Melendez-Diaz* was issued, Dookhan's numbers did decrease, but rebounded by December when they reached their highest point for 2009, at 617 samples. In 2010, Dookhan analyzed 6,466 samples, while the next highest-producing chemist analyzed 3,329 samples.

Elisabeth O'Brien, Evidence Office Supervisor I, first noted Dookhan's post-*Melendez-Diaz* high numbers in December 2009 and alerted Salemi. Before *Melendez-Diaz*, Salemi considered an average of 150 to 350 samples analyzed per month to be an acceptable range. Yet Dookhan

¹²⁴ Certain samples take longer to analyze than others. For instance, marijuana can be analyzed fairly quickly, while powders, such as heroin and cocaine, take longer. Dookhan's testing generally included a high number of powders. With respect to the 595 samples tested by another chemist referenced above, 525 were marijuana samples. In contrast, Dookhan's March 2004 sample volume of 902 included 384 marijuana samples, but also 420 powders.

¹²⁵ Dookhan had 91.7 hours of documented court appearances from June 29, 2009 through December 17, 2009. Dookhan had 201.5 hours of documented court appearances for the calendar year 2010.

¹²⁶ Specifically, Dookhan tested 517 samples in January, 472 in February, 467 in March, 267 in April, 455 in May and 408 in June.

processed 617 samples¹²⁷ in December 2009 (after *Melendez-Diaz*), eighty-seven of which were listed as “not tested.”¹²⁸ Salemi was appropriately concerned.

In January 2010, Supervisor of the Drug Lab, Charles Salemi and O’Brien told Director of the Division of Analytical Chemistry, Julianne Nassif about their concerns with Dookhan’s testing volume. The three spoke about Dookhan’s eagerness to work extra hours without getting compensation and her general efficiency. Salemi reached the conclusion that Dookhan was trying to please people and was rushing her work in an effort to do so. Salemi suggested that they could transfer Michael Lawler, a more senior chemist (with the title of Chemist III) into Dookhan’s lab room to serve as a team leader. Nassif and O’Brien disagreed with Salemi and Nassif denied the request. Rather than move a senior chemist into Dookhan’s room, Nassif instructed Salemi and O’Brien to perform a paper audit of one month of Dookhan’s work.

Salemi and O’Brien conducted an audit in January 2010 and focused on the paperwork associated with the analyses Dookhan performed in December 2009. Salemi and O’Brien also audited the paperwork of two other chemists so that Dookhan would not feel targeted. The audit revealed that Dookhan failed to report the GC/MS results on multiple powder sheets, but Salemi and O’Brien viewed this as a minor issue.¹²⁹ Salemi viewed it as another indication that Dookhan was rushing. Salemi gave Dookhan a copy of the audit and told her she needed to fill out her paperwork completely. After the paperwork audit, no further action was taken to monitor Dookhan or ensure the quality of her forensic results.

B. Other Concerns About Dookhan

In the months that followed, Lawler reported concerns to O’Brien and Salemi that Dookhan could not have possibly performed the number of analyses she claimed. Salemi informed Lawler that he had already spoken to Nassif regarding Dookhan’s high numbers, and that if Lawler had any other concerns, he should take them directly to Nassif. In the spring of 2011, Lawler began secretly monitoring Dookhan’s reagent mix levels and her discarded microscope slides, both needed for the microcrystalline test used to identify cocaine. He did so in an effort to determine whether Dookhan was actually conducting these time-consuming tests. Lawler also brought his suspicions to the chemists’ union, Massachusetts Organization for State Engineers and Scientists (“MOSES”), but the union official warned Lawler against defaming a fellow union chemist and that so-called “hearsay” could damage a young woman’s career. This encounter with the

¹²⁷ Of those 617, 365 were powders.

¹²⁸ A chemist to whom the evidence office has assigned samples for testing may enter “not tested” on a control card for a variety of reasons. Reasons for not testing a sample include instances in which the chemist is notified that the case has resolved and the sample no longer needs to be tested. It also includes instances in which the sample is assigned to the chemist who did the original analysis in order for the chemist to accompany a defense chemist in the Drug Lab as he reweighs and/or retests the sample.

¹²⁹ It is important to note that Salemi and O’Brien’s audit was quite superficial, in that they failed to look at underlying testing documents. One of the residue samples analyzed by Dookhan that they “audited” was a sample that she preliminarily tested on the stand-alone GC instrument and for which Dookhan documented on her powder sheet a positive finding for cocaine. However, the first GC/MS run of that vial – which had been positive on the GC – failed to indicate the presence of cocaine. A second GC/MS run also failed to indicate the presence of cocaine. A third GC/MS run, however, generated a very strong peak, indicating a positive for cocaine.

MOSES official frightened Lawler into silence. During this same timeframe, GC/MS Supervisor Peter Piro also voiced his concerns to O'Brien and Salemi about Dookhan's high numbers and his suspicion that Dookhan was not performing the required analyses on all samples. O'Brien assured Piro that she had no doubts about Dookhan performing all of the necessary tests. Salemi told Piro that he had already discussed Dookhan's productivity with Nassif.

Another chemist, Daniel Renczkowski, noticed that since 2010, Dookhan had a higher than average number of "returns" on her GC/MS submissions due to discrepancies between Dookhan's preliminary testing results and the confirmatory chemist's results on the GC/MS instrument. He also noted that Dookhan was making transcription errors on the vials she submitted to the GC/MS section, including writing the same evidence sample number on multiple vials. When Renczkowski confronted Dookhan about the transcription errors, she changed the numbers on the spot, claiming that she remembered the correct sample number for each vial. Further, on several occasions dating back to 2009, Renczkowski noticed that Dookhan would line up several dozen uncapped GC/MS vials in a rack on her bench as she prepared them in a group fashion for submittal to GC/MS. Renczkowski questioned Dookhan about the vials because the practice at the Drug Lab was for chemists to analyze one sample at a time and because the sample numbers were not written on the vials. Dookhan responded that the vials were in the same order as her stack of control cards so she would not get confused. Renczkowski reported all of these concerns to his direct supervisor, Piro. Piro ultimately told Salemi about these GC/MS issues, but not until after the June Breach was discovered.

Around March 2011, chemist Kate Corbett reported to Piro that Dookhan had forged Corbett's initials on a "batch sheet" for the GC/MS instrument, falsely indicating that Corbett had been the operator on a particular GC/MS run. Piro assured Corbett that he would discuss the matter with Dookhan. Whether Piro directly confronted Dookhan remains unclear.

In addition, at some point prior to the discovery of the June Breach, Piro witnessed what appeared to be Dookhan testing samples without first performing the necessary calibration of her balance.¹³⁰ Piro confronted Dookhan by handing her the weights needed to perform the calibration. Dookhan took the weights from Piro and performed the calibration without comment. There is no evidence to suggest that Piro reported this incident to either Salemi or Nassif.

In late April 2011, O'Brien reported to Salemi that Dookhan's numbers were high again for the month of March 2011. Records indicate that Dookhan analyzed 715 samples that month, with thirty-seven listed as "not tested."¹³¹ Salemi again communicated these concerns to Nassif and asked that he, Nassif and O'Brien meet to discuss the issue. The three met on May 2, 2011. Salemi again took the position that Dookhan was merely rushing. They also discussed the belief that Dookhan was working overtime and not requesting compensation.

On May 3, 2011, as a result of their meeting the previous day, Nassif indicated that she would assign Dookhan a project, presumably to slow down her testing. Specifically, Nassif suggested

¹³⁰ Chemists must check their balances daily. The calibration of a balance is an important quality control measure taken to ensure that the balance's readings are within an acceptable range of error.

¹³¹ Of these 715 samples, 245 were powders.

that Dookhan assess the forensic application of a Raman Spectrometer, a type of forensic testing equipment, in the Drug Lab. Both Salemi and O'Brien approved of Nassif's plan; however, there is no evidence that Nassif ever gave Dookhan that project.

Also in May 2011, Piro and Renczkowski approached Salemi to report another issue with Dookhan. Specifically, Renczkowski informed Salemi that Dookhan had forged his initials on a GC/MS control sheet and thereby falsely indicated that he had received the samples in the GC/MS section. When Piro confronted Dookhan about the forgery, she claimed it was a mistake and took the sheet back. Without talking to Dookhan or doing any other due diligence, Salemi viewed this transgression as another indication that Dookhan was rushing her work. He believed she had forged the chemist's initials in order to get her samples tested more quickly.

In May 2011, Dookhan began to request by sample control number and geographical location – namely the City of Quincy – the samples that she wanted to test. At some point in May 2011, Evidence Officer Shirley Sprague denied Dookhan's requests because she felt that Dookhan should get whatever samples were next in line, like every other chemist.

In addition to the concerns that Dookhan's fellow chemists voiced, and concerns about her high productivity, the week before the discovery of the June Breach, the evidence office discovered that a sample Dookhan had analyzed had been returned to the wrong police department. The evidence office determined that the error occurred because Dookhan had placed the sample into the wrong envelope. On June 15, 2011, one day before the discovery of the June Breach, O'Brien, Salemi and Nassif conferred and agreed that they needed to implement stricter chain-of-custody protocols in order to protect the integrity of the chain of custody in the Drug Lab. They decided that, under the new protocols, a member of the evidence office would verify that the evidence envelopes contained the correct samples when chemists returned them to the evidence office. Under the previous practice, an evidence officer could accept the envelopes without checking their contents. They also agreed that the new protocols would go into effect as soon as practical, but no later than Monday, June 20, 2011.

C. The June Breach

On June 16, 2011, Sprague was entering drug findings from control cards into the computer for purposes of creating and printing drug certificates. After inputting the findings from approximately five control cards, she noticed that the name of the primary chemist on the control cards (Dookhan) failed to automatically appear in FoxPro, the evidence office's database, and she had to manually enter Dookhan's name each time. Concerned that multiple samples failed to have Dookhan's name already designated in FoxPro, Sprague alerted O'Brien to the situation. In response, O'Brien reviewed the control cards, the chain-of-custody screen in FoxPro and then the evidence logbook. Finding no evidence that anyone had assigned the samples to Dookhan, O'Brien checked the safe and found that the samples in question were not there. O'Brien immediately notified Salemi.

Salemi confirmed what O'Brien had found – that Dookhan appeared to have custody of ninety samples that had not been assigned to her in the evidence logbook or in FoxPro. O'Brien and Salemi arranged to meet with Nassif on the following Monday, June 20, 2011. At that meeting, Salemi and O'Brien told Nassif of Dookhan's apparent breach in protocol and showed Nassif

that there were blank lines in the evidence logbook where an evidence officer's initials should have appeared had an evidence officer properly assigned the samples to Dookhan. Because Dookhan had already left for the day, they decided to meet with her the following day and ask about the situation. Nassif immediately contacted Director of the Bureau of Laboratory Sciences ("BLS"), Linda Han to tell her about the situation with Dookhan.

The next day, just before the meeting with Dookhan, O'Brien discovered that the previously blank lines in the evidence logbook had been filled in and dated June 14, 2011, with a purported transfer of samples from Evidence Officer Gloria Phillips to Dookhan. Phillips, however, could not have signed and dated the evidence logbook, because she had not been at work between the time that Nassif, Salemi and O'Brien observed the blank lines on the previous day and the time her initials were discovered in the logbook. It was apparent to O'Brien, Nassif and Salemi that Phillips' initials had been forged.

Shortly after discovering the forgery, Nassif, O'Brien and Salemi met with Dookhan. When they confronted her with the evidence logbook, she did not confirm or deny the allegations that she had breached chain-of-custody protocols and forged Phillips' initials. She simply stated "I can see why you would think that."¹³² At Nassif's direction, O'Brien called Phillips three days later and verified that Phillips had not initialed the evidence logbook.

D. Management's Failure to Take Appropriate Action

After the June 21, 2011 meeting, Nassif planned to temporarily remove Dookhan from her testing responsibilities and assign her to draft protocols for the Drug Lab. Ultimately, she placed Dookhan at a desk in the Drug Lab, outside of the secured chemist testing areas, near the evidence office. Nassif's purported rationale for this quiet removal was that Dookhan had always been an outstanding employee without any disciplinary issues. Both Salemi and O'Brien advised Nassif that they had no suspicion about the integrity of Dookhan's work product and that she was a hard worker and a good analyst. Further, Nassif believed that Dookhan had suffered some problems in her personal life that may have affected her judgment. There is evidence that Nassif believed that Dookhan would eventually transfer back to full testing responsibilities once she demonstrated an understanding of what she had done wrong. Nassif informed Han of her approach to the situation and Han approved.

At that time, neither Nassif nor Han reported Dookhan's breach in chain-of-custody protocols or her forgery to any senior staff at DPH. They failed to tell anyone in DPH's Human Resources department, Labor Relations department or the Commissioner's Office for more than five months, even though Han had regularly scheduled meetings with each of these groups.¹³³ Nassif clearly was aware of the legal significance of a breach in chain of custody. She had experience with overseeing high-profile cases in the Drug Lab in which she instructed others as to the

¹³² Memorandum from Steven Chilian, Deputy General Counsel, Department of Public Health to John Auerbach, Commissioner, Department of Public Health (Feb. 29, 2012).

¹³³ DPH was organized into ten separate bureaus, one of which was the Bureau of Laboratory Sciences, directed by Han. At least once a month, DPH Commissioner John Auerbach would meet with all bureau directors as a group. He also held individual meetings with each bureau director roughly every two months. Thus, Han likely met with Auerbach multiple times in the five-and-half month period during which she failed to report the June Breach.

importance of chain of custody. Further, Nassif oversaw the Chemical Threat Laboratory, where chain of custody was an essential aspect of that lab's operations. For instance, one month after she and the others discovered the June Breach, Nassif was involved in a small, yet significant, change to chain-of-custody protocols in the Chemical Threat Laboratory's standard operating procedures.

The reason for Han and Nassif's failure to report the June Breach may have been based on their desire to conceal any problems at the Drug Lab, given its potential transfer to EOPSS and/or their fear of losing the money it was receiving through the federal Coverdell grant.¹³⁴ It is also possible that from Han and Nassif's vantage, the Drug Lab was just not that important compared to the more pressing needs of the other public health laboratories in the SLI building. In any event, neither disclosed Dookhan's misdeeds with respect to the June Breach to anyone outside the SLI building for five and a half months.

Neither Nassif or Salemi ever officially informed Drug Lab employees of Dookhan's transgressions with respect to the June Breach. In fact, Nassif admonished Phillips not to tell anyone about the June Breach and the forgery. However, news of the June Breach spread among the chemists. Given what they learned, the chemists did not view Dookhan's transfer from sample analysis to drafting protocols as discipline, and some felt that it seemed more like a promotion. Some questioned why a Chemist II like Dookhan would be given such a high-level assignment. Others were disturbed that management had asked the very person who had breached the protocols to draft them.

Not only did Nassif and Han fail to report Dookhan's transgressions in a timely fashion, they also failed to further investigate Dookhan and the June Breach for several months. Nassif, O'Brien and Salemi took the position that there was no issue with the integrity or accuracy of the test results for the samples involved in the June Breach; however, there is no evidence that anyone took steps to verify that was true. O'Brien looked at the evidence logbooks to determine whether there were any other breaches, and either uncovered or reminded herself of a second breach – one that had occurred the previous month ("May Breach").¹³⁵ O'Brien informed Nassif of the May Breach within a week of their meeting with Dookhan on June 20, 2011. Even armed with this information, Nassif and Han failed to direct a widespread investigation into the Drug Lab's chain of custody, which would have unearthed the many breaches the OIG later uncovered, or to verify the integrity of the May Breach testing results. In fact, no one ever questioned Dookhan about the May Breach.

E. Dookhan's Continued Access to the Drug Lab

Furthermore, not only did Nassif and Han fail to report or fully investigate the June Breach (or May Breach) for an extended period of time, they also failed to restrict Dookhan's access to samples. After the June 21, 2011 meeting, Dookhan continued to test the samples in her

¹³⁴ The impact of the money received from the Coverdell grant on Nassif and Han's decision-making will be explored more deeply in Section XIV.

¹³⁵ See Section XIII.

possession, including the samples from the June Breach.¹³⁶ It was not until July 18, 2011 that Nassif told Dookhan that she had to minimize her time in the chemist testing area and focus on writing the protocols for the Drug Lab.¹³⁷ Despite this directive, Dookhan was allowed to continue testing all of the samples she had in progress, the last of which she completed on July 20, 2011.¹³⁸ Moreover, between July 21, 2011 and November 2011, Nassif approved the assignment of samples to Dookhan for analysis. Dookhan was assigned twenty-six additional samples as primary chemist during this timeframe; she took possession of all twenty-six but only analyzed ten.

