



MEDICAL EXAMINER

***FUTURE STATE PROCESSES AND
WORKFLOWS (TO-BE)***

***LIMS SELECTION - MEDICAL
EXAMINER***

TARRANT COUNTY

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LIMS REP Updated

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The signatures appearing on this document approval sheet indicate the corresponding individual's understanding and acceptance of this To-Be Workflow Document. This acceptance does not mean that the future state workflows cannot or should not be modified. Additional and more in-depth review of the processes is likely to occur in preparation for and during the implementation of the selected LIMS.

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Table of Contents

1. INTRODUCTION	14
2. GLOSSARY AND ACRONYMS	15
2.1. ACRONYMS	15
2.2. WORKFLOW SHAPES	19
2.3. TERMINOLOGY	21
3. OVERVIEW	22
3.1. ASSUMPTIONS	25
3.2. ENABLING LIMS FUNCTIONALITY	25
4. CHAIN OF CUSTODY (COC) TRANSFERS	27
5. RECEIVE AND PROCESS ME CASES	28
5.1. CASE INTAKE	29
5.1.1. Case Assignment	30
5.1.2. Jurisdictional and Non-Jurisdictional Case Intake	31
5.1.3. Jurisdiction Terminated Case Intake	32
5.2. BODY, EVIDENCE AND PROPERTY HANDLING	34
5.2.1. Body Intake	34
5.2.2. Item Handling	36
5.3. REPORTS	38
5.3.1. Morning Mortality Report	38
5.3.2. Critical Case Review	40
6. MORGUE OPERATIONS	42
6.1. CASE ASSIGNMENT	42
6.2. AUTOPSY AND SPECIMEN COLLECTION	43
6.3. AUTOPSY EVIDENCE COLLECTION	45
6.4. COMPLETED EXAM	48
7. HUMAN ID	51
7.1. CASE ASSIGNMENTS	51
7.2. FINGERPRINT IDENTIFICATION	51
7.3. FORENSIC ANTHROPOLOGY	55

7.3.1.	Examination of Skeletal Remains	55
7.3.2.	Examination of the Larynx	62
7.3.3.	Radiographic Comparisons	64
7.3.4.	Examination of Animal Bones	66
7.3.5.	Field Recovery Work	69
7.3.6.	Statistical Reporting	69
7.4.	DNA ANALYSIS	69
7.5.	FORENSIC ODONTOLOGY	70
7.6.	ID CERTIFICATES	74
8.	HISTOLOGY	76
8.1.	PRODUCTION OF SLIDES AND BLOCKS	76
8.2.	REQUESTS FROM THE DISTRICT ATTORNEY (DA) AND OTHERS	80
9.	RECEIVE AND TRANSFER EVIDENCE	83
10.	ANALYZE AND EXAMINE EVIDENCE	85
10.1.	CRIME LABORATORY	85
10.1.1.	Trace Evidence	85
10.1.1.1.	Evidence Receiving	87
10.1.1.2.	Trace Evidence Recovery	88
10.1.1.3.	Gunshot Residue (GSR) Testing and Analysis	92
10.1.1.4.	Hair Examination	94
10.1.2.	Forensic Biology	97
10.1.2.1.	Case Assignment	97
10.1.2.2.	Serology	100
10.1.2.3.	DNA Testing	105
10.1.2.4.	Reporting, Technical and Administrative Reviews	116
10.1.2.5.	Blood Cards	118
10.1.3.	Latent Fingerprints	118
10.1.3.1.	Case Assignments	119
10.1.3.2.	Latent Fingerprint Examinations	119
10.1.4.	Firearms and Tool Marks	128
10.1.4.1.	Case Assignments	128
10.1.4.2.	Firearms Safety	129
10.1.4.3.	Firearms and Tool Mark Examination	129
10.1.4.4.	Verification and Reporting	134
10.1.4.5.	Reference Collections and Libraries	135

10-1-5	Forensic Photography	136
10-1-5-1	Case Assignment	137
10-1-5-2	Photograph Retrieval	137
10-1-5-3	Photographic Storage	142
10-1-6	Crime Lab Reviews, and Report Distribution	143
10-1-6-1	Technical and Administrative Reviews	144
10-1-6-2	Reporting	149
10-1-6-3	Release of Information Prior to Report	151
10-2	DRUG CHEMISTRY AND TOXICOLOGY LABORATORY	153
10-2-1	Drug Chemistry	153
10-2-1-1	Evidence Transfers	156
10-2-1-2	Testing	157
10-2-1-3	Technical and Administrative Reviews	163
10-2-1-4	Report Distribution	166
10-2-2	Toxicology	166
10-2-2-1	Receiving Evidence	168
10-2-2-2	Testing	173
10-2-2-3	Technical and Administrative Reviews	183
10-2-2-4	Reporting	186
10-2-2-5	Returning Evidence to the Evidence Custodian	188
10-3	QUALITY ASSURANCE (QA) AND QUALITY CONTROL (QC)	188
10-3-1-1	Reagents, Controls, Buffers and Calibrators	189
10-3-1-2	Instrument Maintenance and Environmental Controls	189
10-3-1-3	Control Charting	189
10-3-1-4	Technical Procedure Departure Form	189
11	DETERMINE AND REPORT CAUSE AND MANNER OF DEATH	190
11-1	PREPARATION OF AUTOPSY REPORT	190
11-2	DEATH CERTIFICATES	193
12	RELEASE BODY	195
13	BILLING CUSTOMERS	198
13-1	AGENCY SERVICE REQUEST BILLING	198
13-2	NON-JURISDICTIONAL AUTOPSY BILLING	200
13-3	NON-JURISDICTIONAL TOXICOLOGY BILLING	201
13-4	CHECK RECEIVING AND DEPOSITS	203
14	RETURN EVIDENCE	204

15·	ADMINISTRATION DEPARTMENT.....	206
15.1·	MEDICAL ADMINISTRATION.....	206
15.1.1·	Cremation Permits.....	206
15.1.2·	Tarrant County Medical Examiner's Annual Report.....	210
15.1.3·	Public Health Reportable Diseases or Conditions.....	210
15.2·	RECORDS ADMINISTRATION.....	210
16·	BUSINESS OFFICE.....	211
17·	INTERACTIONS WITH TARRANT COUNTY DA'S OFFICE	213
17.1·	REQUESTS FOR REPORTS	213
17.2·	REQUESTS FOR INFORMATION.....	214
18·	REQUESTS FOR TISSUE PROCUREMENT.....	216

Table of Figures

Figure 1 TCME - Overview of Operations.....	25
Figure 2 TCME - Chain of Custody Transfer	28
Figure 3 Forensic Death Investigations - Case Intake Assignment.....	30
Figure 4 Forensic Death Investigations - Jurisdictional and Non-Jurisdictional Case Intake.....	31
Figure 5 Forensic Death Investigations - Jurisdiction Terminated Case Intake.....	33
Figure 6 Forensic Death Investigations - Morgue Body Intake	36
Figure 7 Forensic Death Investigations - Item Handling	38
Figure 8 Forensic Death Investigations - Daily Morning Mortality Report Generation	40
Figure 9 Forensic Death Investigations - Critical Case Review Report Generation	41
Figure 10 Medical Examiner - Autopsy Schedule Generation	43
Figure 11 Medical Examiner - Autopsy and Specimen Collection	45
Figure 12 Medical Examiner - Autopsy Evidence Collection	48
Figure 13 Medical Examiner - Completed Exam	49
Figure 14 Autopsy Technician - Completed Exam	51
Figure 15 Human ID - Fingerprint Collection and Records Search.....	54
Figure 16 Human ID - Fingerprint Analysis.....	55
Figure 17 Human ID - Forensic Anthropology - Skeletal Examination - Retrieval.....	57
Figure 18 Human ID - Forensic Anthropology - Skeletal Examination - Examination.....	60
Figure 19 Human ID - Forensic Anthropology - Skeletal Examination - Example of Homunculus.....	60
Figure 20 Human ID - Forensic Anthropology - Skeletal Examination - Review and Reporting	62
Figure 21 Human ID - Forensic Anthropology - Larynx	63
Figure 22 Human ID - Forensic Anthropology - Radiographic Comparisons	65
Figure 23 Human ID - Forensic Anthropology - Animal Remains	68
Figure 24 Human ID - DNA Send-Outs	70

Figure 25 Human ID - Forensic Odontology.....	74
Figure 26 Human ID - ID Certificates.....	76
Figure 27 Histology - Block and Slide Preparation	78
Figure 28 Histology - Send Outs.....	80
Figure 29 Histology - Requests from DA.....	81
Figure 30 Histology - Requests from DA - Prepare Slides.....	83
Figure 31 Evidence Operations - Evidence Intake.....	84
Figure 32 Trace Evidence - Evidence Receiving	87
Figure 33 Trace Evidence - Morgue Trace Evidence Recovery	89
Figure 34 Trace Evidence - Vehicle Trace Evidence Recovery.....	91
Figure 35 Trace Evidence - GSR Testing	93
Figure 36 Trace Evidence - GSR Analysis.....	94
Figure 37 Trace Evidence - Hair Examination.....	97
Figure 38 Forensic Biology - Case Assignment.....	98
Figure 39 Forensic Biology - Sexual Assault Kit Submissions.....	100
Figure 40 Forensic Biology - Serology - Sexual Assault Kit - Semen.....	101
Figure 41 Forensic Biology - Serology - Blood on Clothing.....	105
Figure 42 Forensic Biology - Serology - Sexual Assault Kit - End of Test	105
Figure 43 Forensic Biology - DNA - Extraction.....	108
Figure 44 Forensic Biology - DNA - Quantitation.....	109
Figure 45 Forensic Biology - DNA - Amplification	111
Figure 46 Forensic Biology - DNA - Electrophoresis	113
Figure 47 Forensic Biology - DNA - Analysis	116
Figure 48 Forensic Biology - DNA - Reporting, Reviews and Evidence Disposition.....	118
Figure 49 Forensic Biology - Blood Cards.....	118
Figure 50 Latent Fingerprints - Packaging Documentation.....	120

Figure 51 Latent Fingerprints - Processing.....	123
Figure 52 Latent Fingerprints - Fingerprint Analysis.....	126
Figure 53 Latent Fingerprints - Report and Verification.....	128
Figure 54 Firearms and Tool Marks - Packaging Examination.....	131
Figure 55 Firearms and Tool Marks - Examination.....	133
Figure 56 Firearms and Tool Marks - Verification and Report.....	135
Figure 57 Forensic Photography - Forensic Death Investigation Photograph Retrieval.....	138
Figure 58 Forensic Photography - Morgue Photograph Retrieval.....	140
Figure 59 Forensic Photography - Photograph Archiving and Storage.....	143
Figure 60 Crime Laboratory - Technical Review.....	145
Figure 61 Crime Laboratory - Administrative Review.....	148
Figure 62 Crime Laboratory - Reporting.....	150
Figure 63 Crime Laboratory - Release of Information Prior to Report.....	152
Figure 64 Drug Chemistry - Overview.....	156
Figure 65 Drug Chemistry - Receive Evidence.....	156
Figure 66 Drug Chemistry - Retrieve Evidence from Laboratory Storage.....	157
Figure 67 Drug Chemistry - Inventory Evidence.....	159
Figure 68 Drug Chemistry - Determine Weights.....	161
Figure 69 Drug Chemistry - Test Procedures.....	162
Figure 70 Drug Chemistry - Prepare Report.....	162
Figure 71 Drug Chemistry - Technical Reviews.....	165
Figure 72 Drug Chemistry - Administrative Reviews.....	165
Figure 73 Drug Chemistry - Report Distribution.....	166
Figure 74 Toxicology - Evidence Retrieval - ME Cases.....	170
Figure 75 Toxicology - Evidence Retrieval - non-ME Cases.....	172
Figure 76 Toxicology - Send-Outs.....	172

Figure 77 Toxicology - Specimen Analysis.....	175
Figure 78 Toxicology - Batch Technical Review.....	176
Figure 79 Toxicology - Drug Screening	177
Figure 80 Toxicology - Drug Quantitation.....	178
Figure 81 Toxicology - DWI Testing.....	181
Figure 82 Toxicology - Alcohol Testing for ME Cases.....	182
Figure 83 Toxicology - Case Technical Reviews	183
Figure 84 Toxicology - Case Administrative Reviews.....	185
Figure 85 Toxicology - Reporting.....	187
Figure 86 Toxicology - Evidence Return	188
Figure 87 Medical Examiner - Prepare Report	191
Figure 88 Administration - Autopsy Report Transcription	192
Figure 89 Administration - Death Certificate Creation and Amendment	195
Figure 90 Forensic Death Investigations - Morgue Body Release.....	197
Figure 91 Forensic Death Investigations - Family Property/Protocol Letter Process	197
Figure 92 Business Office - Agency Service Request Billing.....	199
Figure 93 Business Office - Non-Jurisdictional Autopsy Billing.....	200
Figure 94 Business Office - Non-Jurisdictional Toxicology Billing.....	202
Figure 95 Business Office - Check Receipt and Deposit	203
Figure 96 Evidence Operations - Return of Evidence.....	205
Figure 97 Administration - Cremation Permits - Part 1.....	209
Figure 98 Administration - Cremation Permits - Part 2	210
Figure 99 Business Office - County Burial Approval.....	212
Figure 100 Request for Reports from DA's Office	214
Figure 101 Subpoenas for Records for DWI Cases	216

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1. INTRODUCTION

This document provides graphical representations depicting conceptualized future state (To-Be) processes that would leverage a new laboratory informatics solution to Tarrant County Medical Examiner (TCME) tasks. Diagrams include who would perform the tasks, the relative order of the tasks, how the tasks would be synchronized, what information would flow to support the tasks, how the information would flow, and how tasks would be tracked. This document, combined with the Vendor Selection Requirements, provides a framework for TCME stakeholders to select a laboratory informatics solution that will meet the needs of the entire TCME. The document also provides a basis for a vendor to understand the organizations and activities that their product needs to support so that they can propose a solution most appropriate for TCME.

It is important to understand that the workflows in this document are not intended to represent the final processes that will be implemented by TCME. TCME stakeholders do not require finalized workflows to select a vendor and product, and vendors do not need finalized workflows to offer an optimal solution. Instead these workflows represent an initial working illustration of how TCME processes would flow upon implementation of the new laboratory informatics solution. LabAnswer recommends that TCME use these workflows as a starting point for optimizing its processes over the next several months and then to finalize the workflows after selection of an informatics solution and the vendor(s) that will support that solution.

The processes depicted and described in this document are 1) built on an understanding of current workflows (As-Is) as described in *Current Operations (As-Is): LIMS Selection - Medical Examiner*, which was previously delivered to TCME, and 2) from interviews with and contributions from the following individuals:

- Administration
- Business Office
- Chief Medical Examiner
- Crime Laboratory Director
- Carol Lawson, Christie Smith, Kristen Casteleirio and Ayman Itani
- Tracye Poirier
- Nizam Peerwani
- Susan Howe

- Crime and Toxicology Laboratory • Deatra Keele
Secretary
- Drug Chemistry • John Harris and Sara Skiles
- Drug Chemistry and Toxicology Chief • Robert Johnson
- Firearms and Tool Marks • Jamie Becker
- Forensic Biology • Heather Kramer and Kira Tillman
- Forensic Death Investigators • John Briggs and Michael Floyd
- Forensic Photography • Larry Reynolds
- Histology • Mike Smith
- Human ID • Dana Austin, Roger Metcalf and William Walker
- Latent Fingerprints • Bill Walker
- Morgue and Evidence Operations • Traci Wilson
- Tarrant County District Attorney's Office • Naomi Daniel, Ashley Fourt, Ronnie Dale Smith and Debra Windsor
- Toxicology • Connie Lewis and Aria McCall
- Trace Evidence • Vicki Hall and Anne Koettel

This document is furnished as the deliverable "Prepare and publish "To-Be" Document including "To-Be" process diagrams detailing current operations and business rules" - under contract 2015-099 issued by Tarrant County.

2. GLOSSARY AND ACRONYMS

2.1. ACRONYMS

The following table provides a list of acronyms relevant to this document:

Acronym	Definition
ABN	Acid, Base, Neutral Screen

Acronym	Definition
AFIS	Automated Fingerprint Identification System
ANAB	ANSI-ASQ National Accreditation Board
ASCLD/LAB	American Society of Crime Laboratory Directors Laboratory Accreditation Board
CCR	Critical Case Review
CoC	Chain of Custody
CoD	Cause of Death
CODIS	Combined DNA Index System
CME	Chief Medical Examiner
CRYPT	Current TCME LIMS
DA	District Attorney
DIMS	Digital Information Management System
DNA	Deoxyribonucleic acid
DWI	Driving while Intoxicated
EDR	Electronic Death Registration
EDX	Energy Dispersive X-ray Spectroscopy
ELISA	Enzyme-Linked Immunosorbent Assay
ELN	Electronic Laboratory Notebook
FATM	Firearms and Tool Marks
FBI	Federal Bureau of Investigation
FDI	Forensic Death Investigator
FT-IR	Fourier Transform Infrared Spectroscopy
GC/MSD	Gas Chromatography with Mass Spectrometric Detection

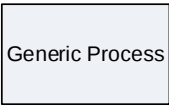
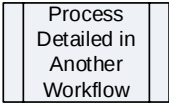
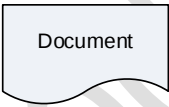
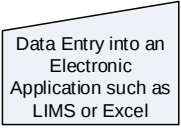
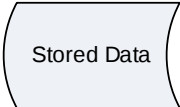
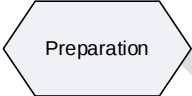
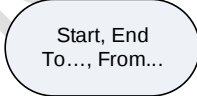
Acronym	Definition
<i>GSR</i>	<i>Gunshot Residue</i>
<i>HGD</i>	<i>Hypergeometric Distribution</i>
<i>ID</i>	<i>Identification</i>
<i>LEA</i>	<i>Law Enforcement Agency</i>
<i>LC/MS</i>	<i>Liquid Chromatography with Mass Spectrometric Detection</i>
<i>LC/UV</i>	<i>Liquid Chromatography with Ultraviolet Detection</i>
<i>LIMS</i>	<i>Laboratory Information Management System</i>
<i>ME</i>	<i>Medical Examiner</i>
<i>MoD</i>	<i>Manner of Death</i>
<i>NAME</i>	<i>National Association of Medical Examiners</i>
<i>NOK</i>	<i>Next of Kin</i>
<i>PCR</i>	<i>Polymerase Chain Reaction</i>
<i>PMI</i>	<i>Postmortem Interval</i>
<i>QA</i>	<i>Quality Assurance</i>
<i>QC</i>	<i>Quality Control</i>
<i>rfu</i>	<i>Relative Fluorescence Units</i>
<i>SANE</i>	<i>Sexual Assault Nurse Examiner</i>
<i>SD</i>	<i>Secure Digital</i>
<i>SDMS</i>	<i>Scientific Data Management System</i>
<i>SEM</i>	<i>Scanning Electron Microscopy</i>
<i>TCME</i>	<i>Tarrant County Medical Examiner</i>
<i>TER</i>	<i>Texas Electronic Registrar</i>