Not only did Nassif and Han fail to restrict Dookhan's access to samples as a primary analyst, they also failed to restrict her access as a confirmatory analyst. Dookhan remained in the GC/MS rotation for a week after June 21, 2011. On June 28, 2011, Nassif informed Dookhan that she was removing her from the GC/MS rotation so that she could work with Nassif on protocols and technical review templates. However, Dookhan continued to analyze samples as a confirmatory chemist, testing thirty-six samples between June 21, 2011 and July 12, 2011. Another chemist, Nicole Medina, observed Dookhan alone in the GC/MS room with the lights off and the door closed at some point between July 2011 and September 2011, after Piro had told the other chemists that Dookhan was no longer allowed in the area.

Dookhan was also allowed to continue her role as a QC reviewer in the Drug Lab through September 2011.¹³⁹ This work consisted of reviewing daily quality control documentation in connection with GC/MS equipment functionality and calibration to ensure the documentation was completed and properly recorded.¹⁴⁰ Dookhan's quality control work also included reviewing and signing off on Salemi's monthly quality control audits¹⁴¹ and monitoring chemists' compliance with balance QC procedures.

At some point after the June Breach, Renczkowski reviewed some of Dookhan's quality control work and discovered that she had falsified records for the QC standard mix run on the GC/MS instrument¹⁴² by recording fabricated data that suggested the instrument was working correctly.¹⁴³

¹³⁶ Between June 21, 2011 and July 20, 2011, Dookhan analyzed, as primary chemist, 155 samples that had been assigned to her prior to June 21, 2011.

¹³⁷ The day that Nassif finally told Dookhan to minimize her time in the lab, was the very day that Nassif was preparing for an upcoming visit from the MSP on July 26, 2011 to review the Drug Lab for purposes of determining the continued receipt of Coverdell grant funds. *See* Section XIV.

¹³⁸ Dookhan returned the samples from the June Breach to the evidence office in a storage bin that typically was used to store samples in the safe; the bin was not ordinarily used to transport samples from the evidence office to the lab. Dookhan's possession of the storage bin further corroborated the theory that she had taken the samples from the June Breach directly from the safe herself.

¹³⁹ *See* Section IX.

¹⁴⁰ Dookhan verified that the GC/MS operators had properly recorded daily quality control documentation such as the GC/MS Daily Injector/Column Check. Dookhan also signed off on GC/MS tune tests.

¹⁴¹ Salemi conducted audits on the paperwork and testing methods for five to ten randomly-selected samples per month. These audits also involved preliminary retesting. *See* Section IX.

¹⁴² The QC standard mix is a quality control procedure that ensures that the GC/MS instrument can distinguish between two compounds.

¹⁴³ *See* Section IX.

Also at some point after the June Breach, Renczkowski and Medina discovered that Dookhan had forged Medina's initials on a tune test.¹⁴⁴ Renczkowski reported both of these concerns to his supervisor, Piro.

In addition to Dookhan's continued involvement in sample analysis and quality control procedures, neither Nassif nor Han restricted Dookhan's involvement in the court system. Dookhan continued to fill discovery requests and to testify in court. She testified thirty-two times between June 22, 2011 and February 9, 2012.

Furthermore, Dookhan's supervisors did not restrict her security clearance in the Drug Lab in any way. Dookhan retained all of her keys and no one changed the keypad codes and hand reader in the Drug Lab until December 2011. Furthermore, no one changed the verbal password for access to the Drug Lab after normal working hours with the Drug Lab security company. In fact, as discussed in Section X, on one occasion – on October 1, 2011 – Dookhan was in the Drug Lab alone on a weekend day, having gained access through a telephone call to the security company.

In the late summer or early fall of 2011, Piro and Lawler met with O'Brien and Nassif. During that meeting, Piro and Lawler expressed numerous concerns about Dookhan: her forgeries of Corbett's, Medina's and Renczkowski's initials on Drug Lab documents; the false QC standard mix documentation; and her continued access to the chemist testing area, including the report from Medina that Dookhan had been in the GC/MS room with the lights off and the door closed. They further expressed concern that Dookhan's continued presence in the Drug Lab after Nassif removed her from testing was demoralizing and that Dookhan was being investigated only for her action in the evidence office, but not the multiple alleged transgressions in the Drug Lab. There is no evidence that Nassif reported Dookhan's other misconduct to anyone, including to anyone in Human Resources, Labor Relations, or the Commissioner's Office. Nor is there evidence that she investigated the allegations further. Rather, Nassif told O'Brien, Piro, Lawler and others when they asked that the situation with Dookhan was a "personnel matter" and refused to elaborate.

F. Han and Nassif's Delayed Report of the June Breach

It was not until late November 2011, when Nassif was discussing the upcoming transfer of the Drug Lab to the MSP with Grace Connolly, Director of Administration and Finance for the BLS and Emergency Preparedness, that Nassif first mentioned to anyone outside of the SLI building that Dookhan had breached chain-of-custody protocols and was no longer analyzing samples in the Drug Lab. Instantly recognizing the gravity of the situation, Connolly raised her concerns to Nassif and suggested that Nassif promptly inform the Labor Relations department at the upcoming monthly Labor Relations meeting.

The next monthly Labor Relations meeting took place shortly thereafter, on December 1, 2011. At the meeting, Nassif and Han informed David Young, an attorney and Labor Relations

¹⁴⁴ A tune test is a quality control measure that ensures that the GC/MS instrument is operating within acceptable parameters.

Specialist at EOHHS; Karen King, an Employment Services Manager at EOHHS; and Connolly that Nassif had removed Dookhan from the Drug Lab due to a breach in chain-of-custody protocols five and a half months earlier. Immediately following the meeting, Connolly alerted Monica Valdes Lupi, Deputy Commissioner of DPH, to the situation, and Young informed his supervisor, Marianne Dill, Labor Relations Director at EOHHS. Within days, DPH Commissioner John Auerbach, Valdes Lupi, Dill, Young, Connolly, Han and Nassif met to discuss the Dookhan situation. The Commissioner decided to conduct an internal investigation. At the time the investigation was ordered, Han and Nassif assured Auerbach and Valdes Lupi that Dookhan had been removed from the Drug Lab testing area since June 2011.

G. DPH's Response to the June Breach

Auerbach assigned Steven Chilian, DPH Deputy General Counsel, to investigate the June Breach. However, Chilian was narrowly tasked with corroborating only what O'Brien and Salemi had discovered on June 16, 2011 – that Dookhan had breached the chain-of-custody protocols in connection with the June Breach. Chilian was not asked to look into Dookhan's work product, the integrity of her testing process, or any other potential acts of malfeasance she may have committed. Chilian also was not tasked with assessing the appropriateness of Han, Nassif or Salemi's responses to the June Breach. Chilian understood he was to focus on verifying the breach to address a human resources concern that a chemist had been removed from her duties without the due process required under the state's collective bargaining agreement with the chemists' union, MOSES. Chilian interviewed staff members who were directly involved in the June Breach: Sprague, Phillips, O'Brien, Nassif, Salemi and Dookhan. He interviewed no other chemists or Drug Lab employees.

At the beginning of Chilian's investigation, Han and Nassif informed him of the May Breach.¹⁴⁵ At the time of Chilian's investigation, O'Brien, Nassif and Salemi were all also aware of Dookhan's excessively high productivity in sample analysis, as well as her forgeries and fabrications on a variety of testing and QC documents. However, Nassif, O'Brien and Salemi failed to tell Chilian about any of these other acts of alleged malfeasance or concerns.

Furthermore, around the time of Chilian's investigation in December 2011, concerns began to surface about Dookhan misrepresenting her credentials, both on her curriculum vitae ("CV") and when she testified under oath in criminal proceedings in court.¹⁴⁶ Specifically, in the winter of 2011- 2012, Dookhan was falsely representing on her CV that she was still involved in Drug Lab quality control and that she had a Master of Science degree in Chemistry from UMass, Boston. No one – not Han, Nassif, Salemi or O'Brien – alerted Chilian or the Commissioner's Office to the fact that Dookhan may have been falsifying her credentials on her CV and in court. As a result, prosecutors unwittingly continued to summons Dookhan to testify.

Ultimately, Chilian concluded his investigation without receiving any evidence of Dookhan's other suspected malfeasance (besides the June and May Breaches), including the alleged forgeries on multiple lab documents and her suspiciously high productivity. The investigation

¹⁴⁵ See Section XIII of this report for more information about the May Breach.

¹⁴⁶ As noted in Section V, Drug Lab supervisors failed to observe chemists testify.

found that Dookhan failed to follow proper chain-of-custody protocols when she removed the samples from the June Breach from the evidence office, and further, that she most likely falsified documentation of the June Breach transfer.¹⁴⁷

Although Auerbach tasked Chilian with conducting a narrow investigation into a single breach in protocol (the June Breach), Chilian did ask questions that should have led him to information about Dookhan's other transgressions. In response to Chilian's pointed questions, Nassif, O'Brien and Salemi specifically told Chilian that the integrity of Dookhan's work was not in question and that Dookhan was a stellar employee. Despite these individuals' knowledge of Dookhan's other misconduct, they each withheld that information, leaving Chilian and DPH upper management (including Auerbach and Valdes Lupi) with the impression that Dookhan's only potential misdeeds were related to the June and May Breaches.

It was not until Chilian's investigation was well underway that EOHHS Secretary Dr. JudyAnn Bigby learned of the June Breach. In January 2012, at their regularly scheduled monthly meeting, Auerbach disclosed the details of the June Breach to Bigby.¹⁴⁸ After Bigby learned of the June Breach, she appropriately reported the details of the situation up the chain of command to the Governor's Office.

In late January 2012, DPH General Counsel Donna Levin notified the Norfolk County District Attorney's Office ("Norfolk DA's Office") of the June Breach. The Norfolk DA's Office recognized the prosecution's ethical obligation to disclose this information to the defendants and requested a statement in writing from DPH detailing the incident. On February 1, 2012, Han sent a letter to the Norfolk DA's Office. In that letter, Han stated that DPH was investigating a "possible breach of protocol" with respect to samples from Norfolk County. The letter further stated that the samples had been assigned to a chemist the same day the lab received them, an impossible statement, as there was no way to know when Dookhan took the samples from the evidence office.¹⁴⁹ Han further stated in her letter that there was no evidence that the accuracy of the sample analysis had been affected, despite the fact that DPH had failed to take any action to verify that statement.

On February 21, 2012, Han sent a follow-up letter to the Norfolk DA's Office with further details surrounding the June Breach. In that letter, however, Han failed to disclose that the breach consisted of a suspected forgery and suspected deliberate malfeasance by a chemist. Han reiterated that the integrity of the samples and the test results were not affected, despite no further efforts to investigate whether that was true. Han also stated that the chemist had been removed from all analysis duties on June 21, 2011, despite the fact that Dookhan continued to test samples, both as a primary and a confirmatory chemist, through November 2011. The letter did not mention any other alleged malfeasance committed by Dookhan.

¹⁴⁷ Memorandum from Steven Chilian, Deputy General Counsel, Department of Public Health to John Auerbach, Commissioner, Department of Public Health (Feb. 29, 2012).

¹⁴⁸ There is no evidence that Auerbach or anyone else ever disclosed the May Breach, or any other Dookhan malfeasance, to Secretary Bigby.

¹⁴⁹ Furthermore, as a general rule, samples were not assigned to chemists on the same date the lab received them.

On February 21, 2012, Dookhan was placed on a paid administrative leave of absence. The terms of Dookhan's leave included a requirement that she continue to respond to court subpoenas, despite DPH's investigation finding that Dookhan had committed acts of dishonesty, including removing samples from the drug safe without the authority to do so and her likely forgery of the logbook. DPH and MOSES, on behalf of Dookhan, reached a settlement on March 8, 2012, in which Dookhan agreed to voluntarily resign the following day.

On March 1, 2012, at the direction of Bigby, Auerbach wrote a letter to Han expressing his disappointment with the way Han had handled the June Breach. Aside from this letter, there were no further disciplinary actions taken by DPH against Han or Nassif until after the MSP's investigation led to Dookhan's confession in August 2012.

Soon after the confession, in late August 2012, Han placed Nassif on administrative leave. DPH ultimately terminated Nassif on September 12, 2012. At Auerbach's request, Han resigned on September 11, 2012, stating that she was ultimately responsible for the actions of those working under her. Days later, on September 17, 2012, Auerbach voluntarily resigned. However, he stayed on at DPH until November 1, 2012 in order to help with the transition to a new Commissioner.

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XIII. The May Breach

In addition to the June Breach, the OIG found that Dookhan breached the chain of custody with respect to a second large group of samples. Specifically, in May 2011, Dookhan took thirty samples from the Drug Lab's evidence office without following the proper chain-of-custody protocols ("May Breach"). The May Breach consisted of twenty-six samples from the Dedham police department and four from the Cohasset police department. The samples involved three cases: two from Dedham and one from Cohasset. Like the ninety samples from the June Breach, Dookhan acquired and tested the May Breach samples without following the Drug Lab's chain-of-custody protocols.

According to FoxPro – the database the Drug Lab used to track drug samples – the evidence office never assigned the May Breach samples to Dookhan. The only chain-of-custody entries in FoxPro were for the receipt of the samples from the police departments and the return of the samples to the police departments. Furthermore, examination of the evidence logbook revealed no initials by an evidence officer recording a transfer of the samples to Dookhan for testing or any chemist's initials signifying receipt of the samples. The Drug Lab had returned the samples and the corresponding drug certificates to the submitting police departments on June 13, 2011 (Cohasset) and July 21, 2011 (Dedham) without reporting a breach in the chain-of-custody protocols.

It is unclear to the OIG exactly when the evidence office discovered the May Breach. Certain evidence, as discussed below, suggests that Evidence Office Supervisor Elisabeth O'Brien knew of the May Breach either at the time that staff entered the control cards' findings into FoxPro or at the time that evidence officers scanned the samples back into the evidence safe. Specifically, O'Brien represented that she did not report the May Breach because she thought it was a computer glitch and believed the samples were in the safe,¹⁵⁰ a statement that supports a finding that she discovered the May Breach shortly after it occurred, particularly because the Cohasset samples had already been returned to the police department by the time the June Breach was discovered. Other evidence suggests that O'Brien discovered the May Breach after discovering the June Breach, when she went back through the evidence logbook to investigate whether there had been any other similar incidents. In either case, O'Brien reported the May Breach to director of the Division of Analytical Chemistry, Julianne Nassif within seven to ten days of discovering the June Breach, by the end of June 2011. However, besides O'Brien, Nassif, and eventually the director of the Bureau of Laboratory Sciences, Linda Han, it appears that no other Drug Lab employee knew about the May Breach, including the supervisor of the Drug Lab, Charles Salemi. Furthermore, neither Nassif nor O'Brien nor anyone else ever confronted Dookhan to question her with respect to the May Breach. Similarly, Han, O'Brien and Nassif failed to report the May Breach to anyone outside of the SLI building for at least five months.

¹⁵⁰ The Drug Lab received the twenty-six Dedham samples on March 18, 2011. Dookhan analyzed them on May 7, 2011. Records indicate that each sample underwent GC/MS analysis on May 17, 2011. The Drug Lab received the four Cohasset samples on April 14, 2011. Dookhan analyzed them on May 7, 2011. Each underwent GC/MS analysis on May 11, 2011.

When DPH assigned Deputy General Counsel Steven Chilian to conduct an internal investigation into the June Breach in December 2011, he received notice of the May Breach at the outset of his inquiry. Specifically, O'Brien, through Han, provided Chilian with information indicating that Dookhan had analyzed the May Breach samples and that these samples lacked a complete chain-of-custody record. Additionally, when Chilian interviewed O'Brien, Nassif and Han, they told him about the May Breach as a potentially similar chain-of-custody breach involving Dookhan. Chilian followed up on the information related to the May Breach that O'Brien, Nassif or Han provided to him. He had a telephone conversation with Nassif on January 27, 2012, in which she confirmed the existence of the May Breach and reassured Chilian that the integrity of the tests was not in question. Despite Nassif's reassurance, there is no evidence that anyone, including O'Brien, Nassif and Han, ever conducted any investigation to confirm that the integrity of the samples was uncompromised. To the contrary, the Cohasset samples were part of a GC/MS run for which Dookhan falsified the QC standard mix data, as discussed in Section IX. Chilian memorialized his conversation with Nassif in a Memorandum for Record dated January 27, 2012. Chilian reported the existence of this additional breach to his supervisors, which included DPH General Counsel Donna Levin.

On January 31, 2012, Nassif emailed a spreadsheet listing the samples contained in the May Breach to Levin, DPH Deputy Commissioner Monica Valdes Lupi and Han indicating that Dookhan had not yet received summonses to testify in three pending criminal cases stemming from the May Breach. The email also contained a spreadsheet of criminal cases associated with the June Breach.