Acronym	Definition
UNT	University of North Texas

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2.2. WORKFLOW SHAPES

The following four tables define the workflow shapes used within this document:

Visio Workflow Shapes		
		
		
		

Microsoft Symbols					
	Outlook (E-mail)		Excel		Word
	Notepad				

<i>Electronic Shapes</i>					
	<i>Opalrad</i>		<i>Tablet</i>		<i>Desktop Computer</i>
	<i>Instrument or Application Computer</i>		<i>Network Storage</i>		<i>AFIS</i>
	<i>Electronic Data Transfer</i>		<i>Scan Barcode Label</i>		<i>Text Message</i>
	<i>Dropbox</i>		<i>Web Interface</i>		<i>Digital Photo Media</i>
	<i>QuickBooks</i>		<i>PDF Document</i>		

Other Shapes					
	Manual Record		Barcode Labels		Handwritten Label
	US Mail		Telephone Call		Open Package
	Face to Face Meeting		Transport Items		Evidence Package
	Open Package		Fax		Print
	Scan Document		Photograph		Copy Document
	Secure Storage		96-well Plate		Stereo or Light Microscopy
	Balance		Scanning Electron Microscope		Fusion Dictation System
	Body		Verification		Travel by Car

2.3. TERMINOLOGY

The following terms are used interchangeably in this document:

- Sample, specimen, evidence
- Medical Examiner (ME), Pathologist

Laboratory informatics solutions include numerous technologies, e.g.: Laboratory Information Management Systems (LIMS), Electronic Laboratory Notebooks (ELN) and Scientific Data Management Systems (SDMS). A main differentiator between LIMS and ELN is that the former is designed as a solution for managing structured data and the latter is designed as a solution for managing unstructured data. The SDMS component is designed to manage documents, e.g., reports; instrument outputs such as chromatograms and spectra; and images. Many vendors offer two or more of these technologies bundled under one system. Some of the vendors began as LIMS vendors and then acquired or built ELN and SDMS capability; others began as ELN vendors and then acquired or built LIMS and SDMS capability, etc. The key

point is that the boundaries have blurred as product features encroach on the strengths of other products and vendors. For the purpose of this document, the symbol  is used as an umbrella that globally represents the laboratory information management system - which may contain components of each type of system - that may be acquired by and implemented at TCME. However, the text within the boxes will differentiate if SDMS or ELN technologies are appropriate.

3. OVERVIEW

TCME is a Department of Tarrant County government that contracts to provide regional ME services to Tarrant, Denton, Johnson, and Parker counties, representing a core population of approximately three million citizens. TCME provides additional autopsy services on a fee-for-service basis to multiple clients outside of the ME District (referred to as non-jurisdictional cases). ME services are supported by a staff of Medical Investigators, a Histology Laboratory, and a Human Identification Laboratory, including Forensic Odontology, Forensic Anthropology, and Fingerprint components. TCME also operates a multi-service Crime Laboratory and Toxicology Laboratory that provide analytical and examination services to the ME, Law Enforcement Agencies (LEA), District Attorney's (DA) offices, and the defense bar in approximately 30 counties throughout North Central Texas and the rest of the United States. Disciplines of the two laboratories include Forensic Biology, Trace Evidence, Latent Prints, Firearms and Tool Marks, Toxicology, and Drug Chemistry.

A staff of 72 performs the work listed in the following table:

ME Section	Number of Cases Processed per Year
Pathology	~3,300 autopsies
Human ID	~560 ID cases
Medical Investigations	~11,000 reported; ~1,400 scenes investigated
Histology	~2,500 cases
Photography	~2,000

<i>Laboratory Sections</i>	<i>Per Year</i>
<i>Number of Samples</i>	<i>~15,000</i>
<i>Number of Analyses</i>	<i>~50,000</i>

TCME is accredited by the National Association of Medical Examiners (NAME), and the laboratories are accredited by ANAB International including compliance to ISO/IEC 17025 and ANAB AR3028 and the American Society of Crime Laboratory Directors Laboratory Accreditation Board (ASCLD/LAB) and by the Texas Forensic Science Commission.

The following figure provides an overview of TCME operations and lists the document sections in which each activity is discussed:

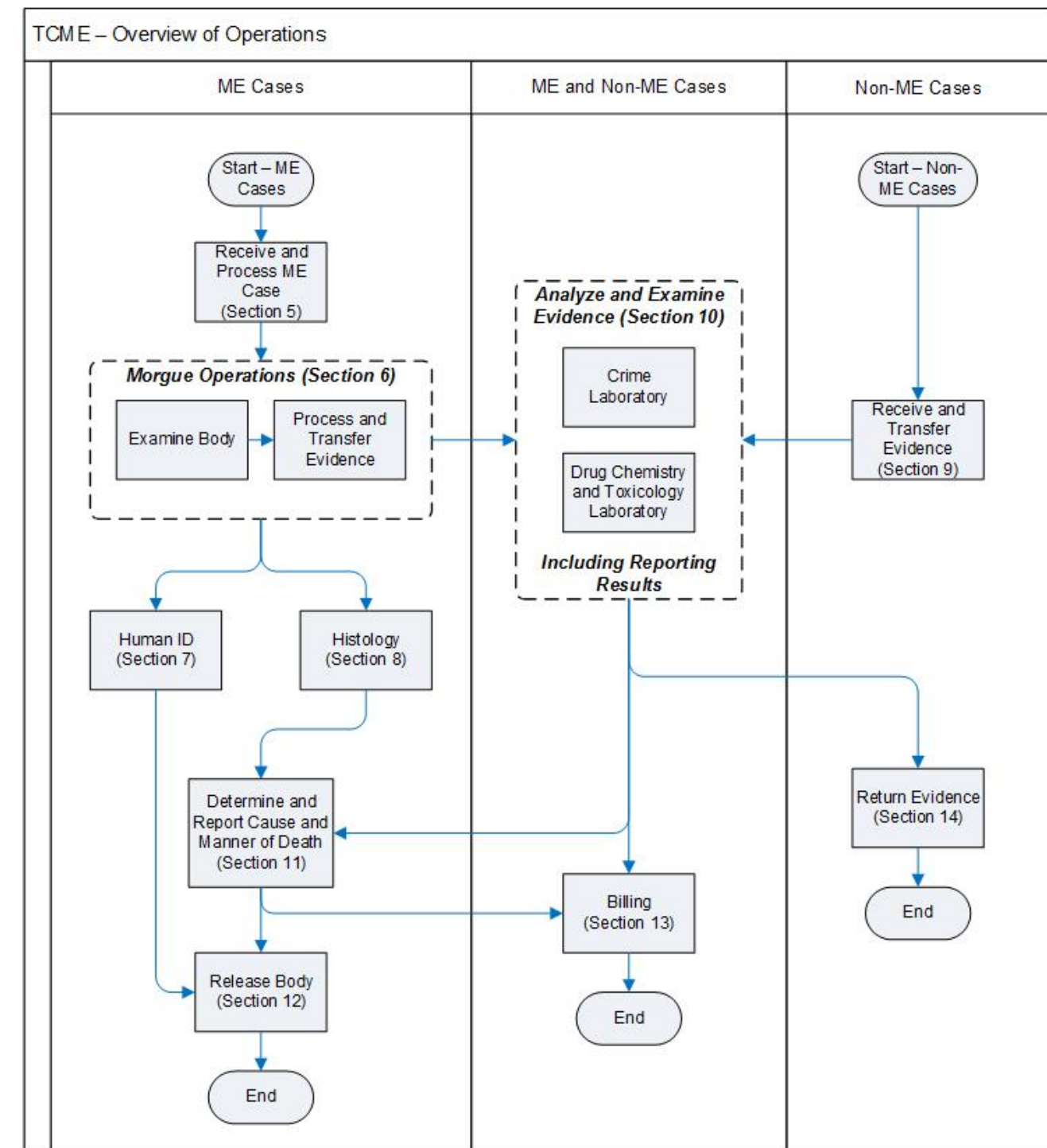


Figure 1 TCME – Overview of Operations

In addition to the processes depicted in Figure 1, this document describes the following support processes:

- Administration Department (See Section 15)
- Business Office (See Section 16)
- Interactions with Tarrant County DA's Office (See Section 17)
- Requests for Tissue Procurement (See Section 18)

3.1. ASSUMPTIONS

Technology upgrades to support the To-Be workflows, include:

- Barcode scanners – barcode scanners would be available at each location where sample and other identifiers will be entered into the LIMS and instruments
- Label printers – label printers would be available near every location where labels are required to identify LIMS-managed items
- Instrument integration – LIMS would be integrated with all instruments capable of being integrated
- Mobile device hardware – mobile devices, especially tablet PCs, configured for LIMS access would be available to all users who need them

3.2. ENABLING LIMS FUNCTIONALITY

Enabling functionality refers to LIMS functions that enable significant savings of effort. Typically available LIMS functions include:

- Query functionality – provides the ability to extract data from all fields in the LIMS database by allowing the user to specify fields and to set appropriate filters to select specific records
- Custody/location tracking – provides a legal, defensible record when a tracked item is exchanged from one user to another or moved from one location to another
- Case management – provides the capability:

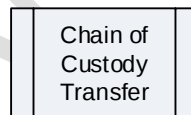
- to associate evidence that has been collected or submitted at either the same time or at different times
 - to retrieve all data related to a case
- *Workflow management - provides the capability to determine where samples are in the workflow stream, e.g., preparation, testing, peer review.*
- *Electronic worksheets - improve accuracy and reduce effort by:*
 - *Eliminating the need to reenter results and sample metadata*
 - *Retrieving and displaying results and sample metadata on graphical user interfaces upon entry - by typing or barcode scan - of applicable identifiers*
 - *Retrieving and displaying data upon execution of a query*
- *Electronic records, including, but not limited to CoCs, worksheets, reports, and case files - reduce the need to store paper copies of these documents thereby reducing the possibility of loss in case of fire, tornados or other catastrophes.*
- *Electronic signatures - eliminate the need to print reports solely for the purpose of applying a signature*
- *Inventory management - manages the life-cycles of many different types of items:*
 - *Sample packaging*
 - *Samples*
 - *Reagents and standards*
 - *Supplies*
 - *Item properties such as expiration date, quarantined, released, opened*
- *Alerts - automatically notify others of pending activities, e.g., service requests, technical reviews, administrative reviews, and the availability of results*
- *Integration - enables the LIMS to communicate with other information systems to:*
 - *Automatically send E-mail*
 - *Transfer files to define samples and tests directly to instruments*
 - *Transfer result files from instruments to the LIMS database*
 - *Transfer files directly to other databases and applications*

- *Hierarchical storage management - allows defining and managing items in complex, detailed storage including:*
 - *Definition of cabinets with shelves and freezers with shelves and racks*
 - *Definition of boxes that contain samples and can be moved from one storage location to another*
 - *Definition of storage conditions - allows matching the required condition(s) of a reagent with the conditions of a location. For example, users can be warned before placing a liquid sample requiring refrigeration (4 °C) in a freezer (-20 °C).*
- *Equipment Management - manages information about and status of equipment:*
 - *Status: Available, Waiting Maintenance, Out of Calibration*
 - *Information: Required maintenance, maintenance schedule, sample throughput*

4. CHAIN OF CUSTODY (COC) TRANSFERS

Chain of custody (CoC) transfers will be managed entirely within the LIMS, thereby eliminating the need to retain and file multiple copies of paper chains of custody.

References to CoC transfers will be found throughout this document and in the workflow figures. These CoC transfers are indicated by the following shape in the figures:



The following figure illustrates the CoC transfer process referred to by this shape:

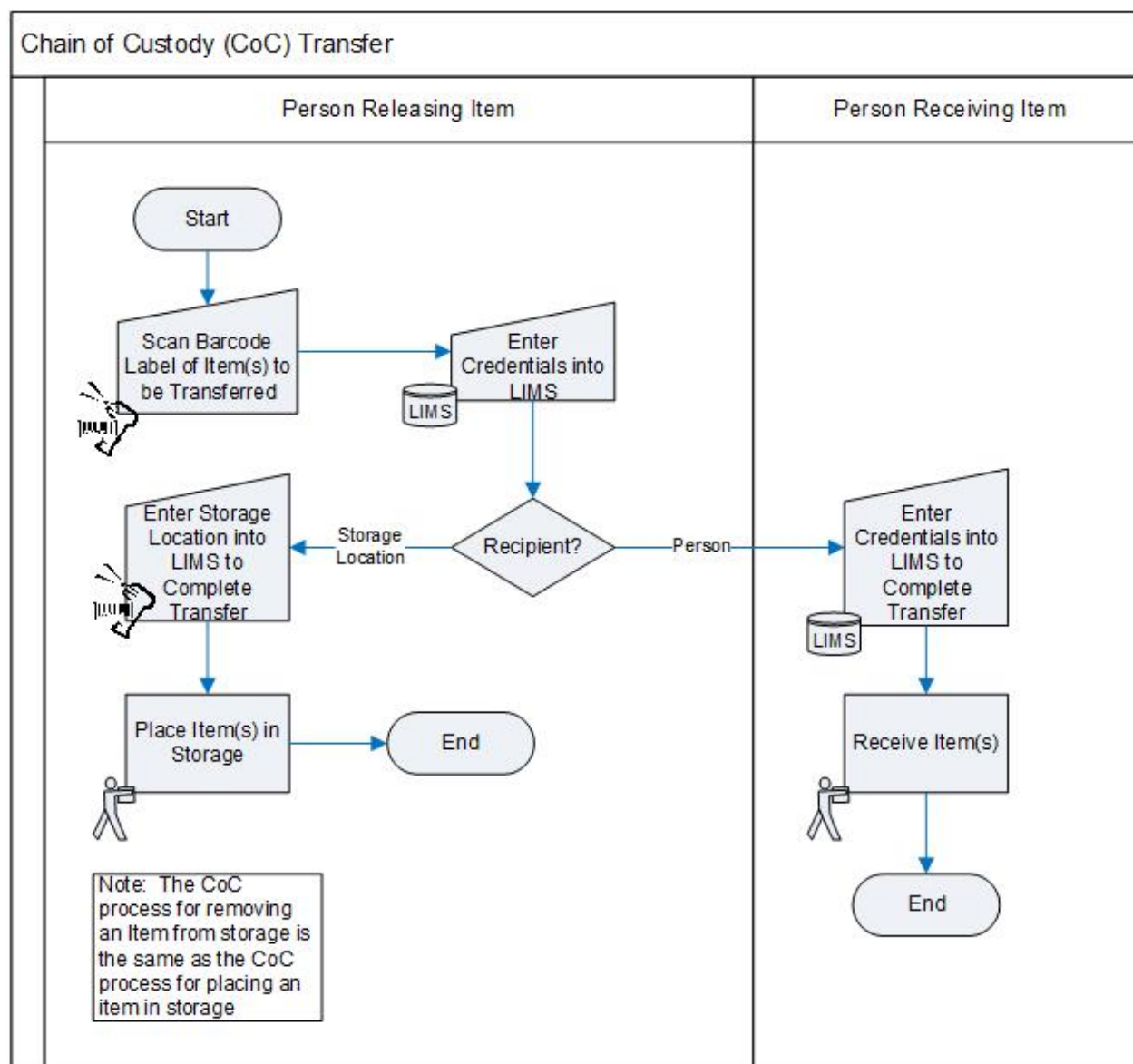


Figure 2 TCME - Chain of Custody Transfer

5. RECEIVE AND PROCESS ME CASES

One of the primary purposes of the TCME is to conduct inquests or investigations into the cause and manner of deaths occurring within its jurisdiction.

The Forensic Death Investigation (FDI) Section is responsible for initiating ME cases and receiving bodies and participating in the intake of bodies with the Morgue Section. The FDI's also receive evidence, property and medications from the decedent and prepare reports for the ME's use during the Morning Mortality Report and Critical Case Review (CCR).

The TCME investigates three types of cases:

- Cases occurring within TCME jurisdiction
- Non-Jurisdictional Cases referred to TCME by a Justice of the Peace of a county without a Jurisdictional ME's Office. The most significant difference between jurisdictional cases and non-jurisdictional cases is that for the latter, the scene investigation is typically conducted by law enforcement local to the case.
- Jurisdiction Terminated Cases - A jurisdiction terminated case refers to when an unobserved death occurs and a licensed physician is willing (or may be willing) to sign the death certificate. The FDI will initiate an investigation to ensure that the unobserved death is eligible to have the ME's jurisdiction waived.