Within minutes of receiving the spreadsheets, Levin forwarded both to the First Assistant District Attorney for Norfolk County ("Norfolk First Assistant DA"). About an hour and a half later, Levin again emailed the Norfolk First Assistant DA, stating "Re the chart of 30 samples – I should not have sent that to you . . . I did not realize that the investigation had not been completed with respect to those samples."¹⁵¹ As mentioned above, Han's February 1, 2012 letter to the Norfolk District Attorney ("Norfolk DA"), which was sent at the Norfolk DA's request, disclosed the "possible" June Breach but made no mention of the May Breach.¹⁵²

On February 2, 2012, Chilian shared a draft copy of his investigative report with Nassif, Levin and DPH First Deputy General Counsel Susan Stein. The report focused entirely on the June Breach. Chilian, however, made clear that there was an ongoing investigation into the May Breach that he would address in a separate report.

The OIG has determined that Chilian had fully intended to investigate the May Breach, as he believed that it was no different from the June Breach. However, at some point after February 2, 2012, there was a meeting at DPH headquarters where DPH Commissioner John Auerbach, Levin, Stein, Valdes Lupi and Chilian met to discuss the investigation into the June Breach. Walking into that meeting, Chilian believed that DPH should and would investigate the May

¹⁵¹ Email from Donna Levin, General Counsel, Department of Public Health, to Jeanmarie Carroll, Norfolk County First Assistant District Attorney (Jan. 31, 2012, 12:42 EST).

¹⁵² Letter from Linda Han, Director, Bureau of Laboratory Sciences, William A. Hinton State Laboratory Institute, Department of Public Health, to Michael Morrissey, Norfolk County District Attorney (Feb. 1, 2012).

Breach. Upon exiting that meeting, Chilian understood that DPH would not be investigating the May Breach.

Subsequent official communications from DPH regarding Dookhan and the internal investigation at the Drug Lab omitted any reference to the May Breach. For instance, the OIG found that DPH officials withheld information regarding the May Breach from David Young, the EOHHS Labor Relations specialist tasked with handling Dookhan's "show cause" hearing related to her employment termination; Young was shocked to learn of it just before the hearing was scheduled to take place.¹⁵³

Furthermore, the Governor's Office, EOPSS and the Norfolk DA collaboratively devised a Drug Lab Outreach Plan on February 17, 2012 to disseminate information about Dookhan to stakeholders, the media and the Legislature. The plan referred to the June Breach as an isolated irregularity by one of its chemists on a single day of testing and omitted any reference to the May Breach. The OIG found that no one from DPH made the Norfolk DA aware of the May Breach during the development of the outreach plan, despite the fact that all of the samples were from Norfolk County and the fact that the Norfolk DA was included as one of the collaborators of the plan.

As mentioned above, Han's February 21, 2012 follow-up letter to the Norfolk DA emphasized that DPH had investigated only a "single batch" containing ninety samples. The letter additionally stated that the Drug Lab had taken steps to avoid any future breaches. The letter failed to mention the May Breach.¹⁵⁴

DPH finalized its official investigative report on February 29, 2012. The report focused entirely on the June Breach and made no reference to the May Breach. There is no evidence that DPH disclosed the May Breach to other stakeholders, including the AGO, EOPSS, Governor's Legal Counsel, the MSP or other prosecutors' offices. Furthermore, the OIG found that Auerbach failed to report the existence of the May Breach to EOHHS Secretary JudyAnn Bigby or anyone outside of EOHHS.

DPH's motivation for failing to report the May Breach remains unclear. One possible motive was a concern that the existence of additional chain-of-custody breaches would hinder the transfer of Drug Lab operations and expenses to EOPSS, thus leaving DPH strapped with the financial burden of operating an analytical lab that performed a non-public health function.¹⁵⁵ Alternatively, DPH may have been concerned that disclosure of the May Breach would further spotlight the threat to the criminal justice system resulting from its failure to properly manage its

¹⁵³ That show cause hearing never took place, as the parties settled Dookhan's employment dispute. As a result, Young did not pursue the fact that he had not been told about the May Breach.

¹⁵⁴ See *supra* note 152.

¹⁵⁵ As discussed in Section II, neither EOHHS nor DPH considered forensic drug analysis to be a core public health function.

forensic drug lab. A third possible motive was that Han, Nassif, and DPH were fearful of losing the funding the Drug Lab received from the federal Coverdell grant.¹⁵⁶

¹⁵⁶ See Section XIV for more detail regarding the Coverdell grant including DPH's failure to report the May and June Breaches to Coverdell.

XIV. Failure to Disclose Dookhan's Conduct in Coverdell Grant Reports

Beginning in the fall of 2009, the Drug Lab had the opportunity to receive funds from the National Institute of Justice's ("NIJ") Paul Coverdell Forensic Sciences Improvement Grant ("Coverdell grant"). The Coverdell grant awards funds to states to help "improve the quality and timeliness of forensic science and medical examiner services."¹⁵⁷ Recipients may use these funds to provide training and employ forensic laboratory personnel to eliminate a backlog in the analysis of forensic evidence. The MSP was the Coverdell Grant State Administering Agency, meaning that the MSP applied directly to the NIJ for the funds and then coordinated the sub-recipients' applications, funds distribution, and grant progress reports. Starting in fiscal year ("FY") 2010, DPH received Coverdell grant funds for the Drug Lab through an interdepartmental service agreement with the MSP. DPH received a total of \$215,331.31 for FY10, FY11 and FY12 from the Coverdell grant, an amount equal to approximately 7% of state funding allocated to the Drug Lab for those years.

The Coverdell grant made a positive impact on Drug Lab operations at a time – post *Melendez-Diaz* – when the Drug Lab needed funds to curb the growth of the backlog. For FY10, the Drug Lab used the Coverdell grant funds to hire one full-time chemist, send two chemists to DEA training and pay chemists overtime, all in an effort to reduce the sample backlog and improve the turn-around time for testing samples. In FY11, the Drug Lab used the funds to employ one full-time chemist, upgrade data analysis software, pay overtime to chemists, send four analysts to DEA training and provide instrument training to ten chemists.

In April 2011, the MSP notified Director of Analytical Chemistry Julianne Nassif that it planned to eliminate the Drug Lab's Coverdell grant allocation due to an overall reduction in Coverdell grant funds for the upcoming fiscal year. Nassif responded that the Drug Lab could not absorb the loss of the Coverdell grant without a significant impact on the delivery of drug-testing services. Specifically, she noted that the loss of the funds would result in the dismissal of an analytical chemist, which in turn would increase the backlog and turn-around time for testing samples. EOHHS Secretary JudyAnn Bigby, DPH Commissioner John Auerbach, DPH Deputy Commissioner Monica Valdes Lupi, Bureau of Laboratory Sciences ("BLS") Director Linda Han, Director of Administration and Finance and the BLS Grace Connolly, and Nassif were involved in discussions with MSP officials regarding the Coverdell grant allocation to DPH. Ultimately, the MSP reduced the Coverdell grant allocation to DPH by 18%.

This seemingly desperate need for the Coverdell grant funds may have played into Nassif and Han's decision not to report Dookhan's malfeasance. The NIJ requires grant recipients to report allegations of serious negligence or misconduct, and to provide updates on those allegations in progress reports. This direct conflict between the need for full disclosure (with the accompanying requirement to report the malfeasance up the chain of command) and the desire to hold on to much-needed funds manifested when it was time for the Drug Lab to submit its FY10 Coverdell Grant Annual Report ("Annual Report").

¹⁵⁷ See U.S. Dept. of Justice, Office of Justice Programs, National Institute of Justice, OMB No. 1121-0329, *Solicitation: Paul Coverdell Forensic Science Improvement Grants Program*, 3, 8 (May 2010).

To comply with the NIJ's annual reporting requirements, recipients of Coverdell grant funds must respond to the External Investigations Report section of the Annual Report, which asks for the following information:

- (1) the number and nature of any allegations of serious negligence or misconduct substantially affecting the integrity of forensic results received during the 12-month period of the award;
- (2) information on the referrals of such allegations (e.g. the government entity or entities to which referred, the date of referral);
- (3) the outcome of such referrals (if known as of the date of the report); and
- (4) if any such allegations were not referred, the reason(s) for the non-referral.

On January 5, 2012, the MSP asked Nassif to complete by January 19, 2012 the Annual Report, including the External Investigations Report section, for the period of October 1, 2010 through December 31, 2011. By January 5, 2012, Nassif knew of the June and May Breaches. She also knew about other allegations of malfeasance related to Dookhan's forgeries and falsified QC standard mixes, as well as questions about the accuracy of Dookhan's CV. Nassif and Han, along with the DPH Commissioner's Office, were reluctant to report the June Breach, but ultimately did so. Nassif, Han and Valdes Lupi failed, however, to report the May Breach and Nassif failed to report any of Dookhan's other malfeasances.

Nassif first exhibited her reluctance to report the Dookhan situation by seeking an extension for drafting the response to the External Investigations Certification¹⁵⁸ for the Annual Report. More specifically, Valdes Lupi sought an extension on Nassif's behalf. The MSP granted a one-week extension on January 19, 2012. Five days later, on January 24, 2012, the MSP project administrator again contacted Nassif requesting the External Investigations Certification for the Annual Report. On January 26, 2012, Valdes Lupi requested another extension. The next day Nassif reported to Han that she had so far been successful in avoiding inquiries from the MSP project administrator.¹⁵⁹ Ultimately, the MSP granted an additional extension to January 27, 2012.

DPH failed to meet this second deadline extension and on January 30, 2012, the MSP informed Nassif that failure to file the certification that day would result in the immediate freezing of all grant activities for all state agencies receiving Coverdell funding. Han informed Valdes Lupi of the risk to funding caused by a further delay.

Meanwhile, Nassif continued to ignore inquiries from the MSP project administrator. On January 30, 2012, Nassif finally submitted via email the FY10 and FY11 progress reports but without the External Investigations Report. On February 2, 2012, the MSP project administrator

¹⁵⁸ The Annual Report must include an External Investigation Certification at the close of the report. The NIJ assumes that grant recipients will report any allegation of negligence or misconduct to the designated agency.

¹⁵⁹ Nassif and Han had an opportunity to disclose the June incident to the MSP prior to the reporting deadlines. MSP personnel made a site visit to the Drug Lab on July 26, 2011 – a full month after the discovery of the June Breach and the resulting reassignment of Dookhan. During the visit, MSP personnel met with Nassif and other lab staff to perform a full review of the Drug Lab's use of Coverdell grant funds, including any fraud, waste or abuse relating to the funds. The information the MSP sought under the fraud, waste and abuse component of the site visit mirrored the information that the External Investigations Report section of the Annual Report required the Drug Lab to disclose. Nassif failed to inform the MSP of any Dookhan wrongdoing during the site visit.

informed Nassif that DPH's failure to submit the necessary External Investigations Report jeopardized both the current grant and future awards. Nassif submitted a response on February 6, 2012. The response read as follows:

[DPH] is currently in the process of investigating an isolated incident involving a breach in documentary protocols and can confirm that we do not believe that the integrity of the samples has been impacted by this breach.

Valdes Lupi and Han vetted this language before Nassif submitted it to the MSP. Auerbach was aware of the role Valdes Lupi played in writing the response and believed that she would report the Dookhan situation accurately. The response failed to mention the May Breach or any of Dookhan's other acts of malfeasance.

In addition, DPH's External Investigations Report stated that the agency had appropriately reported the "breach in documentary protocols" to "the appropriate state and federal law enforcement agencies." However, this language is not completely accurate in the Coverdell grant context. Before obtaining funds from the Coverdell grant, an applicant must certify that "a government entity exists and an appropriate process is in place to conduct independent external investigations into allegations of serious negligence or misconduct substantially affecting the integrity of the forensic results committed by employees or contractors of any forensic laboratory facility . . . that will receive a portion of the grant amount."¹⁶⁰ The MSP notified Nassif in August 2011 that the Internal Affairs Division of the MSP was the governmental agency designated to conduct Coverdell-related external investigations. DPH never reported the June Breach (or any of Dookhan's malfeasances) to the MSP's Internal Affairs Division, which would have been the "appropriate" government entity to which to report Dookhan's misconduct under the terms of the Coverdell grant.

Further, in its FY10 Coverdell Closeout Report, dated May 11, 2012 ("FY10 Closeout Report"), DPH again failed to fully report the Dookhan incidents. The information Nassif provided in the External Investigations Report section for the time period of January 1, 2012 to March 31, 2012 failed to report the outcome or status of the Dookhan investigation, did not include information related to referrals to the designated investigatory agency, and failed to address why allegations of misconduct (including the May Breach and other Dookhan malfeasances) had not been referred to the designated investigatory agency. Even when prompted with the suggestion that Chilian's investigation should be included in the FY10 Closeout Report, Nassif failed to do so.

The MSP took control of the Drug Lab on July 1, 2012. On July 3, 2012, after two Drug Lab chemists reported their concerns regarding Dookhan to an MSP official, the MSP immediately launched an investigation into Dookhan's conduct. The MSP promptly notified the Attorney General's Office, which was the agency designated to investigate allegations of misconduct at the time. During the next Coverdell reporting cycle – the FY11 Coverdell Closeout Report in approximately May 2013 – the MSP made a full disclosure of their investigation into Dookhan's malfeasance and the resulting criminal case against her. Since then, the MSP has properly reported the details of the Dookhan matter to the NIJ in all of its Coverdell reports.

¹⁶⁰ See U.S. Dept. of Justice, *supra* note 158 at 4, 5, 15, 29, 31.

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XV. Failures of Management that Allowed for Dookhan's Malfeasance

Any review of the Dookhan scandal begs the question of how this could have happened. The OIG found two primary issues at the Drug Lab that allowed Dookhan to commit and perpetuate her malfeasances: (1) a lack of supervision over the chemists in the Drug Lab; and (2) a lack of an effective mechanism for reporting concerns that Dookhan's peers had about her behavior and work habits, exacerbated by an inappropriate response by Drug Lab supervisors to these concerns when they were raised.

As mentioned earlier in Section V, Charles Salemi, who was responsible for day-to-day oversight of the Drug Lab, was a distant supervisor. This was particularly true after 2006, when Nassif became the director of Analytical Chemistry overseeing the Drug Lab and Salemi removed himself from most areas of oversight. Even prior to that, through the years, the essence of Salemi's management style was *laissez faire* as he let chemists work on their own, at their own pace, on the kinds of samples they were interested in, using techniques they felt comfortable using. Also, Salemi was not a strong communicator. Not only was there no uniformity in Drug Lab policies and testing protocols, but Salemi often allowed for changes in policy and protocols to "trickle down" to staff. In addition, the chemists sometimes created policies or new practices that "trickled up" to Salemi for his approval.

Furthermore, the physical layout of the Drug Lab supported the culture of chemists working on their own. Some of the chemist testing area spaces, including Room 362, where Dookhan was assigned, were separate rooms with doors that closed and locked. This allowed for chemists to work alone and unmonitored for most of their day. As a means of addressing this separation and lack of supervision, Salemi assigned a Chemist III or team leader to each room. Elisabeth O'Brien was the Chemist III designated as the team leader for Room 362, where Dookhan and chemist Daniela Frasca worked. However, beginning in 2008, Nassif reassigned O'Brien from testing – despite the ever-increasing backlog of samples awaiting analysis – and had her spend the majority of her time in the evidence office, and ultimately promoted her to the newly created position of Evidence Office Supervisor I. Dookhan and Frasca remained unmonitored in Room 362 until Dookhan's removal from testing in approximately June 2011.

The lack of direct oversight of Dookhan fed into her sense of self-importance. Dookhan referred to herself as "indispensable," and perhaps for good reason. Dookhan appeared to have a close relationship with O'Brien. Dookhan also inserted herself into all aspects of the lab. Dookhan assisted Salemi with computer-related tasks, assisted O'Brien in the evidence office by entering control card information into FoxPro and assisted Peter Piro, the technical supervisor in charge of quality control, with gathering and signing the Drug Lab's quality control records. Dookhan also had special access to O'Brien's computer in Room 362, which allowed her to access FoxPro, the Drug Lab database, and which she used to help other chemists find information on their cases. Dookhan, only a Chemist II, had the code to the chemist testing area's alarm and was allowed to open and close the testing area. Furthermore, she checked other chemists' math on trafficking cases and helped train new chemists. At times, Dookhan was given permission to enter the evidence safe unaccompanied (while O'Brien and others remained in the evidence office) and O'Brien would assure others that it was okay.

As Dookhan took on more responsibilities around the Drug Lab, the lack of formal lab protocols and the overall lack of supervision gave Dookhan the freedom to start making and following her own rules. When there was no evidence officer available or when the evidence officer was not giving her the samples she requested, Dookhan on occasion took her own samples. When there were no other GC/MS chemists available to receive her samples or to operate her GC/MS run or to approve her tune test, she forged initials. In order to analyze samples more quickly, she may have skipped the microcrystalline tests or batched the creation of multiple GC/MS vials. And, at times when the GC/MS results indicated different substances than she had expected, Dookhan admittedly tampered with the vials to make the result positive for the substance she expected it to be.

Not only did the atmosphere at the Drug Lab allow for Dookhan to commit malfeasances for an extended period of time, she was also able to continue committing these malfeasances because Drug Lab management ignored red flags raised by her actions and disregarded reports from her peers complaining of her suspicious behavior. One significant red flag that Dookhan's supervisors ignored was her spectacular productivity, particularly after *Melendez-Diaz*, the U.S. Supreme Court case that required forensic drug chemists to testify in court about their test results, when the productivity of all other Drug Lab chemists precipitously declined. Drug Lab supervisors failed to recognize that Dookhan's continued high testing volume was a harbinger for errors or malfeasance. When O'Brien alerted Salemi to Dookhan's numbers for the month of December 2009, Salemi concluded that Dookhan was trying to please people and was rushing her work.¹⁶¹ What apparently did not enter Salemi's mind at that time was the possibility that Dookhan was not following proper analytical protocols and, in some instances, not performing the forensic tests at all. O'Brien and Nassif similarly lacked a high level of concern and both rejected the suggestion that a Chemist III should be transferred into Dookhan's lab room to serve as team leader.

When O'Brien brought the issue of Dookhan's high numbers – 715 samples with thirty-seven listed as “not tested” in March 2011– to Salemi again in late April 2011, they met with Nassif, but again there was no elevated response to this red flag. Salemi again took the position that Dookhan was just rushing her work. They also discussed their understanding that Dookhan was working overtime but not requesting compensation. Nassif suggested that Dookhan should work on a project to slow her down. Both Salemi and O'Brien approved of the plan.

Further, there was no formal mechanism in place for chemists in the Drug Lab to report concerns related to a peer's work performance. The chemists generally understood, however, that if any chemist had an issue, he could speak directly to Salemi about it. With respect to Dookhan, many chemists reported their concerns about her to Salemi. From that point, however, it was unclear what needed to happen. To the extent that Salemi was unresponsive to concerns, chemists typically had no recourse. Some of the chemists went over Salemi's head to Nassif, but even she ignored their reports. Salemi himself had no recourse when Nassif would not address the

¹⁶¹ To the extent Salemi had concerns about Dookhan, he never addressed those concerns directly with her. Clearly, however, he did not approve of her volume of testing and made that disapproval known by telling the Drug Lab's newest hire, Hevis Lleshi, who was in training in the early months of 2011, that she should not perform testing at Dookhan's pace. He told Lleshi what his philosophy had always been: that it was most important to focus on obtaining the correct test result and not on the number of samples tested, regardless of the size of the backlog.

concerns he raised. There was no external mechanism that would have allowed the chemists to raise concerns regarding the integrity of the forensic work performed at the Drug Lab.

For instance, chemists Michael Lawler, Kate Corbett, Daniel Renczkowski, and Peter Piro each reported concerns to either O'Brien or Salemi, and some of these concerns ultimately reached Nassif. Piro and Lawler also met directly with O'Brien and Nassif in the late summer or early fall of 2011. During that meeting, Piro and Lawler voiced numerous concerns about Dookhan, including the fact that she had forged Corbett, Renczkowski and chemist Nicole Medina's initials on lab documents.¹⁶² Nassif, however, responded that it was a personnel matter and would not discuss their concerns. This was Nassif's typical response to this issue.

Despite repeated complaints by numerous chemists and their efforts to curtail Dookhan's behavior, management in the Drug Lab failed to acknowledge the gravity of the problem. Dookhan's malfeasance continued until it corrupted not only the integrity of her forensic results but the integrity of the criminal justice system in Massachusetts – largely because there was no mechanism in place for Dookhan's peers to report their concerns beyond the unresponsive management structure in place at the Drug Lab.

¹⁶² See Section XII for additional information about this meeting.

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XVI. Sampling Issues in Drug Trafficking Cases

A. Introduction

During the course of its investigation, the OIG uncovered issues with respect to the Drug Lab’s approach to “sampling” in drug trafficking cases. First, the Drug Lab had no documented policy for how chemists were required to sample in trafficking cases and, as a result, the chemists’ approaches were inconsistent. Second, many Drug Lab chemists routinely used invalid arbitrary methods for both identity and weight estimates. Third, when the Drug Lab applied statistical approaches, it often did so incorrectly. Finally, the Drug Lab inadequately reported, or in some cases may have failed to report at all, the methods it used and the limits of its statistical identity inferences and net weight estimates.

As will be explained further, these issues potentially caused chemists to inaccurately report drug identity and net weight findings and left stakeholders without the information needed to assess chemists’ conclusions.

“Drug trafficking” refers to a class of drug charges in Massachusetts that require proof of the weight of the substance containing the drug and result in mandatory minimum jail or prison sentences for the offender.¹⁶³ To obtain a conviction for drug trafficking charges, the prosecution must prove the weight of some mixture containing the drug beyond a reasonable doubt.¹⁶⁴ The defendant then faces a mandatory minimum jail or prison sentence, depending on the type and reported net weight of the substance.¹⁶⁵ For example, the drug trafficking law in effect between 2002 and August 2012 required mandatory minimum state prison sentences from five to fifteen years for defendants convicted of trafficking heroin, depending on the reported weight.¹⁶⁶ For that same period, trafficking cocaine or methamphetamine resulted in mandatory minimum state prison sentences from three to fifteen years, also depending on the reported weight.¹⁶⁷ And

¹⁶³ See M.G.L. c. 94C, § 32E.

¹⁶⁴ Weight may be an issue with regard to other drug crimes but is not typically an element of the crime. As an example, for charges of possession with intent to distribute, “[t]he quantity of a controlled substance alone may be sufficient circumstantial evidence to raise an inference of intent to distribute.” *Commonwealth v. LaPerle*, 19 Mass. App. Ct. 424, 428 (1985) (*internal citations omitted*). By comparison, with limited exceptions, weight is not an element of the crime of simple possession.

¹⁶⁵ See M.G.L. c. 94C, § 32E.

¹⁶⁶ Heroin is a Class A substance. See M.G.L. c. 94C, § 31(b)(10). The mandatory minimum sentence for heroin trafficking in weights of 14 grams to less than 28 grams was 5 years; from 28 grams to less than 100 grams was 7 years; from 100 grams to less than 200 grams was 10 years; and 200 grams and over was 15 years. See M.G.L. c. 94C, § 32E(c) *amended by* 2012 Mass. Acts c. 192, § 25.

¹⁶⁷ Cocaine and methamphetamine are Class B substances. See M.G.L. c. 94C, §§ 31(a)(4), (c)(2). The mandatory minimum sentence for cocaine or methamphetamine trafficking in weights of 14 grams to less than 28 grams was 3 years; from 28 grams to less than 100 grams was 5 years; from 100 grams to less than 200 grams was 10 years; and 200 grams and over was 15 years. See M.G.L. c. 94C, § 32E(b) *amended by* 2012 Mass. Acts c. 192, § 21.

finally, also from 2002 to 2012, for marijuana trafficking crimes, mandatory minimum sentences ranged from one year in jail to ten years in state prison.¹⁶⁸

1. Law Enforcement Agencies Routinely Submitted Multi-Item Drug Evidence to the Drug Lab

Between 2002 and 2012, law enforcement agencies routinely submitted multi-item drug evidence (*e.g.*, 100 bags of suspected heroin) to the Drug Lab for chemists to identify and weigh, in part to determine whether the evidence met or exceeded the statutory weight thresholds for drug trafficking charges. Rather than weigh and identify each item (*e.g.*, each bag of suspected heroin), the Drug Lab routinely applied sampling approaches to process these multi-item drug cases.¹⁶⁹

2. The Drug Lab Applied Sampling Approaches to Process Multi-Item Drug Cases

Sampling refers to forensic drug chemists' practice of only testing and weighing some of the suspected drug items in a multi-item case and making inferences with respect to the rest of the items. For example, a chemist might only test and weigh 10 out of 100 bags of suspected heroin. Based on the test results and weight of the 10 items, the chemist might infer the drug's presence in all of the bags and estimate the "net weight"¹⁷⁰ for all the submitted items, including the items that the chemist did not actually test or weigh. The purpose of applying a sampling approach is to reduce the time spent identifying and individually weighing each and every item in a large multi-item submission.¹⁷¹ When done properly, it also allows for more efficient use of government resources while maintaining accuracy and relative certainty in chemists' findings, conclusions and reports.

3. Only Statistical Sampling Approaches Are Appropriate

The forensic drug community, including the Scientific Working Group for the Analysis of Seized Drugs ("SWGDRUG") and the European Network of Forensic Science Institutes ("ENSFI"), generally identify two categories of seized-drug sampling – "statistically-based" and "arbitrary."¹⁷² A statistically-based approach allows for logical inferences to be made from a

¹⁶⁸ The sentence for trafficking in 50 pounds to less than 100 pounds was 1 year; from 100 to less than 2000 lbs. was 3 years; from 2000 to less than 10,000 lbs. was 5 years; and 10,000 lbs. or more was 10 years. *See* M.G.L. c. 94C, § 32E(a) *amended by* 2012 Mass. Acts c. 192, §§ 18-19.

¹⁶⁹ The Drug Lab applied sampling approaches in approximately 15% of the trafficking cases that the OIG reviewed.

¹⁷⁰ "Net weight" refers to the weight of the contents (*e.g.*, the powder suspected of containing cocaine) without the weight of the containers.

¹⁷¹ *See* John R. Mario, *A Probability-Based Approach for the Analysis of Drug Seizures Composed of Multiple Containers of Either Cocaine, Heroin, or Cannabis*, 197 *Forensic Science International*, 105, 107 (2010).

¹⁷² *See* SWGDRUG, *Minimum Recommended Standards for Sampling Seized Drugs for Qualitative Analysis*, 2 (2005), *available at* <http://www.swgdrug.org/archived.htm>. *See also* United Nations Office on Drugs and Crime & ENSFI, *Guidelines on Representative Drug Sampling*, 9 (2009), *available at* <http://www.unodc.org/documents/scientific/DrugSampling.pdf>.

sample¹⁷³ of items to the larger population of items with an associated, quantifiable degree of confidence; an arbitrary approach does not.¹⁷⁴ The problem with arbitrary approaches is that without a quantifiable degree of confidence in a lab's findings, stakeholders cannot assess the lab's conclusions regarding the estimated net weight of the entire population or the portion of the population that is likely positive for the drug of interest. Stated differently, with an arbitrary approach, the only items the chemist may reasonably report as containing a controlled substance and weighing a certain amount are the items the chemist actually tests and weighs.¹⁷⁵

4. Accepted Approaches to Testing and Weighing Multi-Item Submissions

When processing multi-item submissions, a drug lab has at least three options. First, it can test and weigh all the items. Second, it can test and weigh enough items to meet or exceed a relevant statutory threshold and report the remaining items as not tested. Third, it can apply a statistical sampling approach for both weight and identity and report the limits of the inferences it makes.

a. Test and Weigh All Items

One approach to multi-item submissions is for the chemist to test and weigh each individual item in the submission. This is the most conservative and likely the most accurate approach, but it takes considerable time and resources.

b. Test and Weigh All Items Needed to Meet or Exceed a Weight Threshold

Alternatively, the chemist may test and weigh enough items to meet any relevant statutory threshold. For example, if the gross weight¹⁷⁶ of the evidence is 27 grams, the chemist knows the net weight of the evidence cannot possibly reach the 28 gram drug trafficking threshold, so the chemist could just weigh and identify each item until the evidence exceeds the lower 14 gram threshold by a comfortable margin. Then, the chemist may choose not to test the remaining items and report them as not tested; or the chemist may apply a statistical sampling approach to the remaining items to give the parties some information about the total weight and composition of the evidence, thereby minimizing further testing.

¹⁷³ In this context, "sample" refers to a portion of a population of items (*e.g.*, 10 out of 100 bags). It is a statistical term. Confusingly, the Drug Lab referred to submitted evidence as "samples" and each sample received a "sample number." Some samples had many individual items (*e.g.*, 5 bags of suspected cocaine) and some samples only had one item. For example, if law enforcement seized five bags of suspected cocaine in a suspect's glove box, and one bag of cocaine in his house, the Drug Lab would assign two sample numbers to the evidence: one sample number for the five bags in the glove box and one for the bag in the house.

¹⁷⁴ *See* Mario, *supra* note 171, at 105.

¹⁷⁵ *See* SWGDRUG, *supra* note 172, at 5.

¹⁷⁶ "Gross weight" refers to the total weight of the contents and containers.

c. Apply a Statistical Sampling Approach

Another option is for the chemist to apply a *statistical* sampling approach to infer the identity and estimate the net weight of the evidence. Before applying a sampling approach, however, the chemist must identify the population as “homogenous,” and establish an approach for choosing a “random sample” of items to test and weigh.

A population is homogenous if each item’s contents are similar in size, color and appearance.¹⁷⁷ The determination that a population is homogenous requires the chemist to see the contents of the packages. Therefore, foil, paper and opaque containers must be opened. A chemist should not apply a sampling approach to a non-homogenous population. However, if the population has two (or more) identifiable sub-populations that share the same visual characteristics, the chemist may split the entire submission into sub-populations and apply a sampling approach to each sub-population.

Before conducting statistical sampling, the chemist also must establish an approach for randomly selecting the items to test and weigh. Statistically, a random selection process ensures that each item in the population has an equal chance of being selected. “Randomness is obtained by positive action; a random selection is not merely a haphazard selection, nor one declared to be without bias.”¹⁷⁸ One accepted method to ensure randomness is to use a random number generator to select which items to test. The chemist assigns a number to each item in the population and the computer-based random number generator provides the numbers to select and test.

Once a chemist has a homogenous population and a method for random selection, the chemist can apply a statistical approach to sampling for both identity and weight. One accepted way as set forth below is to use the “hypergeometric approach” to statistically estimate identity in combination with the use of a drug sampling calculator to calculate a confidence interval for a net weight estimate.

i. Statistically Identifying the Drug of Interest

The hypergeometric method is a statistically-based approach that predicts the probability of drawing (in a sample) a number of “successes” or “failures” in a population.¹⁷⁹ In the context of seized drug analysis, “success” means that an item tests positive for a controlled substance and “failure” means that an item tests negative.¹⁸⁰ The hypergeometric approach provides drug chemists with the number of items (a sample) they must analyze to yield a statistically accurate estimate with regard to the identity of the population. Its use results in a conclusion, with an associated “confidence level,” that at least a certain percentage of the population contains the

¹⁷⁷ See SWGDRUG *supra* note 172, at 3.

¹⁷⁸ See Mario, *supra* note 171, at 112, Appendix A.

¹⁷⁹ See Mario, *supra* note 171, at 109-110.

¹⁸⁰ See *id.*

drug in question.¹⁸¹ The confidence level represents the probability that the inference about the identity of the population is likely accurate. For example, if 23 out of 100 suspected bags of heroin test positive (23 is the sample size the hypergeometric approach requires for a population size of 100), the chemist may state that he is 95% confident that 90%, or 90 out of 100 bags, are positive for heroin.¹⁸²

Occasionally, one or more items in the sample may not test positive for drugs.¹⁸³ If one or more items test negative, that negative result weakens the inference that each item in the population would test positive for a controlled substance is weakened. As a result, the 95% confidence level that 90% of the population is positive for a controlled substance decreases. To maintain the confidence level, the chemist must identify more items. That is, using the hypergeometric approach, if one of the 23 items tested negative for heroin, the chemist would need to test an additional 13 items, or 36 items altogether¹⁸⁴ to maintain a 95% confidence level that 90% of the population is positive for heroin. Alternatively, if the chemist keeps the sample size at 23, the chemist may only say with 77% confidence that 90% of the remaining population is positive for the heroin.¹⁸⁵

ii. Statistically Estimating Net Weight

The chemist may also use statistics to properly estimate the net weight of the population. ENFSI created a drug sampling calculator using Microsoft Excel (“Drug Calculator”) that incorporates statistical formulas to aid in estimating net weight. To use the Drug Calculator, a chemist inputs the desired confidence level, the population size (the total number of items), the sample size (the number of items actually weighed),¹⁸⁶ the “sample mean weight” and the “sample standard deviation.” The Drug Calculator then provides an estimated net weight and a confidence interval.

The sample mean weight refers to the average of the net weights of each item in the sample. The sample standard deviation indicates the distance of the items’ net weights from the average, or mean weight. A low standard deviation indicates that the net weight of the contents of each individual item is close to the mean. For example, if a chemist weighs four bags and each bag weighs 1 gram, the standard deviation is zero because the weight of the contents of each item is

¹⁸¹ Each unit in the sample must be analyzed sufficiently to meet SWGDRUG minimum requirements. The chemist may not, for instance, simply test all of the selected items using a color test, but only confirm one item with GC/MS; they must fully analyze each item.

¹⁸² Both the confidence level and the percentage of the population statistically identified may be adjusted.