5.1. CASE INTAKE

The introduction of a new LIMS would introduce the following changes to the case intake workflows:

- Case assignments would be made in the LIMS
- The LIMS would notify FDIs of their assignments
- The LIMS would replace CRYPT for recording case information
- LIMS-integrated tablet PCs would enable FDIs to electronically record field data and eliminate the need to transcribe this data upon return to TCME
- If a second FDI needs to follow up, they would access case information in LIMS

5.1.1. Case Assignment

Case assignments would be made by the FDI Supervisor or the On-Call Investigator as shown in the following conceptualized future state workflow:

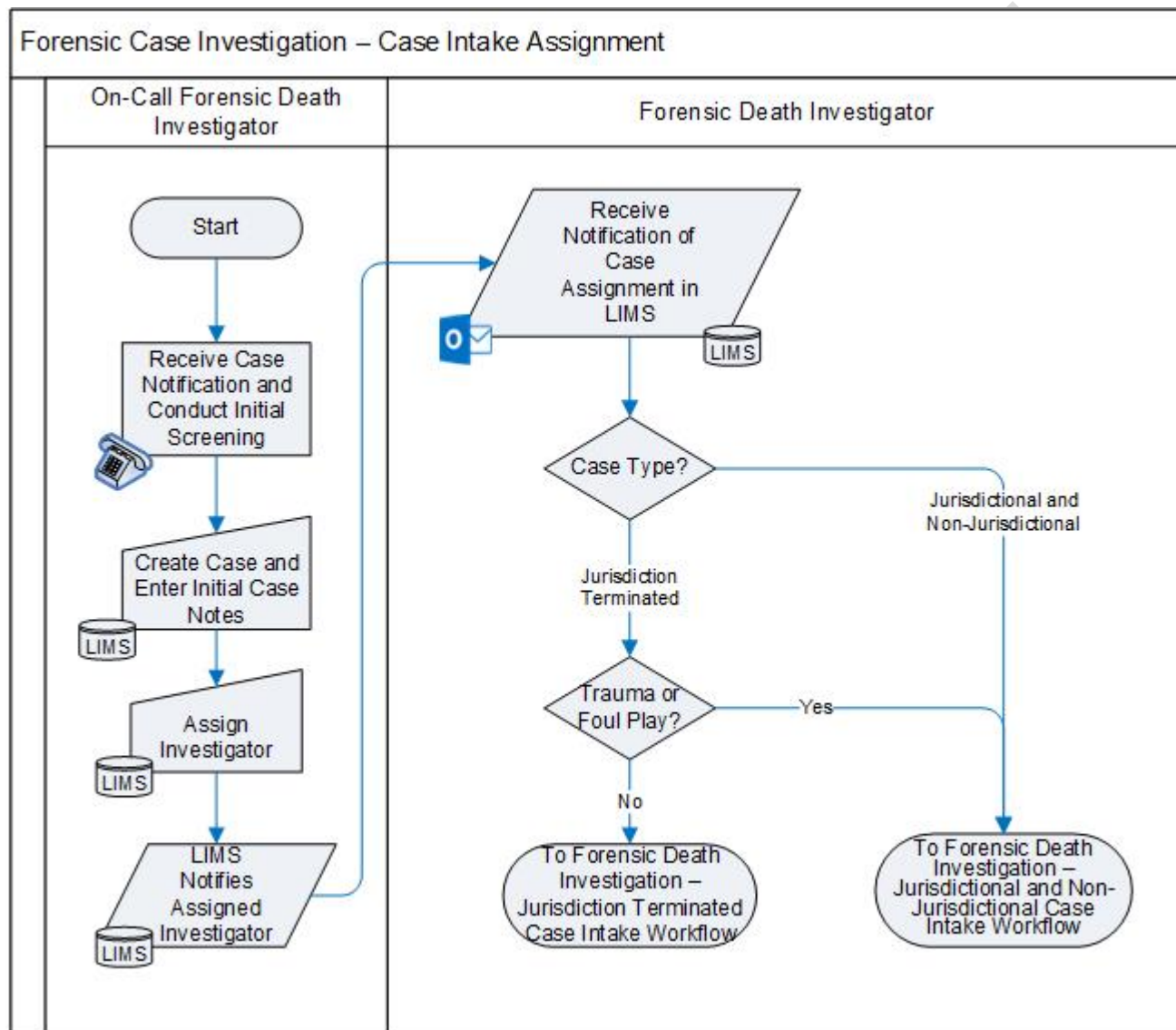


Figure 3 Forensic Death Investigations – Case Intake Assignment

In some cases, especially at night, the On-call Investigator may assign the case to him/herself.

5.1.2. Jurisdictional and Non-Jurisdictional Case Intake

The following figure illustrates a conceptualized future state jurisdictional and non-jurisdictional case intake workflow:

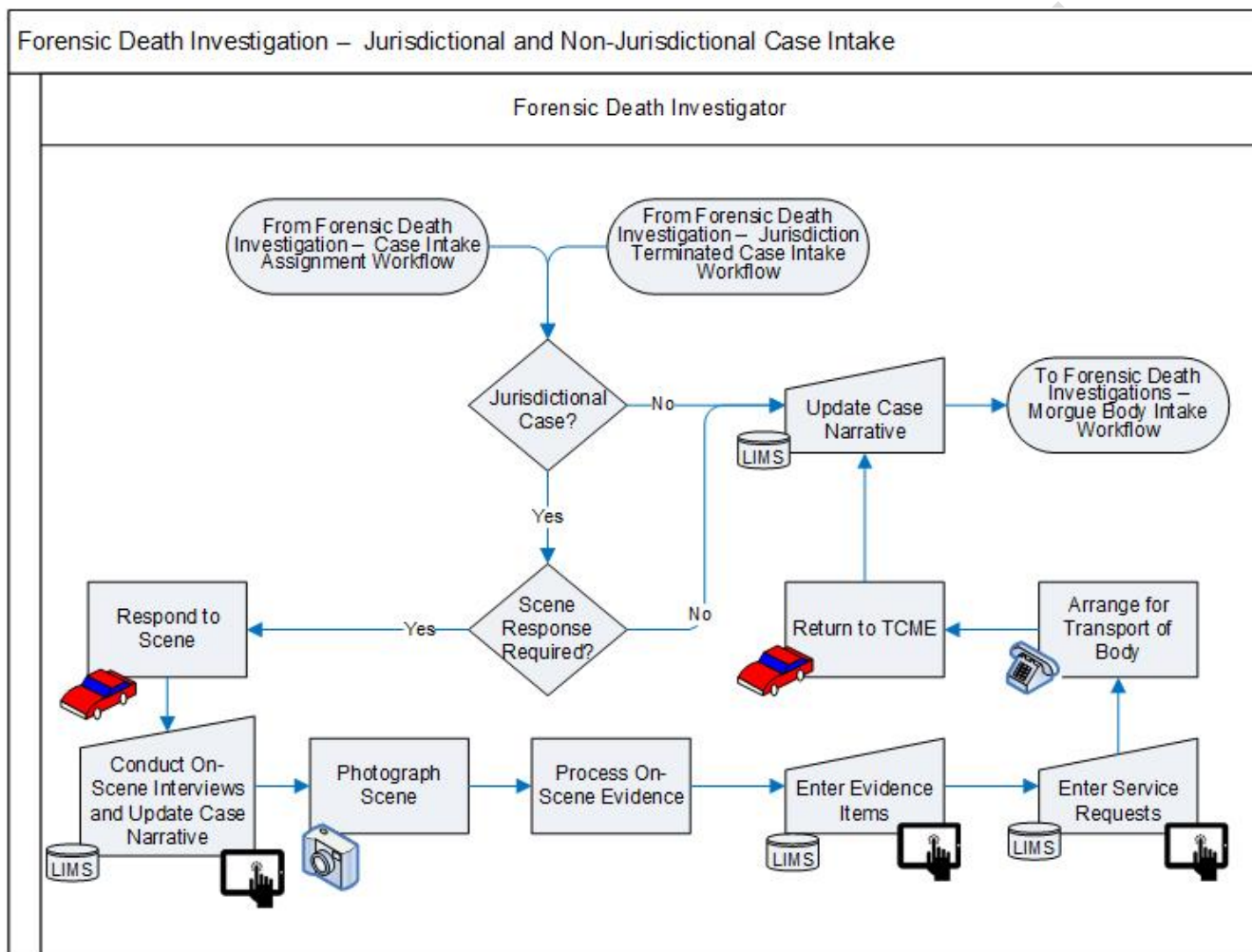


Figure 4 Forensic Death Investigations – Jurisdictional and Non-Jurisdictional Case Intake

5.1.3. Jurisdiction Terminated Case Intake

The following figure illustrates a conceptualized future state jurisdiction terminated case intake workflow:

LIMS REP Updated

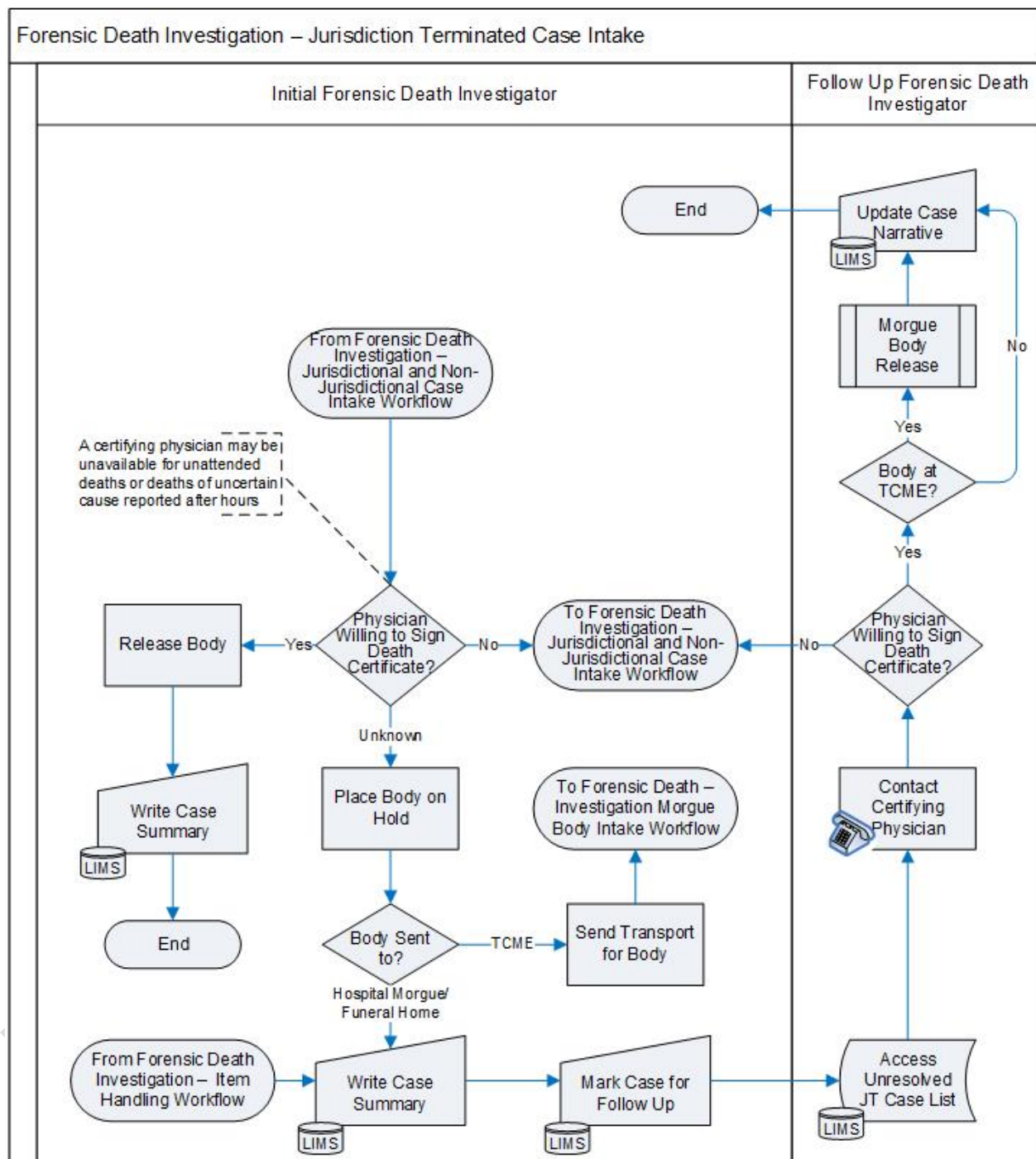


Figure 5 Forensic Death Investigations – Jurisdiction Terminated Case Intake

5.2. BODY, EVIDENCE AND PROPERTY HANDLING

The FDI shares the activity of receiving and releasing bodies from the TCME with the morgue staff. As the FDI is always present at TCME, the responsibility for receiving and releasing a body often falls under their purview.

FDIs also receive evidence, property and medications from the decedent. These must be packaged, accounted for and stored.

5.2.1. Body Intake

The introduction of a new LIMS would introduce the following changes to the body intake workflows:

- All comments regarding the condition of the body and recovered evidence and property would be recorded in the LIMS
- Barcode labels for body tags would be printed from LIMS
- Service Requests for trace evidence recovery would be entered into the LIMS
- The morgue logbook would be eliminated
- The release form would be generated in the LIMS and the driver would sign a tablet PC to accept custody of the body

The following figure illustrates a conceptualized future state body intake workflow:

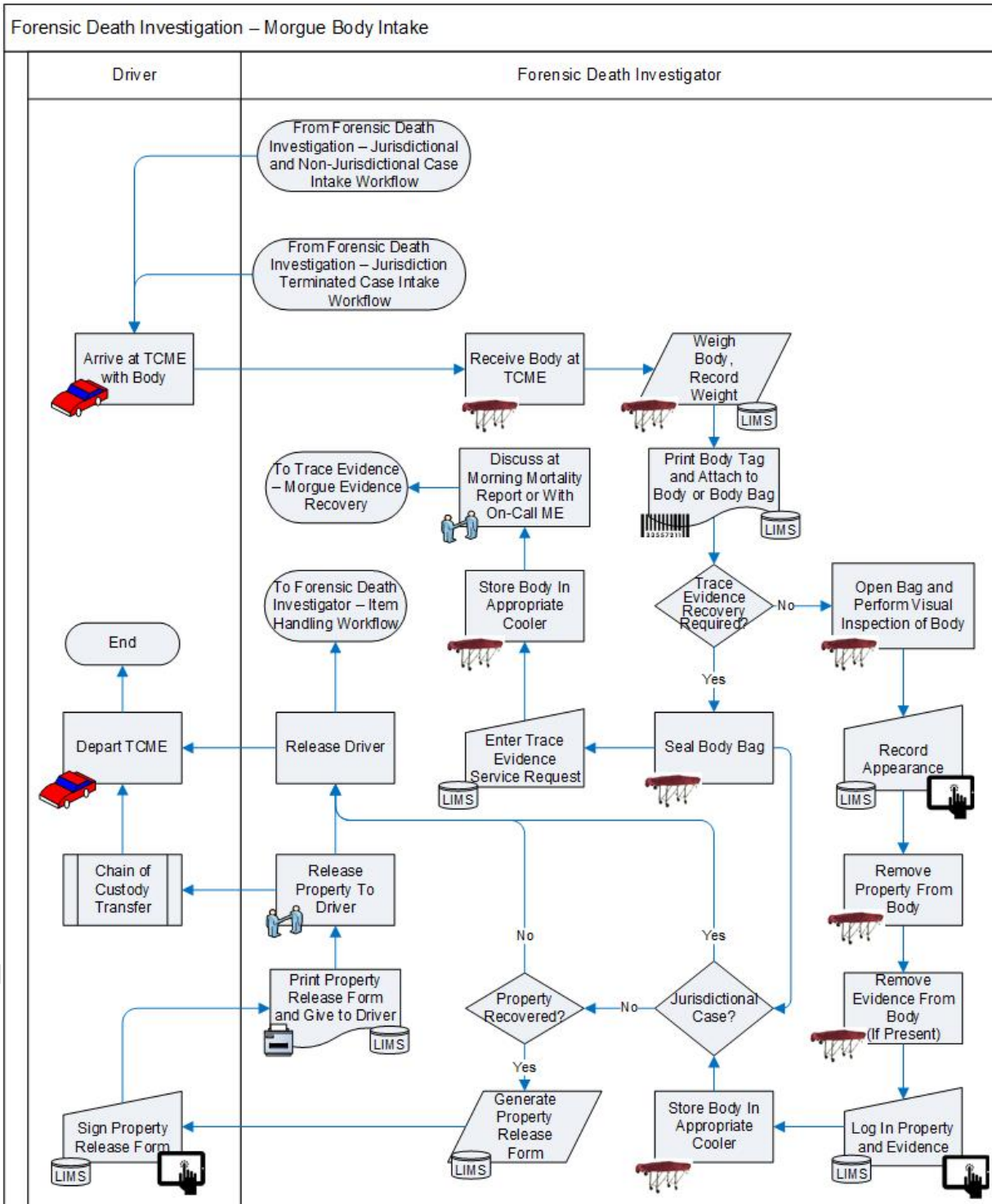


Figure 6 Forensic Death Investigations - Morgue Body Intake

5.2.2 Item Handling

The introduction of a new LIMS would introduce the following changes to the item handling workflow:

- All evidence, property, medications and photographs would be logged into the LIMS instead of CRYPT*
- Barcode labels would be printed from the LIMS*
- An electronic case file would be created in the LIMS, if not already created, to replace the hard copy case file*
- Reports would be written in the LIMS rather than using a Word template*

The following figure illustrates a conceptualized future state workflow for handling items:

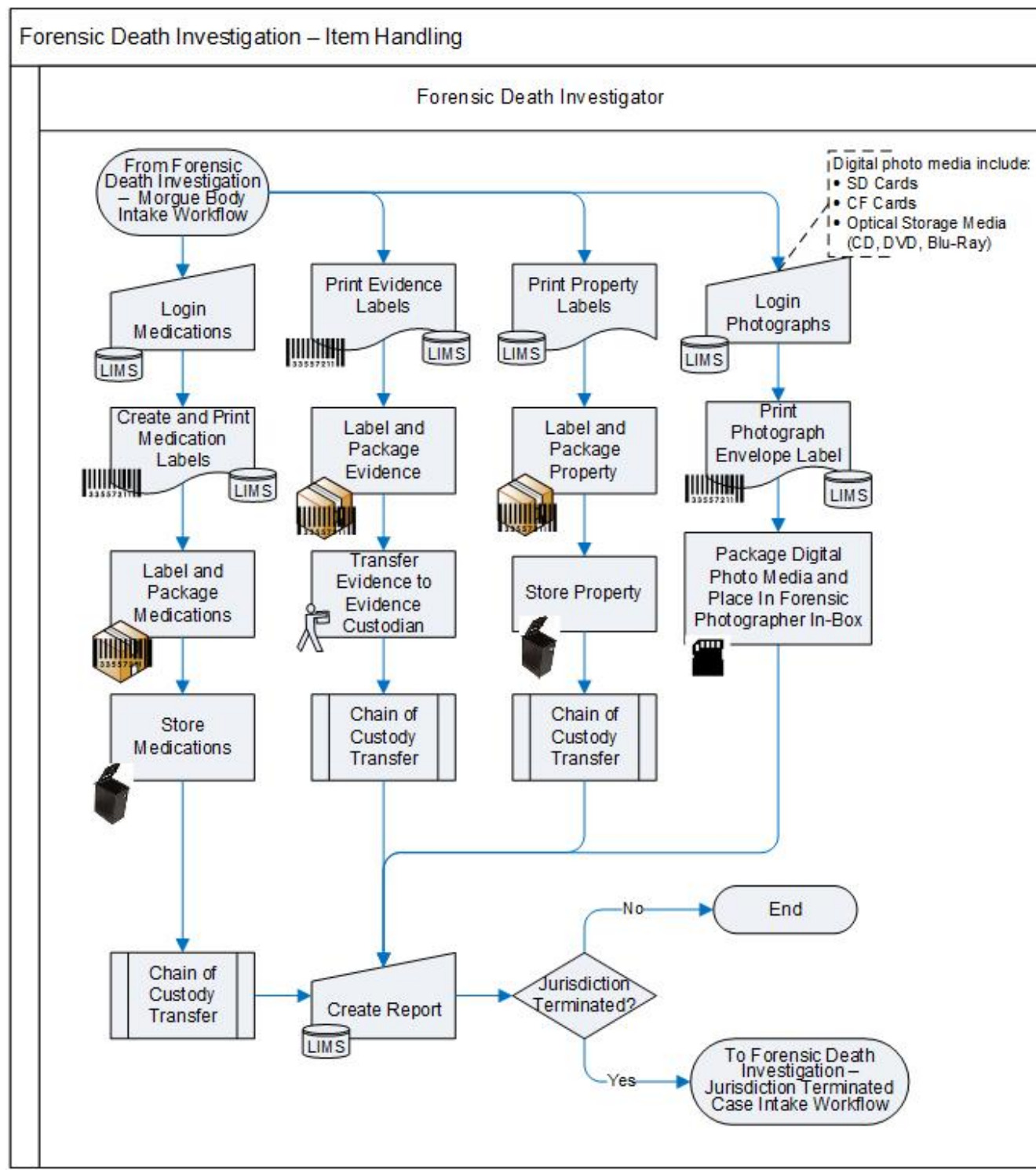


Figure 7 Forensic Death Investigations - Item Handling

5.3. REPORTS

The FDIs are responsible for generating reports for the ME's use during the morning planning meeting and CCR.

5.3.1. Morning Mortality Report

The Morning Mortality Report is a summary of every death reported to the TCME within the previous 24 hours. The report must be compiled by the FDI prior to the MEs' morning planning meeting.

The introduction of a new LIMS would introduce the following changes to the morning mortality report workflow:

- Reports, morgue schedules and morgue case lists would be printed from the LIMS instead of CRYPT*
- Case information would already be in LIMS eliminating the need to add case information via a Word document*

The following figure illustrates a conceptualized future state Morning Mortality Report generation workflow:

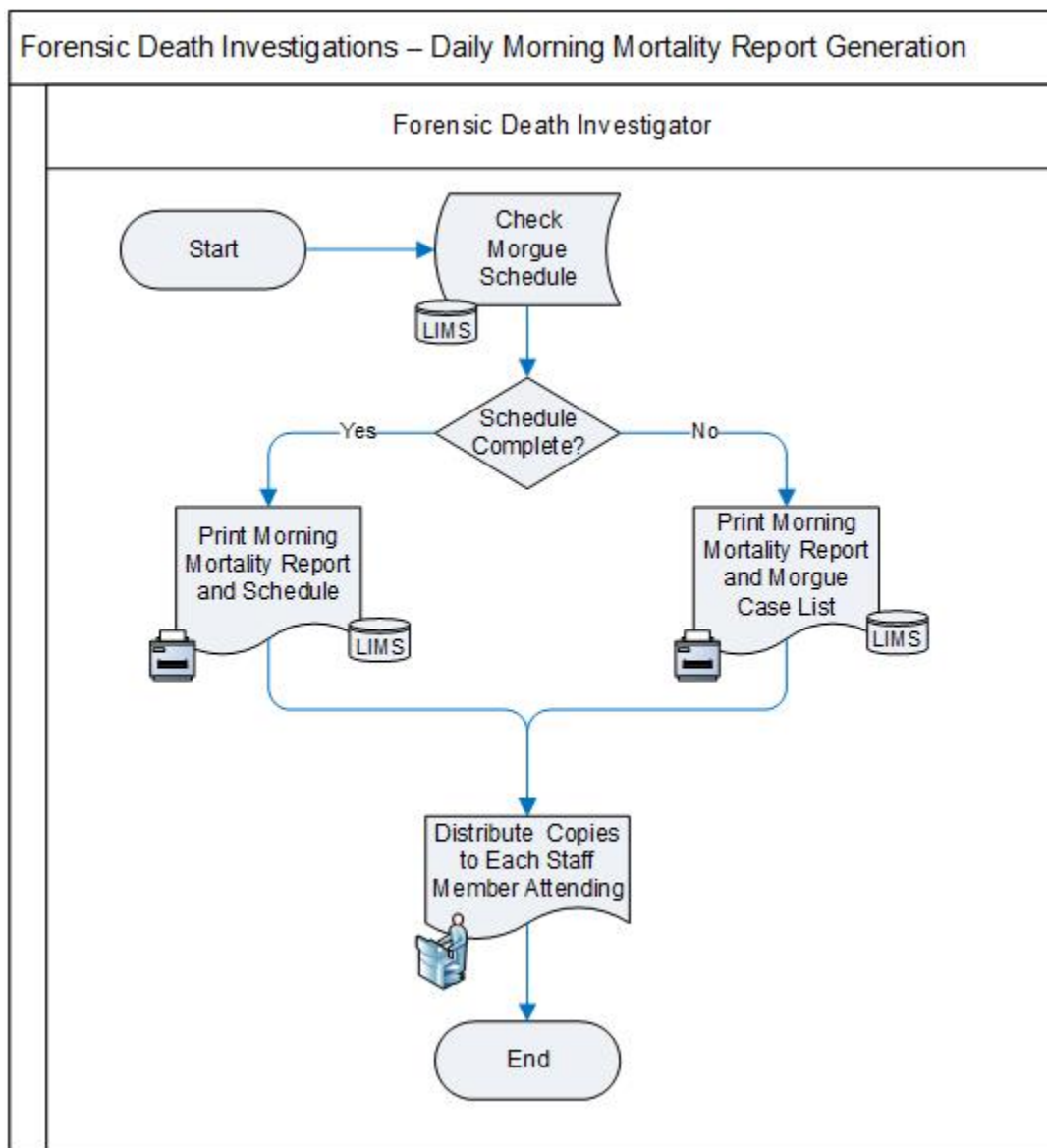


Figure 8 Forensic Death Investigations - Daily Morning Mortality Report Generation

5.3.2 Critical Case Review

The CCR is a bi-weekly meeting of the MEs where cases that are designated as critical by a ME are presented and discussed in detail. This report must be produced and distributed prior to this meeting.

The introduction of a new LIMS would introduce the following changes to the critical case review workflow:

- Designation of cases as critical in the LIMS would eliminate the need for sign-up sheets and a CCR tracking spreadsheet
- Critical case summaries would already be in the LIMS eliminating the need to create the summary in a Word document
- Critical case summaries and toxicology reports would be printed from the LIMS

The following figure illustrates a conceptualized future state CCR report generation workflow:

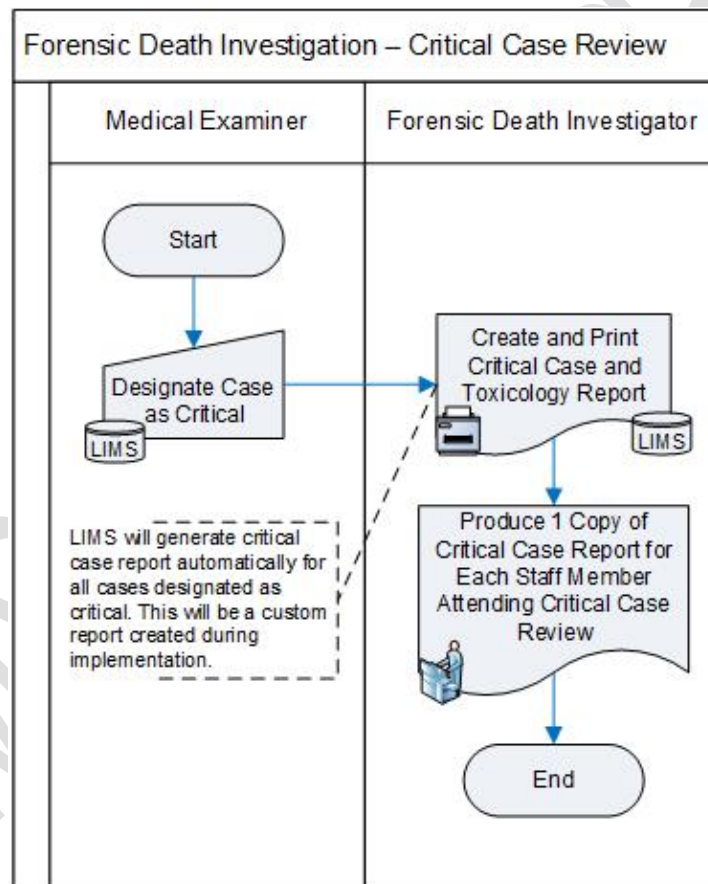


Figure 9 Forensic Death Investigations – Critical Case Review Report Generation

6. MORGUE OPERATIONS

The section describes morgue operations especially as it pertains to examining bodies to determine the CoD and the manner of death (MoD). During the examination, the ME's and assisting Autopsy Technicians also recover evidence for examination and analysis by the Crime and Toxicology Laboratories.