¹⁸³ See United Nations Office on Drugs and Crime, *Guidelines on Representative Drug Sampling*, 13 (2009), available at http://www.unodc.org/documents/scientific/Drug_Sampling.pdf

¹⁸⁴ See *id.*

¹⁸⁵ See *id.*

¹⁸⁶ Typically, this will be the same number of items the chemist identified using the hypergeometric approach. However, the Drug Calculator is based on the assumption that drug populations are normally distributed and studies have revealed that not all seized drug populations distribute themselves normally. But with sample sizes of 20 items or more, sample means of non-normally distributed seized-drug populations do distribute themselves normally. See Mario, *supra* note 171, at 108.

equal to the mean. Therefore, the mean weight is a good representation of the true net weight of each bag in the sample.

Conversely, if many of the net weights of the sampled items lie far from the mean, then the standard deviation is high. Using a hypothetical example, if a chemist weighs the contents of four different bags and the first bag weighs 1.0 gram, the second bag weighs 2.0 grams, the third bag weighs 3.0 grams, and the fourth bag weighs 4.0 grams, the mean weight is 2.5 grams and the standard deviation is 1.3 grams. This is a relatively high standard deviation considering the average weight. A high standard deviation may indicate that the average net weight is not a good representation of the true net weight of each item in the sample.

The confidence interval refers to a range in which the actual value of a given result could deviate from the calculated value with a selected degree of probability. For seized drug sampling, the confidence interval can be generated to provide lower and upper limits for a population net weight estimate (*e.g.*, 15.5 gram estimated net weight, based on weighing 23 out of population of 100 items, plus or minus 2 grams). The population's true net weight is likely to lie within those limits. The "confidence level," in the context of a net weight estimate, is the probability of accuracy associated with the confidence interval, typically expressed as a percentage.

Therefore, a chemist who uses the Drug Calculator to estimate population net weight will have a statistical basis for stating, for example, that the estimated net weight is 15.5 grams plus or minus 2 grams, with a 99% confidence level. Based on the confidence interval of plus or minus 2 grams, the chemist can be 99% confident that the true net weight of the entire population (*e.g.*, all 100 bags of heroin) is between 13.5 grams and 17.5 grams. Because the lowest range of the confidence interval, in this example, is below the 14 gram trafficking threshold, the chemist should either not report the estimated weight as over 14 grams or, at the very least, should report the confidence interval (of plus or minus 2 grams) to the parties in the criminal case.

5. Chemists Should Report the Method Used and the Limits of any Inferences Made

The chemist should document and report the method used to sample the evidence and the limits of their inferences. More specifically, the chemist should document and report the percentage of the population statistically identified as a controlled substance¹⁸⁷ and the confidence level associated with that identification. Furthermore, the chemist should document and report the calculated confidence interval for the net weight estimate and the associated confidence level. Particularly, in cases near a statutory weight threshold, these statistical estimates will help the parties in a criminal case assess the chemist's findings.

¹⁸⁷ Statistical identification refers to the portion of the population the chemist may report as positive for the drug of interest based on the statistical method used.

B. The Drug Lab's Sampling Practices

The OIG uncovered a number of concerns with the Drug Lab's approach to sampling. The cases demonstrated that at times chemists: used outdated arbitrary approaches; sampled non-homogenous populations; failed to apply a truly random sample selection method; failed to fully analyze each item selected; misused statistical approaches; and failed to document and report the methods, inferences and confidence levels associated with particular samples. Each of these issues is explained below.

1. The Drug Lab Improperly Used Arbitrary Approaches to Infer the Identity and Estimate the Net Weight of Substances

The OIG found a lack of uniformity in the approaches that chemists used to sample multi-item drug evidence. Part of the problem stemmed from the fact that, over time, the Drug Lab added sampling procedures without discontinuing the use of outdated procedures. In the early 2000s, supervisors trained chemists to use the square root method; later, supervisors told chemists to use the 10% method. Both of these are arbitrary methods, as described in further detail below. In 2006, based on SWGDRUG recommendations that a chemist use a statistical sampling approach, supervisors introduced the hypergeometric probability distribution for use in trafficking cases. At no time, however, did supervisors instruct the chemists to discontinue the use of outdated methods.

Another basis for the inconsistency among chemists' sampling practices was that the chemists' training referenced different methods, but did not include the theory and assumptions behind those methods, nor did it include a step-by-step guide to using them. As a result, chemists demonstrated an inadequate understanding of the theory behind their methods. For example, the OIG found that chemists incorrectly believed (and testified about) a non-existent confidence level for the arbitrary square root approach and a non-existent "percent plus or minus" associated with an arbitrary weight determination. Additionally, chemists incorrectly testified that the Drug Lab followed SWGDRUG sampling recommendations even when the chemists continued to use arbitrary approaches.

As late as 2012, chemists in the Drug Lab routinely used invalid arbitrary approaches to sample seized drug evidence in trafficking cases. For instance, some chemists used the arbitrary 10% or square-root methods¹⁸⁸ to determine their sample sizes in trafficking cases. With these approaches, if a population consisted of 36 items, the chemist would chemically identify and weigh 4 out of 36 items (closest to 10%) or 6 out of 36 items (square root). Using the 10% method, if the 4 items tested positive for a controlled substance, the chemist would then infer the presence of that controlled substance in the remaining 32 bags.

¹⁸⁸ ASCLD/LAB describes the square root method, for example, as "not... suitable for forensic drug applications" ASCLD/LAB, *Policy on Sampling, Sampling Plans and Sample Selection in the Drug Chemistry Discipline*, 5 (2011), available at http://www.ascl-d-lab.org/wp-content/uploads/2013/04/AL-PD-1018_Sampling_Policy_v2.0.pdf.

Next, the chemist would calculate the average weight of the 4 bags tested, multiply that average weight by the number of bags, here 36, and use the product as their estimate of the total net weight of the 36 bags. Alternatively, the chemist would calculate the average weight of the containers (*e.g.*, plastic bags), multiply the average weight of the plastic bags by the number of items, and subtract the result from the gross weight of the population.¹⁸⁹

No confidence level is associated with the use of any of the above arbitrary methods. Furthermore, the concern with such arbitrary weight sampling is that the chemist risks overestimating the mean weight of the sample, thereby overstating the actual weight of the population – a critical error in a case near a statutory trafficking weight threshold. Equally, the chemist may underestimate the weight of the packaging and thereby overstate the weight of the contents. If either the contents or the packaging are not uniform in size, and the chemist inadvertently selects the larger items, the calculated average will result in an overestimation of the net weight of the evidence.

2. Lack of Homogeneity in Sampled Populations

The OIG found cases in which chemists appeared to sample non-homogenous populations. For instance, at times, chemists included items in the same sample that had a gram or more variation in net weight. In other words, the items were not similar in size. This practice could have resulted in an overestimation of the mean weight of the sample and caused a chemist to report an estimated net weight greater than the true net weight of the population.

In one instance, a chemist responsible for testing and weighing a resubmitted sample treated the entire population as homogenous, and estimated the net weight based on the average weight of bags chosen from three different sized sub-populations identified by the first chemist.

In addition, the OIG found cases in which chemists tested a population consisting of a combination of paper and foil packets. This is potentially problematic because the chemist cannot see through the foil or paper and thereby determine the consistency of the contents of the packets. The OIG could not determine, from a review of the case notes, whether the chemist opened each item or not.

3. Lack of Truly Random Sample Selection

Chemists also demonstrated inconsistent approaches to randomly selecting sample items. The Drug Lab did not have a defined approach to ensure random sample selection. The OIG found that some chemists looked straight ahead and picked samples or turned around and picked samples behind their back (neither of which are considered random) or picked samples out of a box or bag.¹⁹⁰ The fact that the Drug Lab did not have a defined policy for randomly selecting samples left chemists to select approaches that may not have resulted in truly random sample selections.

¹⁸⁹ Both the evidence officer and the preliminary chemist recorded a gross weight for each sample. The gross weight is the total weight of the containers and their contents.

¹⁹⁰ The “black-box” approach is an acceptable approach to random sample selection.

4. Failure to Fully Analyze Each Selected Item

The OIG identified cases where the chemist failed to complete the full analysis for each selected item. That is, in some instances, chemists preliminarily tested more samples than they submitted for GC/MS confirmatory testing. This practice violates SWGDRUG's recommendation that chemists fully analyze each item selected from a population.

5. The Drug Lab Incorrectly Applied Statistical Approaches

Some chemists used statistical approaches to infer identity and estimate net weight, but did it incorrectly. The Drug Lab gave chemists a hypergeometric chart (the "Chart") that provided the sample size to test based on the size of the total population, which allowed chemists to state that 90% of the population was positive for the drug of interest at a 95% confidence level.

The Drug Lab also had an Excel spreadsheet, which utilized statistical formulas to calculate a confidence interval for net weight estimates ("Weight Spreadsheet"). Chemists entered into the Weight Spreadsheet the number of items in the population, the number of items sampled, the gross weight, the package weight, and the individual net weights of each item tested. The Weight Spreadsheet calculated a confidence interval (*e.g.*, plus or minus 2 grams), a confidence level (usually 99%), a standard deviation, an estimated net weight, and an estimated gross weight for the entire submission. After using the Weight Spreadsheet, a chemist would have a statistical basis for stating, for example, that the estimated net weight of a multi-item sample was 15.5 grams, plus or minus 2 grams, with a 99% confidence level.

As will be set forth below, the OIG found that some Drug Lab chemists: improperly used the Chart to report that 100% of the drug population tested positive for a controlled substance even though there was only a statistical basis for stating that 90% tested positive; failed to properly establish a policy for items that tested negative; misunderstood the fact that the Chart, in the manner of the Drug Lab's use, could only be used for identity and not weight; and failed to use or sometimes improperly used the Weight Spreadsheet.

a. The Drug Lab Improperly Used the Chart to Infer the Presence of a Controlled Substance in 100% of the Population

One issue with the Drug Lab's use of the hypergeometric approach is that the chemists inferred the presence of a controlled substance in 100% of a population with only a statistical basis for inferring that 90% of the population was positive for the drug of interest. This not only resulted in failing to identify 10% of the population as a controlled substance, but technically resulted in overstating the net weight because chemists reported net weights in excess of the portion of the population that they had statistically identified as the drug of interest. In other words, the Drug Lab routinely failed to consider the combination of net weight and drug identity and reported net weights in excess of the portion of the submission they had identified.

For example, assume the Drug Lab received 36 bags of suspected heroin. A chemist weighed the contents of all 36 bags, and found a total net weight of 14.122 grams. If the chemist identified the contents of 15 bags as positive for heroin (the number required by the Chart), the chemist

only has a statistical basis for stating that 90% of the 36 bags contain cocaine (90% of 36 is approximately 32).¹⁹¹ In other words, the chemist has no statistical basis for inferring the presence of heroin in approximately four of the bags. Therefore, the chemist should only report the weight of the population as 12.7098 grams, not 14.122 grams.¹⁹²

With cases near the threshold, it was important for the chemist to have a statistical basis for stating that 100% of the evidence that weighs above a trafficking threshold was positive for the drug of interest.

b. No Provision for Responding to Negative Test Results When Using the Hypergeometric Approach

A related issue with the use of the Chart to select sample size for identity is that the Drug Lab had no definitive policy with respect to items that tested negative for a controlled substance. The chemists demonstrated their lack of understanding of appropriate application of the hypergeometric approach by occasionally splitting off items that tested negative from larger populations without increasing their sample size. Their documented protocol for applying the method did not address this point nor is there any evidence from case review that chemists properly addressed the issue of negative items. The fact that items in the population tested negative for a controlled substance weakens the inference that the remaining untested portion of the population was positive for a controlled substance.

c. The Chemists Could Only Use the Chart for Identification But Appeared to Use it to Make Improper Statements About Weight

As noted above, the hypergeometric method is a statistically based approach to predict the presence or absence of a controlled substance in a multi-item submission. There is no confidence level associated with using the hypergeometric approach to estimate net weight. It appears that some Drug Lab chemists incorrectly believed that if they calculated the average weight of the number of items identified on the Chart, and extrapolated that weight to the population, their net weight estimate had the same 95% confidence level as their identity inferences. It did not.

As noted earlier, the hypergeometric approach is an appropriate method to choose a sample size for weight and identity, but the chemist must take the further step of using a statistical approach to estimate net weight; one example is use of the Weight Spreadsheet.

¹⁹¹ Assuming the chemist used the Chart which provided a 95% confidence level that 90% of the items contained a controlled substance.

¹⁹² 90% of 14.124 g is 12.7116 g.

d. Some Chemists Did Not Use the Weight Spreadsheet and Others Ignored the Calculated Confidence Interval

Despite its apparent utility, most chemists did not use the statistically-based Weight Spreadsheet. Instead, they improperly opted for an outdated arbitrary method and simply multiplied the average weight of sampled bags by the total number of bags in the population, without calculating a confidence interval or the standard deviation. The chemists who did use the Weight Spreadsheet in some instances ignored the implications of the calculated confidence interval. The OIG identified trafficking cases where chemists used the Weight Spreadsheet to calculate net weight and the lowest confidence interval limit was below a trafficking weight threshold, but the estimated net weight and the highest confidence interval limit were above a trafficking threshold. In these cases, the chemists reported the net weight as over a trafficking weight threshold.

To further illustrate, in one instance a chemist had two cocaine samples¹⁹³ that together purportedly weighed 15.11 grams. The first sample was one bag of cocaine that weighed 6.77 grams. Its weight is not in dispute. For the second sample, which included 15 bags, the chemist weighed 9 of the bags to estimate the net weight at 8.34 grams. The chemist entered the net weights of the 9 bags into the spreadsheet. The confidence interval provided the chemist with a range of estimated weights from 5.7637 grams to 10.9163 grams. If that sample weighed anything less than 7.23 grams, the case would fall below the 14 grams threshold. But the chemist reported the 8.34 grams estimated net weight the spreadsheet had provided, despite the fact that the weight associated with the lowest confidence limit (5.7637 grams) placed the sample below a trafficking threshold.

In a related issue associated with the same sample, the chemist had a clear indication that the estimated net weight that the Weight Spreadsheet provided was inaccurate. The gross weight that the calculator estimated, 17.3902 grams, was 1.8602 grams *heavier* than the actual gross weight, 15.53 grams, recorded by the evidence office and by the preliminary chemist. This is a clear indication that the chemist either *underestimated* the weight of the packaging or *overestimated* the weight of the contents because based on the numbers the chemist entered into the Weight Spreadsheet, it calculated an estimated gross weight that was higher than the true gross weight.

C. The OIG Review of the Drug Lab’s Sampling Practices

The OIG reviewed whether the issues related to the Drug Lab’s sampling techniques had an adverse impact on the reliability of trafficking weights that the Drug Lab reported. Specifically, the OIG reviewed certain data related to clandestinely produced drug samples (*i.e.*, those not produced in a commercial pharmaceutical lab) that law enforcement submitted to the Drug Lab

¹⁹³ Here, “samples” refers to two submissions for one defendant.

after January 1, 2002. The OIG limited its review to samples with combined reported net weights per defendant that were within 25% above a drug trafficking weight threshold.¹⁹⁴

1. Reviewed Multiple-Item Cases that Weighed Within 25% Above the Threshold

The OIG's focus on cases within 25% of a trafficking threshold was based on a determination that the 25% threshold would encompass the vast majority of trafficking cases with potential errors significant enough to bring the true net weights below a trafficking weight threshold. This limit was also based in part on a prior study that found average "relative standard deviations" in seized drug populations are typically below 25%.

In the context of seized drug analysis, the relative standard deviation reflects the average dispersion of item weights in a sample to the average weight of the sample and is expressed as a percentage. It is calculated by dividing the sample's standard deviation by the sample's average net weight and multiplying by 100. A high relative standard deviation reflects large variation in individual item net weights. For instance, a 2.5 gram mean weight plus or minus 1.3 grams can be expressed as 2.5 grams plus or minus the relative standard deviation of 51%.

The OIG did not review commercially manufactured drug samples, such as pharmaceuticals, because only multi-item clandestinely produced drug populations, like cocaine and heroin, have been found to reflect high intra-population weight variations.¹⁹⁵

2. Number of Samples Reviewed

The OIG reviewed 56,749 cocaine, 24,722 heroin, 95 methamphetamine, and 3,105 marijuana samples in its efforts to isolate groups of samples (*i.e.*, cases) with net weights that were within 25% above a trafficking threshold. The OIG found that 2,747 cocaine, 460 heroin, 5 methamphetamine, and 118 marijuana samples were calculated by the Drug Lab to be within 25% above a trafficking threshold, a total of 3,381 samples.

Next, the OIG reviewed the underlying documentation for these 3,381 samples, including the powder sheets, control cards, GC/MS reports, drug receipts and control sheets for each sample.

3. Reviewing Chemists' Sampling Practices

For each group of samples, the OIG first determined whether the chemist applied a sampling approach. If so, the OIG determined the total population of items submitted to the lab and the number sampled. If the sample contained only one item and the chemist appeared to test and weigh that one item properly, the OIG did not review it any further. Also, where the sample

¹⁹⁴ That is, the OIG isolated cases with reported net weights between 14-17.5 g; 28-35 g; 100-125 g; and 200-250 g; for cocaine, heroin, and methamphetamine, and between 50-62.5 lbs.; 100-125 lbs.; 2,000-2500 lbs.; and 10,000-12,500 lbs. for marijuana.

¹⁹⁵ See Mario, *supra* note 171, at 108.

contained multiple items but the chemist identified and weighed each item, the OIG did not review it any further. Therefore, the OIG limited its review to multi-item samples for which a chemist did not weigh and identify each item.

For each multi-item sample for which the Drug Lab used a sampling approach, the OIG used the Drug Calculator to determine the true proportion of the population the chemist statistically identified based on the number sampled. In other words, the OIG determined whether the chemist identified 90% of the population or some lesser portion of the population as positive for the drug of interest. For example, if a chemist had a population of 36 bags, the Drug Calculator would suggest a sample size of 19.¹⁹⁶ But if the chemist only tested 4 out of 36 bags, the chemist only had a statistical basis for stating with 95% confidence that 50% of the population, or 18 bags, was positive for a controlled substance.¹⁹⁷ The OIG recorded the fact that the chemist only statistically identified 50% of the population.

Next, the OIG reduced the net weight the Drug Lab reported, based on the proportion of the population that the chemist had a statistical basis for actually reporting as positive for a controlled substance, using the Drug Calculator. In the same example as above, suppose the 4 bags weighed .2 grams, .3 grams, .445 grams, and .6244 grams respectively. If the chemist reported an estimated net weight of 14.1246 grams for those 36 bags, the OIG adjusted the reported net weight and recorded a reduced net weight finding based on the proportion properly identified as cocaine (50%). For the 36 bags, the OIG would record an adjusted net weight of 7.062 grams because the chemist only had a statistical basis for stating that 50% of the reported weight of 14.1246 grams was actually positive for cocaine.¹⁹⁸ Then, the OIG added this case to its list of suspect cases.

Finally, for each multi-item group of samples, the OIG calculated the mean weight, the standard deviation, and the relative standard deviation. Then, the OIG used the Drug Calculator to calculate a confidence interval (with a 95% confidence level) and an estimated net weight. Using the same 4 out of 36 bags (.2 grams, .3 grams, .445 grams, .6244 grams), the mean weight is .39235 grams. The standard deviation is .184 grams. The relative standard deviation is 46.8%. The Drug Calculator provides a confidence interval for the mean weight of plus or minus .276 grams. Therefore, after multiplying the mean weight by 36, the estimated net weight is 14.12 grams plus or minus 9.9 grams. Based on the calculated confidence interval, there is a 95% confidence level that the 36 bags weighed between 4.188 grams and 24.11 grams. The OIG documented the adjusted net weight of this sample as 4.188 grams and added this case to its list of suspect cases.¹⁹⁹

¹⁹⁶ The Drug Calculator and the Chart provide slightly different numbers to identify. The OIG used the Drug Calculator because it reflects the most up-to-date statistical formulas.

¹⁹⁷ Assuming the 4 bags tested positive.

¹⁹⁸ It is quite possible that if the chemist identified and weighed each item that the statutory weight threshold of fourteen grams may have been met. But the Drug Lab's statistical approach was lacking and they did not conduct enough analysis to say for certain.

¹⁹⁹ The OIG documented the lowest confidence interval because it is the most conservative estimate of the net weight.

D. The OIG's Findings Regarding Trafficking Cases

1. Number of Cases Where the Drug Lab Applied a Sampling Approach

Even with multi-item drug samples, chemists in the Drug Lab did not always use a sampling approach – the chemists often weighed and identified each item. The Drug Lab applied a sampling approach in approximately 532 out of the total number of 3,381 trafficking samples, or 15% of the time. This represents approximately 271 cases.

Of those 271 cases, the OIG found 156 cases – 117 cocaine cases, 34 heroin cases, 4 marijuana cases and 1 methamphetamine case – in which the chemist did not statistically identify enough of the population to report the net weights that the Drug Lab reported for the case. In 101 of these 156 cases, the Drug Lab did not identify enough of the population but the lowest confidence interval was above the nearest weight threshold. In 55 cases the Drug Lab did not identify enough of the population *and* the lowest confidence interval was below the nearest trafficking weight threshold.

The OIG searched the electronic Trial Court Information Center for information relating to criminal defendants whose cases were likely implicated in the review. The OIG found that most of the defendants with cases involving substances that potentially weighed less than the reported net weight were not convicted of trafficking offenses.²⁰⁰ The majority of these cases resolved by way of plea to a lesser-included offense, such as possession with intent to distribute.

2. Number of Cases Where the Drug Lab's Sampling Approaches Are Questionable

Of the total of 204 cocaine cases sampled, the OIG performed calculations and found 117 cocaine trafficking cases for which results indicated that the chemist failed to statistically identify a sufficient proportion of the population to meet the nearest trafficking weight threshold. Approximately 103 were calculated using an arbitrary method for identity for at least one sample in the case. In other words, in those 103 cases, chemists identified less than 90% of the population as a controlled substance. In some cases, they statistically identified as little as 12% of the population as positive for a controlled substance.

In some cases in which chemists appeared to apply the hypergeometric approach (*i.e.*, they statistically identified 90%), they still did not statistically identify enough of the population to meet or exceed the nearest weight threshold. That is, if the net weight for the case was 14.1 grams, but the chemist only identified 90% as cocaine, he did not identify all 14.1 grams as cocaine and therefore should not have reported the weight as 14.1 grams.

²⁰⁰ The OIG did not find disposition information for every affected sample. Frequently, a defendant's name that is associated with a sample included "et al.," suggesting others were also charged. Also, the OIG did not have identifying information. The OIG only had a name from the drug receipt and the county corresponding to the police department.

The OIG calculated confidence intervals using the Drug Calculator at a 95% confidence level, and found 44 of the 117 cocaine trafficking cases in which the lowest confidence interval limit was below a statutory weight threshold. In these cases and those detailed below, the estimated weight was typically at or above the relevant threshold, but the confidence interval limit estimated that the case might be below the relevant threshold. The fact that the confidence interval limits were below trafficking weight adds uncertainty to the chemists' weight estimates. Some confidence intervals were quite significant. In one case, the weight difference between the lowest confidence interval limit and the highest was more than 30 grams. At a minimum, this suggests a high level of uncertainty in the weight estimate.

The OIG applied the same statistical approach to the 60 heroin trafficking cases and found 34 cases in which the results indicated that the chemist failed to statistically identify a sufficient portion of the population to meet the nearest trafficking threshold. Twenty-three of these cases were calculated using an arbitrary method for identity for at least one sample in the case. In some cases where chemists appeared to apply the hypergeometric method, they still did not statistically identify enough of the population to meet or exceed the nearest weight threshold.

The OIG calculated confidence intervals using the Drug Calculator at a 95% confidence level, and found 11 of the 60 Heroin trafficking cases in which the lowest confidence interval limit was below a statutory threshold.

The OIG applied the same statistical approach to the 6 marijuana trafficking cases sampled and found 4 cases in which the results indicated that the chemist used an arbitrary method and failed to statistically identify a sufficient portion of the population to meet the nearest trafficking threshold. The OIG calculated confidence intervals using the Drug Calculator at a 95% confidence level, and found 1 of the 6 marijuana trafficking cases where the lowest confidence interval limit was below a statutory threshold.

The OIG applied the same statistical approach to the single methamphetamine trafficking case finding that the chemist used an arbitrary method and failed to statistically identify a sufficient portion of the population to meet the nearest trafficking threshold. The OIG did not uncover any methamphetamine cases with confidence intervals below the nearest trafficking threshold.

E. The Drug Lab's Use of Arbitrary Sampling Approaches Produced Questionable Results from 2002 to 2012

It was not until 2005 that SWGDRUG recommended that drug labs use only statistically-based sampling approaches to make inferences or estimates about untested or un-weighed evidence. Prior to 2005, the Drug Lab used the sampling approaches that the forensic drug community commonly used; that is, arbitrary approaches. The OIG finds no fault with the Drug Lab for using those approaches prior to 2005. But the results they produced using arbitrary approaches are still questionable. For this reason, the OIG reviewed multi-item trafficking cases for the entire span of 2002 to 2012.

Since 2005, the forensic drug community evolved and has come to recognize that only statistical methods are appropriate for sampling seized drug evidence. The Drug Lab was slow to evolve

with the forensic drug community and never fully adopted a consistent statistical approach to sampling.

1. Massachusetts Courts Have Approved of the Use of Non-Statistical Sampling Approaches

The Drug Lab's continued use of arbitrary sampling approaches through the years is somewhat understandable considering that Massachusetts appellate courts have routinely upheld cases in which drug labs have applied such approaches. Massachusetts courts have denied defendants' challenges to sampling methods in cases where:

- the chemist calculated an estimated net weight of 174 cocaine packets by taking the average weight of 20 packages and multiplying that average weight by 174; *Commonwealth v. Coplin*, 34 Mass. App. Ct. 478, 485 (1993);
- the chemist tested 5 of 9 bags, and concluded that all 9 contained cocaine because each bag contained substances that were reportedly similar—as to color, consistency, smell, etc.; *Commonwealth v. Shea*, 28 Mass. App. Ct. 28, 33-34 (1989);
- the chemist weighed 4 of 36 packets of suspected crack cocaine to estimate the weight for the entire population of 36 packets, and infer the presence of crack cocaine in the remaining 32 bags; *Commonwealth v. Crapps*, 84 Mass. App. Ct. 442 (2013).²⁰¹

Despite the fact that Massachusetts courts have implicitly approved of arbitrary approaches (albeit with some reservations) to sampling seized drug evidence, it is the forensic drug labs not the courts, that should be responsible for validating the methods they use and keeping current with changes in the field of forensic drug testing.

2. SWGDRUG Requirements for Documenting and Reporting

SWGDRUG's 2005 recommendations included the provision that chemists must document the limits of their statistical inferences.²⁰² This would require documenting the percentage of the population identified using the hypergeometric approach, the confidence interval for the weight estimate, and the confidence levels associated with both the identity inference and weight

²⁰¹ According to the evidence introduced at trial, the chemist used a computer program to estimate net weight and testified that the program basically took the average weight, multiplied it by the thirty-six bags, and "extended a standard deviation." However, the chemist did not reveal the standard deviation or the algorithms and underlying assumptions of the computer program. *See Crapps*, 84 Mass. App. Ct. at 452. The concurring opinion in *Crapps* expressed concerns about whether the sampling methods employed in that case were proper. The concurrence highlighted the fact that the estimated "14.29 gram net weight came in evidence unadorned by any explanation of its statistical reliability..." The concurrence also expressed concern about the weight variability among the four samples. The chemist testified that the samples were "pretty consistent in size," but the largest packet of crack cocaine that the chemist sampled weighed more than two and one-half times that of the smallest packet sampled. The concurrence cautioned that without explanation of the validity and meaning of the chemist's weight estimate, a lay fact-finder may have difficulty evaluating the importance of the evidence, and may simply accept the estimated weight without appropriate scrutiny. *See id.* at 449-452.

²⁰² *See* SWGDRUG, *supra* note 172, at 2.

estimate. By 2008, SWGDRUG added the provision that labs should report uncertainty²⁰³ when “...it may impact the use of the result by the customer.”²⁰⁴ Specifically, it listed weights close to a statutory threshold as an example of a “critical” value that should be reported.

At the very least, as of 2008, chemists at the Drug Lab should have been documenting the proportion of the population statistically identified, the confidence interval for the net weight estimate and the confidence level associated with both the proportion identified and the confidence interval. Chemists should also have been particularly vigilant in reporting the limits of their inferences in cases near a weight threshold.

3. The Lab Disclosed the Total Number Tested and the Total Number Used to Calculate the Average Net Weight

Despite the many issues with the Drug Lab’s application of sampling approaches, the OIG found that the Drug Lab properly disclosed to the parties in criminal cases that chemists had estimated net weight and inferred chemical identity. First, on the drug certificate, the Drug Lab disclosed that the chemists used a sample to arrive at their conclusions. For example, a typical drug certificate for a sampling case would read:

The identification of the contents of the 36 plastic bags was determined by analysis of a random sample of 4 plastic bags and the net weight of the 36 plastic bags was derived from the average weight of the randomly sampled plastic bags.

Second, the Drug Lab routinely disclosed analysis sheets with chemists’ handwritten notations, including the description of the items; the amount of items in the sample; the amount tested; the weights for the individual items tested; and the estimated average weight. Moreover, the backs of those analysis sheets contained sections on the bottom entitled “Average WT of Packets,” “Average WT of Powder,” and “Net Estimated Powder Weight” with the chemist’s net weight calculations included. Third, the control cards included the number of samples received, and the number of samples tested; they also typically included a notation that the chemist estimated the net weight.

On balance, the drug certificate, the control card, and the powder sheet, along with the other documents that the Drug Lab provided as part of discovery in criminal cases, served to inform the prosecution, defense and court that the Drug Lab used a sample to estimate net weight and infer drug identity. It accurately conveyed to stakeholders that the chemist only tested and weighed a limited number of bags. However, the OIG finds that the Drug Lab should have turned over more data to stakeholders to provide enough detail to analyze and question the chemists’ sampling methods, opinions and conclusions.

²⁰³ “‘Uncertainty’ is an estimate attached to a test result which characterizes the range of values within which the true value is asserted to lie.” SWGDRUG Recommendations, *Annex A SWGDRUG Glossary of Terms and Definitions*, (2006), available at http://www.swgdrug.org/OLD/SWGDRUG%20Recommendations_080907.pdf.

²⁰⁴ SWGDRUG Recommendations, *Part IV C: Quality Assurance/Uncertainty*, §§ 5.5.1 – 5.5.1.2, (2008), available at http://www.swgdrug.org/Archived/SWGDRUG%20Recommendations_012910.pdf.

4. The Lab Failed to Document and Disclose the Confidence Levels for Their Identity Inferences and Weight Estimates

For instance, based on the OIG's review of the documents for over 3,000 drug trafficking samples, there is no evidence to suggest that the Drug Lab ever documented the method or approach they used to sample a particular case. Further, it appears that the Drug Lab did not disclose the percentage of the population identified as a controlled substance, the confidence level associated with that identity inference, or the confidence interval or confidence level for its weight estimates.

5. The Lab Failed to Disclose the Weight Spreadsheet

In addition, to the extent that the Drug Lab chemists used the Weight Spreadsheet to calculate confidence intervals and standard deviations, the OIG determined that the chemists did not routinely turn over the Weight Spreadsheet or the calculations derived from it. For cases near a trafficking threshold, some Weight Spreadsheets could be exculpatory. Specifically, if the lowest limit of the confidence interval was below the trafficking threshold at issue in the criminal case, that confidence interval would tend to call into question whether the sample weight actually exceeded the trafficking threshold.²⁰⁵

As noted in 2009 by the National Research Council in "Strengthening Forensic Sciences," failing to include this type of information in discovery leaves "peers and other courtroom participants without enough evidence to understand, and if needed, question the sampling scheme, processes of analysis, or interpretation...."²⁰⁶

6. The OIG Questions Whether Reweighing Samples Would Resolve any Lingering Questions

Despite concerns with the methods the Drug Lab used to sample drug cases, the OIG questions whether reweighing samples would settle any lingering questions. Unlike testing for a drug's chemical identity, which can be determined years later with laboratory tests, such as a GC/MS instrument, drug samples lose weight or may gain weight over time due to a number of factors. Temperature fluctuations, light, exposure to water and dehydration all may affect the net weight of a substance.

Moreover, evidence storage at each of the more than 200 different agencies that the Drug Lab served has likely exposed the samples to different conditions. Fluctuations and inconsistencies in temperature, moisture, light and exposure to air between each police department will affect the net weight of a sample differently.

²⁰⁵ Exculpatory evidence is not a narrow term connoting only alibi or other complete proof of innocence, but is any evidence that tends to negate the defendant's guilt or support his innocence. *See Commonwealth v. Murray*, 461 Mass. 10, 19 (2011).

²⁰⁶ Committee on Identifying the Needs of the Forensic Sciences Community, National Research Council *Strengthening Forensic Science in the United States: A Path Forward*, 135 (2009), available at <https://www.ncjrs.gov/pdffiles1/nij/grants/228091.pdf>.

For these reasons the OIG chose not to attempt to reweigh any samples. To do so would not settle any uncertainty but only add to it. However, the OIG will report all of the sample numbers and defendants' names implicated in its review to the appropriate prosecutorial agency.

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XVII. OIG Sample Retesting

As noted in Section VIII above, sample vials were sometimes analyzed more than one time on the GC/MS instrument. There were many benign reasons why that might happen, including a need for the primary chemist to concentrate or dilute the aliquot. Sometimes, however, chemists retested vial samples multiple times on the GC/MS instrument because the initial confirmatory GC/MS result was inconsistent with the primary chemist's preliminary identification of the sample. In addition, sometimes with samples run multiple times on the GC/MS instrument, there were inconsistencies among the GC/MS results.

The Drug Lab failed to document multiple runs and also failed to consistently, if ever, disclose the fact of multiple runs to the parties in the resulting criminal case.

Given the anomalies among testing results for certain of these samples that were run multiple times on the GC/MS instrument, the OIG thoroughly reviewed the testing documents of all of the samples run multiple times. As a result of this document review, the OIG determined that it was necessary to retest a certain percentage of these samples to ensure the accuracy of the Drug Lab's testing results. That retesting is ongoing.

A. Failure to Properly Document Multi-Run Samples and Provide Test Results in Criminal Cases

The Drug Lab did not have any form of discrepancy log to document sample vials that needed to be returned by the GC/MS section to the primary chemist for any reason. In addition, for most of the years of the OIG's review, the Drug Lab did not have a policy for documenting the fact of multiple runs. Instead, the confirmatory chemist was only required to write on the front of the sample's control card the date of the final GC/MS analysis and the confirmed identification of the substance. In addition, the confirmatory chemist would sometimes write the final GC/MS sequence on the back of the control card.

At the end of March 2010, the Drug Lab instituted a policy stating that if a sample was returned to the primary chemist and thereafter tested additional times on the GC/MS instrument, the confirmatory chemist was responsible for recording each GC/MS sequence on the back of the control card in order to document the entire GC/MS history of the sample. That new policy, however, was only sporadically adhered to.

Further, when providing discovery in criminal cases in which the Drug Lab analyzed a controlled substance, the Drug Lab failed to disclose either the fact of multiple runs or the actual multiple GC/MS reports. Typically, the Drug Lab gave prosecutors a "discovery packet" with a copy of the following documents associated with a sample: (1) the front of the control card (and inconsistently the back); (2) the drug receipt; (3) the powder sheet or pharmaceutical analysis sheet; and (4) the printouts of the GC/MS report that confirmed the final identification of the sample. The Drug Lab's discovery packet did not include the printouts of any additional GC/MS reports reflecting instrument runs that did not lead to the sample's ultimate identification. Nor did the discovery packet include the sample's control sheets, which may have contained an explanation of why a sample had been returned to the primary chemist. Similarly, the discovery

packet often failed to include the back of the control card, which after March 2010, was supposed to contain information regarding the number of times the sample had been tested on the GC/MS instrument. The failure to turn over the additional GC/MS reports, in addition to the control sheets and the back of the control cards, may have prevented prosecutors and defendants from knowing that a sample had been tested more than once.

B. Need for Retesting

Once the OIG determined that there were samples tested multiple times on the GC/MS instrument (“Multi-Run Samples”) that had deviations or discrepancies among the test results, it became clear that a thorough review of the testing of these samples was necessary. This was particularly true when it became apparent to the OIG that the parties in the criminal cases likely did not know about the multiple tests, which may have deprived certain criminal defendants of a meaningful opportunity to question the reliability and accuracy of the Drug Lab’s test results, particularly on occasions in which the GC/MS instrument produced different results than the primary chemist.

C. Methodology of Review

Because of the Drug Lab’s failure to consistently document when a sample had been tested multiple times on the GC/MS instrument, it was necessary for the OIG to use the raw, electronic data stored on the GC/MS instruments to compile a list of Multi-Run Samples. For its review, the OIG relied on the technical skills of its e-discovery firm, Navigant, to create this list. The OIG’s Multi-Run Sample review focused on the lab work of all the chemists (including Dookhan) who worked in the Drug Lab between 2002 and 2012, as well as all classes of samples that the Drug Lab had tested, including those drugs in Classes A, B, C, D and E.²⁰⁷

Between the years of 2002 and 2012, 112,609 samples were analyzed on the Drug Lab’s GC/MS instruments. Of those 112,609 samples, 9,483 samples, or 8.4% of the total, were Multi-Run Samples. These 9,483 Multi-Run Samples resulted in 27,991 GC/MS runs. For each of these 9,483 Multi-Run Samples, the OIG reviewed the underlying documentation to determine the accuracy of the results. In reviewing the documentation for each sample, the OIG examined: (1) the control cards; (2) the control sheets; (3) the powder sheets; (4) both handwritten and typed batch sheets; and (5) any other documents associated with each sample, including the drug receipt and, if available, the drug certificate.²⁰⁸ The OIG then looked at the GC/MS results for each sample and, in some instances, reviewed the GC/MS reports for more detailed information.

²⁰⁷ Each controlled substance defined in Chapter 94C of the General Laws is assigned to a specific “class” for the purpose of determining the severity of the criminal offenses associated with that controlled substance. In Massachusetts, there are five different classes of narcotics, Class A substances having the most severe criminal punishments and Class E having the least severe penalties. For a list of which substances are included in each class, *see* M.G.L. c. 94C, § 31.

²⁰⁸ The Drug Lab used a template for their drug certificates, in which a prior drug certificate would be overridden by the creation of a new drug certificate. The Drug Lab had no policy for keeping a copy of the drug certificates at the Drug Lab; rather, typically, the one and only drug certificate for each sample was returned to the police department with the sample.

The information obtained from the examination of the underlying drug testing paperwork informed the OIG which samples required retesting.

In creating the OIG's final list of samples for retesting, every effort was made to be over-inclusive so as to identify all samples with potentially inaccurate results. The OIG's mission in this regard was to check the accuracy of the Drug Lab's testing and protect the rights of criminal defendants who may have been wrongfully convicted.

D. The OIG's Findings Regarding Multi-Run Samples

By reviewing the electronic and hardcopy documents associated with each Multi-Run Sample, the OIG categorized each sample by the type of discrepancy found in the Drug Lab's testing results. Multi-Run Samples were assigned to a particular category as follows:

Category 1: GC/MS results differed from the primary chemist's preliminary identification.

Category 2: Substance found in first GC/MS run and substance found in subsequent GC/MS runs differed among the multiple runs.

Category 3: First GC/MS result found "No Integrated Peaks"²⁰⁹ and subsequent GC/MS results confirmed the preliminary identification.

Category 4: The primary chemist's preliminary finding was that the substance was an "unknown," the initial GC/MS finding was of a controlled substance, and all GC/MS runs thereafter were consistent with that initial GC/MS finding.

Category 5: The substance found in all GC/MS runs was consistent with the preliminary identification, and the sample was re-run for no apparent reason.

Category 6: The substance found in all GC/MS runs was consistent with the preliminary identification, but the sample was re-run for reasons stated on the GC/MS control sheet, such as "too weak," "RTC," or "dilute."²¹⁰

Category 7: The sample was not tested multiple times. Rather, the sample appeared to have multiple GC/MS results based on a transcription error on a batch sheet or handwritten sequence sheet.

²⁰⁹ A finding of "No Integrated Peaks" means that the GC/MS instrument was unable to identify a substance satisfying the abundance threshold and parameters set by the GC/MS operator. A GC/MS result finding "No Integrated Peaks" does not necessarily mean that the sample is not a controlled substance.

²¹⁰ A "weak" sample is one that does not meet the minimum spectral requirements of the GC/MS instrument as set by the GC/MS operator. If a sample was too weak, the sample could be retested on a more sensitive GC/MS method or returned to the primary chemist for concentration. The comments for the vast majority of Category 6 samples were either "Repeat" or "Return to Chemist" (or "RTC"), which provided no real insight as to the reason a sample was run multiple times.

Category 8: The sample was not tested multiple times. The sample appeared to have multiple GC/MS results, but for unknown reasons, a sample that was tested once produced duplicate electronic data files.

All of the Multi-Run Samples in Categories 1, 2 and 3 were included on the retest list, because these categories were made up of samples which had discrepancies among the testing results for the samples. There were 762 samples in Category 1, 1,146 samples in Category 2 and 1,342 samples in Category 3.

The OIG did not include on the retest list the 1,850 Multi-Run Samples assigned to Category 4 because the only testing discrepancy associated with a Category 4 sample was a preliminary finding of an “unknown.” While in some instances, the primary chemist could have conducted more bench tests to preliminarily identify a substance (including analyzing the sample on a separate GC instrument or using another preliminary testing technique), this category suggests potential inefficiencies at the Drug Lab, as opposed to any true discrepancies among testing results.

Also removed from the retest list were the 122 Multi-Run Samples in Category 7. While transcription errors suggest a lack of attention to detail, they do not cause concern that the samples had been inaccurately identified. Similarly, the 60 Multi-Run Samples assigned to Category 8 were, by definition, not actually run more than one time on the GC/MS, so these samples were removed from the retest list as well.

The OIG made a determination whether to include the Multi-Run Samples assigned to Categories 5 and 6 on a sample-by-sample basis. Samples in Categories 5 and 6 all had consistent GC/MS results which showed the same controlled substance each time the sample was tested. Additionally, the Drug Lab’s records did not clearly indicate why the samples had been analyzed more than one time on the GC/MS instrument. By comparing the actual GC/MS data – including gas chromatographs and the area, quality and composition of the substances found in each GC/MS run for the Categories 5 and 6 samples – the OIG forensic experts identified certain samples that had minor inconsistencies in the GC/MS results. These inconsistencies suggested potential malfeasance, including the possibility that the multiple GC/MS results were run on vials derived from different samples, even though the same controlled substance was found in each test result. Based on the expert’s analysis, 68 of the 2,830 samples in Category 5 and 31 of the 1,371 samples in Category 6 were included on the retest list.

In total, the retest list of Multi-Run Samples from Categories 1, 2, 3, 5 and 6 totaled 3,349 samples.

Once the list of Multi-Run Samples was complete, the OIG removed all known residues from the list, reasoning that virtually the entire sample was likely to have been consumed during the original drug testing, so a negative finding at this point would be unreliable. After these removals, the OIG’s list totaled 2,987 Multi-Run Samples.

E. Phase One of the OIG's Retesting

After finalizing the retest list, the OIG sent letters to each of the 178 police departments in possession of the samples on the list to determine which samples had already been destroyed pursuant to court order in the normal course, and which samples were still in the department's custody. To date, the OIG has obtained information that 650 samples had been destroyed pursuant to court orders obtained in accordance with Mass. Gen. Laws ch. 94C, § 47A, prior to the MSP's investigation into Dookhan.²¹¹ After removing the destroyed samples from the list, the OIG's retest list totaled 2,337 Multi-Run Samples.

The OIG then coordinated with each police department to transport the existing samples to a geographically centralized location for preliminary retesting. With the cooperation of the Association of Massachusetts Major City Police Chiefs, the OIG tested samples at police departments across the Commonwealth over the course of sixteen days.

To accomplish the preliminary retesting, the OIG forensic experts used a handheld Raman spectrometer instrument, called a "TruNarc," which is manufactured by Thermo Fisher Scientific in Tewksbury, Massachusetts. The TruNarc allows an operator to direct the "nose" of the instrument against a sample and cause a laser to reveal the chemical structure of the sample. After generating spectra for the sample and then reconciling and matching it with a drug listed in its internal drug library, the sample's identity is displayed on the TruNarc screen. One benefit of the TruNarc is that it can identify many types of controlled substances in powder, liquid and tablet form, and can do so through containers such as baggies and glass vials. Another benefit is its speed; many samples take seconds to identify. Furthermore, due to the generosity of Thermo Scientific, the Quincy Police Department and New York's Suffolk County Crime Laboratory, the OIG was able to use three TruNarcs at no cost to the Commonwealth, rendering the process cost-effective.

It should be noted, however, that the OIG's retesting with the TruNarc was preliminary in nature. Due to some limitations, the TruNarc cannot identify every type of controlled substance. When certain powder samples are overwhelmed by cutting agents, the TruNarc cannot identify the controlled substance in the sample.²¹² Similarly, the TruNarc cannot always identify a low-dose pharmaceutical, although there is a "Type-H" kit for enhanced analysis of heroin and some low-dose pills. In addition, when the OIG experts viewed a sample's amount as too small, they did not preliminarily retest those samples.

After removing the samples that had been destroyed by court order and the samples that were not found within the TruNarc library, the list of samples to preliminary test was narrowed to 1,203 Multi-Run Samples.²¹³ In 739 of those 1,203 samples, the TruNarc's finding was consistent with

²¹¹ Since the investigation into Dookhan began, the destruction of samples tested at the DPH Drug Lab was halted.

²¹² A cutting agent is a non-narcotic substance that is added to a narcotic in order to increase its weight or volume. Common cutting agents include baking powder and baby formula.

²¹³ In addition to the 1,203 samples, there were a small number of samples that were preliminarily retested on-site due to human error.

the reported Drug Lab finding. The TruNarc returned an inconclusive finding or a finding inconsistent with the Drug Lab finding with respect to 464 of the 1,203 samples.

The OIG is now in the process of sending the samples that TruNarc identified as “inconclusive” or “inconsistent,” as well as the samples that could not be tested with the TruNarc (due to library issues, for example), to an accredited, independent laboratory out of state. This testing should determine the accuracy of the Drug Lab’s findings with respect to the Multi-Run Samples. The OIG is in the process of providing the appropriate District Attorney’s Office with the results of each TruNarc test conducted.

XVIII. Conclusion

A. Findings

After a careful review of a significant volume of electronic and paper documents, witness testimonies, drug analysis results and other materials, and with the aid of its forensic experts, the OIG finds the following:

1. Dookhan Was the Sole Bad Actor

The OIG makes findings with respect to chemist Annie Dookhan, despite the fact that Dookhan was not the focus of the OIG's investigation. The OIG focused on the Drug Lab's policies and practices from 2002 to 2012 to determine whether any chemists, supervisors or managers at the Drug Lab during that time committed any misfeasance or malfeasance that may have impacted the reliability of drug testing at the Drug Lab. The Attorney General's Office separately investigated and criminally prosecuted Dookhan, and Dookhan pleaded guilty to conduct including tampering with Drug Lab documents, tampering with aliquots (by making negative findings into positives), and falsely testifying to having a Master of Science degree. Nevertheless, it was necessary for the OIG to review Dookhan and her work product as part of a thorough investigation of the Drug Lab.

With respect to Dookhan, the OIG finds that she (1) failed to follow chain-of-custody protocols with in relation to the June Breach and the May Breach; (2) forged certain documents, including the evidence logbook, a GC/MS control sheet, a GC/MS tune sheet and a GC/MS batch sheet; (3) fabricated multiple GC/MS QC standard mix reports; (4) batched the creation of her GC/MS aliquots in such a way as to risk contamination; (5) "tampered" with her own aliquots that had been returned to her by the GC/MS section; and (6) testified falsely in court to having a Master of Science degree.

The OIG did not find evidence that Dookhan tampered with any drug sample assigned to another chemist, or that she tampered with any of the actual evidence samples assigned to her as the primary chemist, only that she tampered with the small portion of the sample contained in the aliquots that she resubmitted to the GC/MS section.²¹⁴ Furthermore, the OIG did not find evidence that Dookhan made changes to drug findings in the Drug Lab's database.

The OIG did not determine Dookhan's motive for tampering with her aliquots. However, the OIG finds that Dookhan's motive was not based on a zealous desire to convict criminal

²¹⁴ The fact that the MSP retested and reached a negative result for certain samples that Dookhan preliminarily tested in the Drug Lab supports this finding that Dookhan only tampered with the aliquots and not the evidence samples.

defendants²¹⁵ given that her percentage of negative findings was consistent with the percentage of negative findings of all other chemists.²¹⁶

Further, the OIG did not find evidence that any other chemist at the Drug Lab committed any malfeasance with respect to evidence testing or knowingly aided Dookhan in her malfeasance.²¹⁷ However, as will be set forth below, the following deficiencies at the Drug Lab created an atmosphere that allowed for Dookhan to commit her crimes.

2. Management Failed

The most glaring factor that led to the Dookhan crisis was the failure of management. Director of the Bureau of Laboratory Sciences (“BLS”) Linda Han and Director of the Division of Analytical Chemistry Julianne Nassif were both weak, absent managers who had no forensic experience or training, failed to have regular meetings with the Drug Lab employees, and were incompetent in dealing with personnel matters. Neither ensured that background checks (including confirmation of academic credentials) were performed for new Drug Lab employees²¹⁸ or that annual employee performance evaluations were conducted.²¹⁹ When faced with repeated reports of Dookhan’s malfeasance – including the May Breach, the June Breach, the forgeries and questions about Dookhan’s ability to conduct all necessary tests given her high testing numbers – Nassif buried the information and quietly (and gradually) removed Dookhan from drug testing duties to writing standard operating procedures, a move that other chemists perceived as a reward. Nassif failed to investigate various allegations about Dookhan’s suspicious behavior. Han and Nassif failed to report any of Dookhan’s transgressions to the DPH Commissioner’s Office or to any outside agency, including agencies involved in criminal investigations or the federal body from which the Drug Lab received Coverdell grant funds. Han and Nassif waited five months to report the June Breach to DPH, and did so only after mentioning it to Director of Administration and Finance for the BLS Grace Connolly in a conversation regarding which chemists should transfer to the Massachusetts State Police (“MSP”).

Further, Nassif created a vacuum in oversight by marginalizing Charles Salemi, who had been the supervisor in the Drug Lab for approximately eight years when Nassif was appointed as director. She distanced a knowledgeable voice in the area of chemical testing processes. When this occurred, Salemi failed to assert himself to ensure the integrity of the Drug Lab, which he had managed for a significant period of time.

²¹⁵ The OIG is aware of Dookhan’s statements, contained in emails, indicating a desire to please prosecutors and email responses from prosecutors suggesting she was helpful to their cases.

²¹⁶ As discussed in footnote 39, Dookhan’s percentage of negatives was in the middle of the range of chemists who worked in the Drug Lab from 2002 to 2012.

²¹⁷ Although the OIG discovered that chemist Kate Corbett did not have an undergraduate degree in chemistry, as she had represented in her curriculum vitae and in sworn court testimony, the OIG found that Corbett was likely mistaken in her understanding that she had such a degree based on statements made to her by faculty at her undergraduate institution after she had completed the coursework for a major in chemistry.

²¹⁸ The one background check performed was a criminal record check.

²¹⁹ This is policy for every state agency and is included in the chemists’ union’s collective bargaining agreement.

Within the Drug Lab, direct supervision and daily oversight was lacking. Salemi's philosophy was to provide chemists with the utmost independence. The Drug Lab's physical layout also perpetuated limited supervision and a high level of independence for chemists. Dookhan, for example, was alone with another chemist in a room with a closed door, without a team leader after 2008. Salemi, like other supervisors and DPH officials, also failed to respond to complaints from Drug Lab chemists regarding Dookhan, and he failed to investigate such complaints.

Management also failed to put systems in place that would have alerted them to testing discrepancies, lapses in the chain of custody and other potential problems in the Drug Lab. They failed, for instance, to create discrepancy logs to document when sample vials were returned to the primary chemist or to document errors in the chain-of-custody records. Similarly, management failed to conduct inventories and audits, such as an inventory of the evidence safe and audits of samples that had been run multiple times on the GC/MS instrument.

3. DPH Commissioner Auerbach Failed to Respond Appropriately to the Report of the June Breach

When Han and Nassif finally notified the DPH Commissioner's Office of the June Breach in December 2011, Commissioner John Auerbach failed to respond appropriately. The resulting investigation that Auerbach commissioned focused solely on confirming the facts of the June Breach rather than investigating any other breaches in chain of custody, any other potential malfeasance committed by Dookhan, or any other issues in the Drug Lab. Auerbach further failed to direct an investigation into the May Breach and failed to disclose the May Breach to prosecutors' offices or to the federal agency providing Coverdell grant funds.

4. The Drug Lab Lacked Formal and Uniform Protocols

The Drug Lab lacked written, uniform protocols for many aspects of its operations, including training, chain of custody and testing methods. This lack of direction from management allowed chemists to create their own discordant (and sometimes incorrect) practices. For a chemist like Dookhan, who appeared to be empowered by her ever-increasing responsibilities and independence, the lack of protocols fostered an atmosphere where she regularly disregarded the minimal procedures in place.

The lack of accreditation exacerbated the Drug Lab's lack of uniform policies, as did the physical location of the Drug Lab within a public health-oriented building, without other forensic science labs with which to consult.

5. Management Did Not Provide Sufficient Training to Chemists

Training was sorely lacking in the Drug Lab. The initial chemist training was limited, lacked uniformity among the new chemists and was deficient in both theory and the scope of required knowledge.

In addition, there was virtually no continuing education provided to the chemists from either inside or outside of the Drug Lab. Unless it was free, outside training was only available to

chemists when they sought it and paid for it. Furthermore, most chemists in the Drug Lab did not belong to any professional forensic organizations and when they did, they paid for it on their own and rarely, if ever, attended meetings. This lack of connection to other forensic drug labs, through either continuing education or attending forensic organization meetings, left the Drug Lab isolated from the rest of the forensic community and behind the times in terms of trends in forensic drug chemistry and practices.

Further, there was virtually no training for chemists related to providing expert testimony in court proceedings, even after *Melendez-Diaz*, when chemists were suddenly testifying in trials on a routine basis. Mock trials were not a regular part of chemists' training and supervisors failed to oversee chemists' live testimony in court. As a result, chemists testified in such a way that they misrepresented the two-chemist system and testified inaccurately about the statistical basis for weight extrapolations in trafficking cases.

6. The Drug Lab Should Have Provided Potentially Exculpatory Evidence to the Parties in Criminal Cases

The Drug Lab's management decided, without consulting legal counsel, to provide prosecutors with copies of only four documents in response to discovery requests. These documents were: (1) the drug receipt; (2) the powder sheet or pharmaceutical analysis sheet; (3) the front of the control card (and, inconsistently, the back); and (4) the GC/MS results that confirmed the sample's presumptive findings. The Drug Lab's failure to give prosecutors printouts of GC/MS runs besides the final one, the control sheets and often the backs of the control cards (after March 2010) may have prevented prosecutors and defendants from learning about potentially exculpatory evidence in the nature of additional GC/MS runs that may have been inconsistent with the final GC/MS run or the preliminary drug finding. To ensure the integrity of certain multi-run test results, the OIG is in the process of retesting 2,337 samples.

The Drug Lab further failed to produce the Weight Spreadsheets used in multi-item trafficking cases, which may have revealed a confidence interval that fell below the statutory threshold for trafficking.

7. The Drug Lab Lacked Effective Quality Controls

The quality control system in place at the Drug Lab was deficient in its ability to detect or uncover the type of malfeasance Dookhan committed or other testing problems or inaccuracies. Most of the Drug Lab's quality control was related to whether the instruments were functioning properly rather than the accuracy of the chemist's case work. The quality control "checklists" that were signed by Technical Supervisor Peter Piro, Dookhan and Nassif and provided to Han, were a paper trail of balances checked and reagents replaced. Salemi's monthly audit of chemists' work was inadequate; he only audited five to ten samples a month and only had the primary chemist repeat the preliminary bench tests. He did not routinely review the GC/MS data from the chemist's original analysis. Further, most chemists completed their drug analysis without a supervisory chemist observing them or reviewing their work. Such a system was ineffective in detecting malfeasance, incompetence or inaccurate results.

8. The Drug Lab Did Not Always Use a Valid Statistical Approach to Multi-Sample Trafficking Cases

The Drug Lab failed to uniformly and consistently use a valid statistical approach to estimate the net weight or to identify a sufficient portion of the population in multi-item drug trafficking cases, creating the possibility that the estimated weight of these samples did not actually reach the statutory threshold for a charge of trafficking.

9. The Drug Lab Lacked Heightened Security

Management at the Drug Lab failed to appreciate the need for heightened security given the contents of the drug safe, and mismanaged those safeguards that were in place, causing the Drug Lab to be vulnerable to a chemist who may have wanted to tamper with or obtain drugs for illicit purposes.

Furthermore, the Drug Lab failed to conduct periodic criminal background checks post-employment, citing a prohibition to do so in the collective bargaining agreement.

B. Recommendations

1. Better Management Practices Are Essential

All state agencies must employ management practices that hold supervisors accountable for their employees. These practices must incorporate comprehensive background checks and, at a minimum, annual top-to-bottom performance evaluations. In addition, these practices must include a mechanism for employees to report significant events and concerns to their supervisors.

In a forensic drug lab, a system to report significant deviations from policy must exist in the form of a discrepancy log or Corrective Action Reports, which alert supervisors to potential problems, including with respect to chain-of-custody and testing results. Additionally, a “whistleblower” reporting mechanism should be in place, so that an employee knows to whom he can make a confidential report of misfeasance or malfeasance.

In addition, managers of forensic labs should be experts in their respective fields; they should have both subject-matter expertise and an understanding of how to address changes in the law.

2. The MSP Is the Correct Agency to Handle the Drug Lab’s Forensic Drug Testing Functions

The Massachusetts State Police (“MSP”) should continue to conduct the forensic drug testing function that the Drug Lab performed before its closure.

The question of whether a forensic laboratory should be outside the purview of law enforcement has been at the forefront of forensic laboratory discussions since the release of the National Academy of Sciences’ 2009 report, “Strengthening Forensic Sciences in the United States: A

Path Forward.” In that report, the National Academy of Sciences suggested that, “ideally,” public forensic science labs should be “independent of or autonomous within” law enforcement agencies. Prior to that report, in 2002, the Commonwealth hired an independent organization, the National Forensic Science Technology Center (“NFSTC”), to conduct a “needs assessment” related to forensic science services in Massachusetts. NFSTC recommended that all forensic drug testing be consolidated into one facility controlled by a separate agency of state government. The next year, then-Governor Mitt Romney appointed a Commission to examine the Commonwealth’s criminal justice system to identify best practices and innovative solutions to crime problems. In the resulting report, the Commission also advocated for consolidation of forensic drug testing in Massachusetts, but this Commission suggested that all drug testing services reside within the MSP.

As we now know, over the eight to ten years after the work of NFSTC and the Governor’s Commission, DPH exhibited a lack of commitment to the enhancement and continued success of the Drug Lab by failing to provide either the necessary resources for accreditation, training and professional development or the appropriate level of management and oversight that the Drug Lab so desperately needed. Moreover, it was while the Drug Lab was under DPH – a non-law enforcement agency – that the Dookhan crimes occurred.

Currently, the MSP has the infrastructure and the financial resources in place, along with the highest level of accreditation (ASCLD/LAB-International Program) to run a lab with the most exacting standards in the forensic drug testing community. The MSP is in the process of hiring and training the appropriate number of personnel to address the substantial backlog and the growing demands for testing.

The OIG has further determined that the MSP Crime Lab Drug Unit is autonomous within the MSP, and was required to demonstrate that autonomy to ASCLD/LAB, its accrediting body. The MSP Crime Lab (including the forensic drug unit) operates under its own budget, which is controlled by the Laboratory Director. Furthermore, the MSP Crime Lab Drug Unit sets its own priorities for casework and budgetary matters without undue influence from MSP management.

Finally, the Legislature should consider re-establishing the Drug Analysis Fund. Under Section 6B of Chapter 280, fines assessed against drug defendants were deposited into the Drug Analysis Fund and then used to support the Drug Lab. This law was repealed in 2003. Chapter 280 would need to be amended to ensure that fines are deposited into the re-established fund and directed to help support the MSP Crime Lab Drug Unit.

3. All Forensic Laboratories Must be Accredited

The Legislature should mandate that all forensic laboratories be accredited and sufficient funding should be appropriated for that purpose.

4. All Chemists Must Be Thoroughly Trained

Forensic drug chemists should receive extensive, theory-based training before analyzing drug samples. They should also be required to complete continuing education courses to stay current

on new laws and trends in testing processes. All forensic scientists should be trained in courtroom testimony and take part in a mock trial program to understand their role as an expert witness. Further, forensic scientists should be trained in the protocols and the importance of chain of custody, as well as the statistical methods of estimating drug trafficking weights.

In addition, forensic chemists should be provided ethics training to ensure that they remain unbiased in their forensic science responsibilities.

5. Drug Labs Should Provide a Complete Record of the Tests Performed to the Parties in Criminal Cases

A forensic drug lab must make it a practice to produce results from all analytical tests run on each sample, particularly tests that show anomalies from other tests. In addition, a forensic drug lab should report all estimated weight confidence intervals in trafficking cases.²²⁰

6. Drug Labs Must Have Ample Quality Controls

In addition to instrument functionality, quality control should be focused on the integrity and accuracy of the chemists' work product.

Testing methods should utilize objectively reviewable data, such as electronic printouts generated from the GC/MS instruments. For instance, instead of color tests, which cannot be reviewed without repeating the test, chemists could use an instrument such as an ultraviolet spectrometer for preliminary tests because this instrument produces objectively reviewable data; alternatively, color and microcrystalline tests could be photographed or contemporaneously reviewed by another chemist.

Every sample tested in the lab should be subject to a technical review by a supervising chemist, which would consist of a review of all the objectively reviewable data to identify errors or possible malfeasance.

Chemists should be subject to proficiency testing, using an outside vendor, to ensure that samples are being analyzed correctly.

Lab supervisors should observe chemists testify in court, and review court transcripts when available, to ensure that chemists understand the process and the science behind the tests they conduct, and are able to testify accurately. In addition, supervisors should periodically review chemists' curriculum vita to ensure accuracy.

7. Security Measures Are Essential

Any employee of a forensic drug lab who has access to controlled substances should submit to periodic random drug testing, as well as annual criminal record checks.

²²⁰ The "Strengthening Forensic Science" report supports the disclosure of all "measures of uncertainty" in testing. Furthermore, ASCLD requires this of laboratories bearing its accreditation, including the MSP.

Forensic drug labs should incorporate well-designed security practices, including the use of biometric devices and closed-circuit televisions, which are consistently and properly managed in line with their identified needs.

8. Concerns About Certain Cases

As noted above, the criminal dockets in Massachusetts are inundated with Drug Lab-related post-conviction motions. As an independent agency charged with preventing and detecting fraud, waste and abuse, it would not be appropriate for the OIG to recommend to the judiciary how it should address these cases. Each case has its own facts and circumstances that must be individually evaluated by the judicial system. Throughout the course of the OIG's investigation, numerous stakeholders have urged this Office to provide an opinion on how the courts should resolve these cases. The OIG declines to do so. As other jurisdictions have faced similar lab controversies, their courts have issued rulings that may be instructive. Based on its thorough review of the Drug Lab, the OIG can only comment as follows:

a. Cases in Which Dookhan Was the Primary Chemist

Because Dookhan admitted to tampering with her own aliquots, making negatives into positives, and the MSP's retesting of certain samples has corroborated that confession, the OIG would suggest that all samples in which Dookhan was the primary chemist be treated as suspect and be subject to careful review.²²¹

b. Cases in Which Dookhan Was the GC/MS Receiver, Operator, Confirmatory Chemist or Notary

As noted above, the OIG did not find evidence that Dookhan tampered with any sample assigned to another chemist. Accordingly, the OIG cannot suggest treating cases in which Dookhan was the GC/MS receiver, GC/MS operator, confirmatory chemist or notary with any increased suspicion because of Dookhan's involvement.

c. Cases that Were Analyzed in the Drug Lab by Other Chemists

Dookhan had a significant amount of access to samples tested by other chemists in the Drug Lab, including access to the drug safe and potentially other chemists' drug lockers. In addition, Dookhan had access to the Drug Lab's database, FoxPro. However, because the OIG did not find evidence that Dookhan tampered with any samples besides her own aliquots or altered any findings in the Drug Lab database, the OIG cannot suggest treating cases in which Dookhan had no known interaction with the drug sample in question with any increased suspicion because of Dookhan.

²²¹ See, e.g., *Ex Parte Coty*, No. WR-79,318-02 (Tx. Ct. Crim. App. Jan. 15, 2014); see also *State v. Roche*, 111 Wash. App. 424 (2002).

d. Cases in Which Multiple GC/MS Runs Were Not Disclosed

For cases that had multiple GC/MS runs and the corresponding printouts were not produced to the defendant in a criminal case, the OIG defers to the courts to determine whether such test results were exculpatory and material to the defendant's conviction.

e. Cases in Which Trafficking Weights Were Not Properly Estimated

For cases in which the estimated weight of multi-unit samples was determined without using a statistical approach, the OIG suggests that when the weight finding is close to the statutory threshold for a finding of trafficking, the case should be carefully reviewed.

f. Cases With Samples that the OIG Wanted to Retest But the Samples Had Been Destroyed

As noted above, the OIG was interested in retesting 3,347 samples because of anomalies among testing results in the Drug Lab. Of those 3,347, approximately 650 samples had already been destroyed by police departments in the normal course, after the conclusion of a case. With respect to cases with samples that the OIG wanted to retest, but which no longer exist, the OIG suggests that the cases be evaluated with increased concern.

C. Supplemental Report

The OIG's mission included a review of the management and operation of the Drug Lab in order to determine whether the testing done at the lab was proper and followed best practices. Further, the OIG's mission included identifying cases that may have been affected by the failures of the Drug Lab.

To that end, the OIG is in the process of retesting certain drug samples identified in this report. The OIG has reported to the appropriate prosecutors' offices the results of the preliminarily retested samples. In a supplemental report, the OIG will detail the results of the samples that are being retested.