6.1. CASE ASSIGNMENT

Cases are assigned to the MEs daily, based on a schedule generated each morning by the Chief Medical Examiner (CME) or the Senior On-Call ME. Cases are distributed among the MEs based upon their availability, the type of exam to be performed, and the workload of the individual ME.

Each morning, the scheduling ME reviews all cases brought in to the TCME that require exams, determines the type of exam to be performed, and then assigns a ME and Autopsy Technician to each case. The scheduling ME refers to the probable CoD and MoD in the FDI narrative summary and the Daily Morning Mortality Report when assigning the cases.

The introduction of a new LIMS would introduce the following changes to the case assignment workflow:

- The LIMS would replace CRYPT as the repository of information needed to create case assignments
- ME and Autopsy Technician utilization would be available through the LIMS

The following figure illustrates a conceptualized future state autopsy schedule generation workflow:

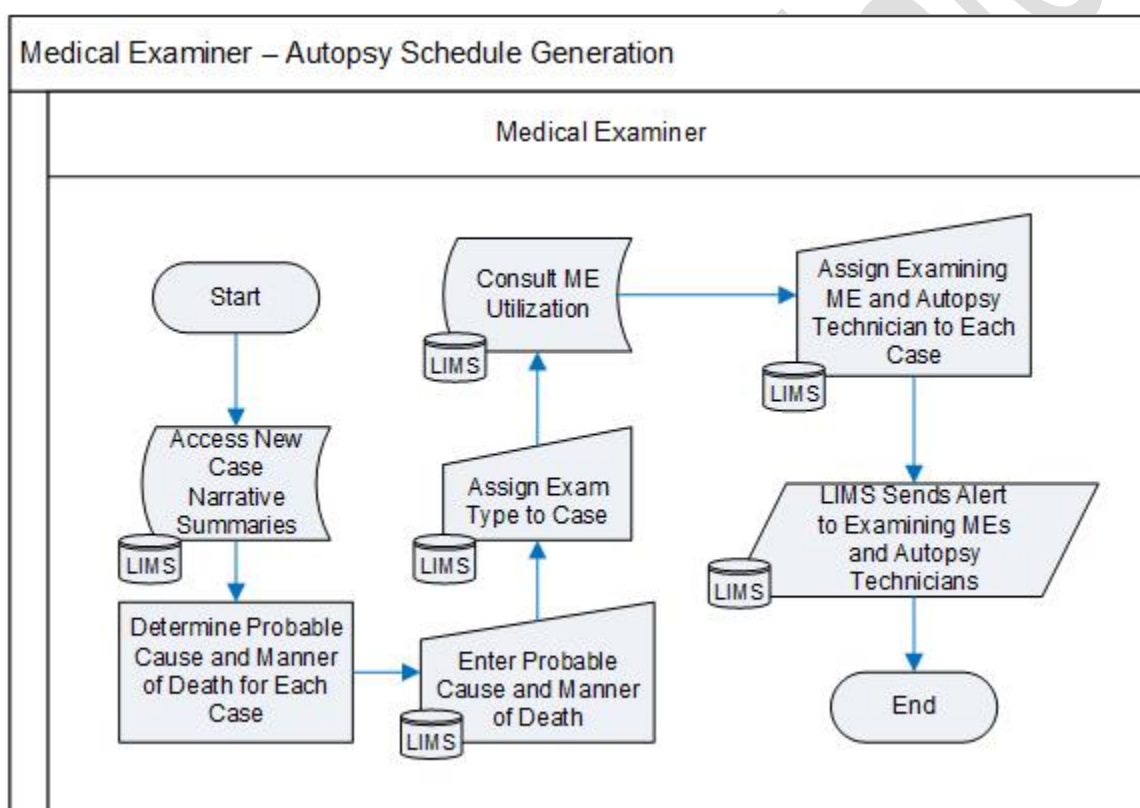


Figure 10 Medical Examiner – Autopsy Schedule Generation

6.2. AUTOPSY AND SPECIMEN COLLECTION

After an examination has been assigned to an ME and an Autopsy Technician, the Autopsy Technician retrieves the body from the cooler and begins the examination. The autopsy is conducted as a team operation with the ME directing the examination.

The introduction of a new LIMS would introduce the following changes to the autopsy and specimen collection workflow:

- *The location of the body would be tracked in LIMS by scanning the body tag barcode labels*
- *Recovered property would be recorded in LIMS instead of a logbook*
- *Property labels with barcodes would be printed from LIMS*
- *A formal CoC transfer via the LIMS would replace the use of the morgue logbook*

The following figure illustrates a conceptualized future state autopsy and specimen collection workflow:

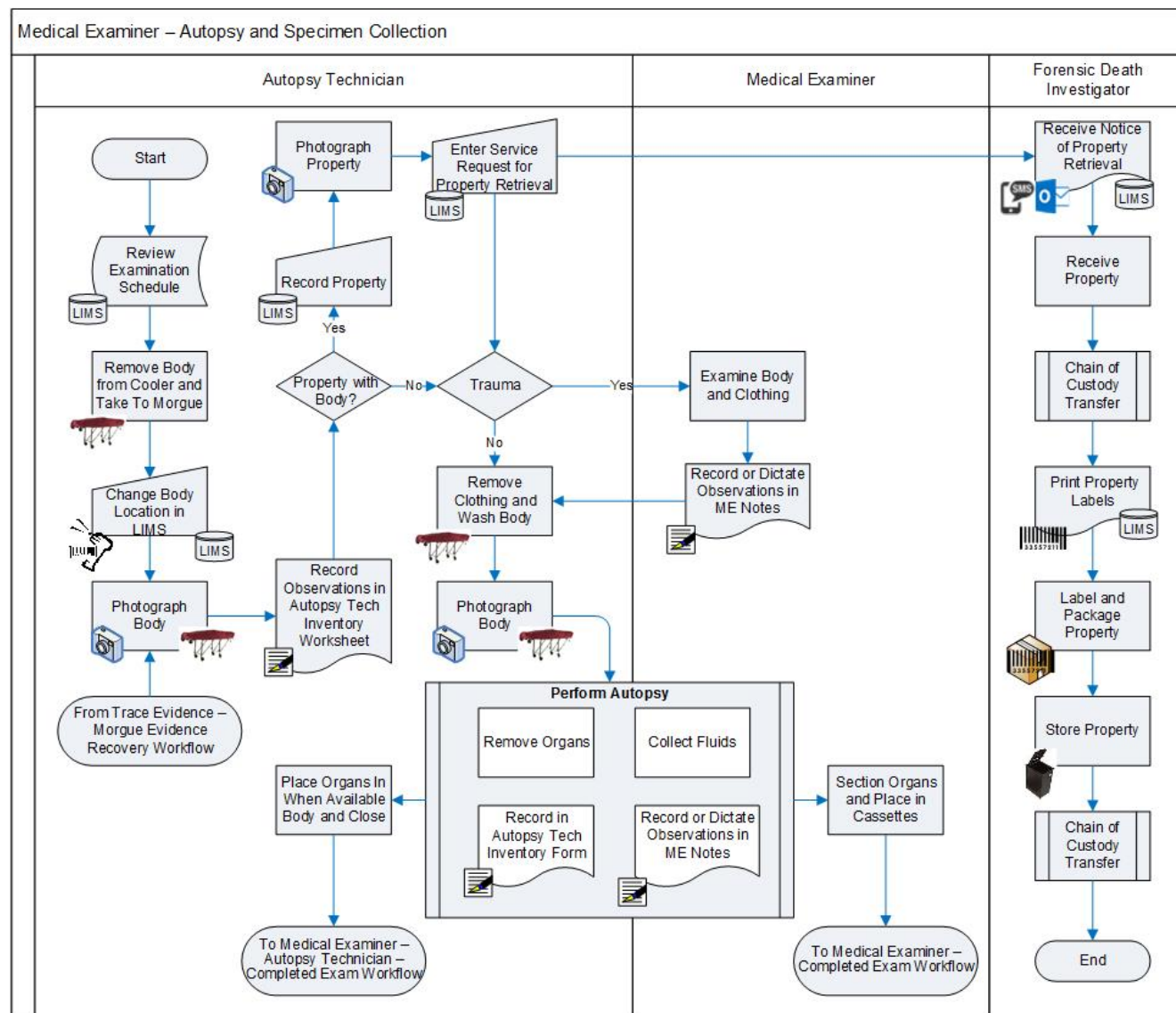


Figure 11 Medical Examiner - Autopsy and Specimen Collection

6.3. AUTOPSY EVIDENCE COLLECTION

For cases where the probable MoD includes homicide or suicide, the decedent's identity must be verified and evidence must be collected prior to the autopsy. Section 7 describes the process for identifying decedents.

The introduction of a new LIMS would introduce the following changes to the autopsy evidence collection workflow:

- All evidence would be recorded in the LIMS*
- Evidence labels with barcodes would be printed from the LIMS*

LIMS REP Updated

The following figure illustrates a conceptualized future state autopsy evidence collection workflow:

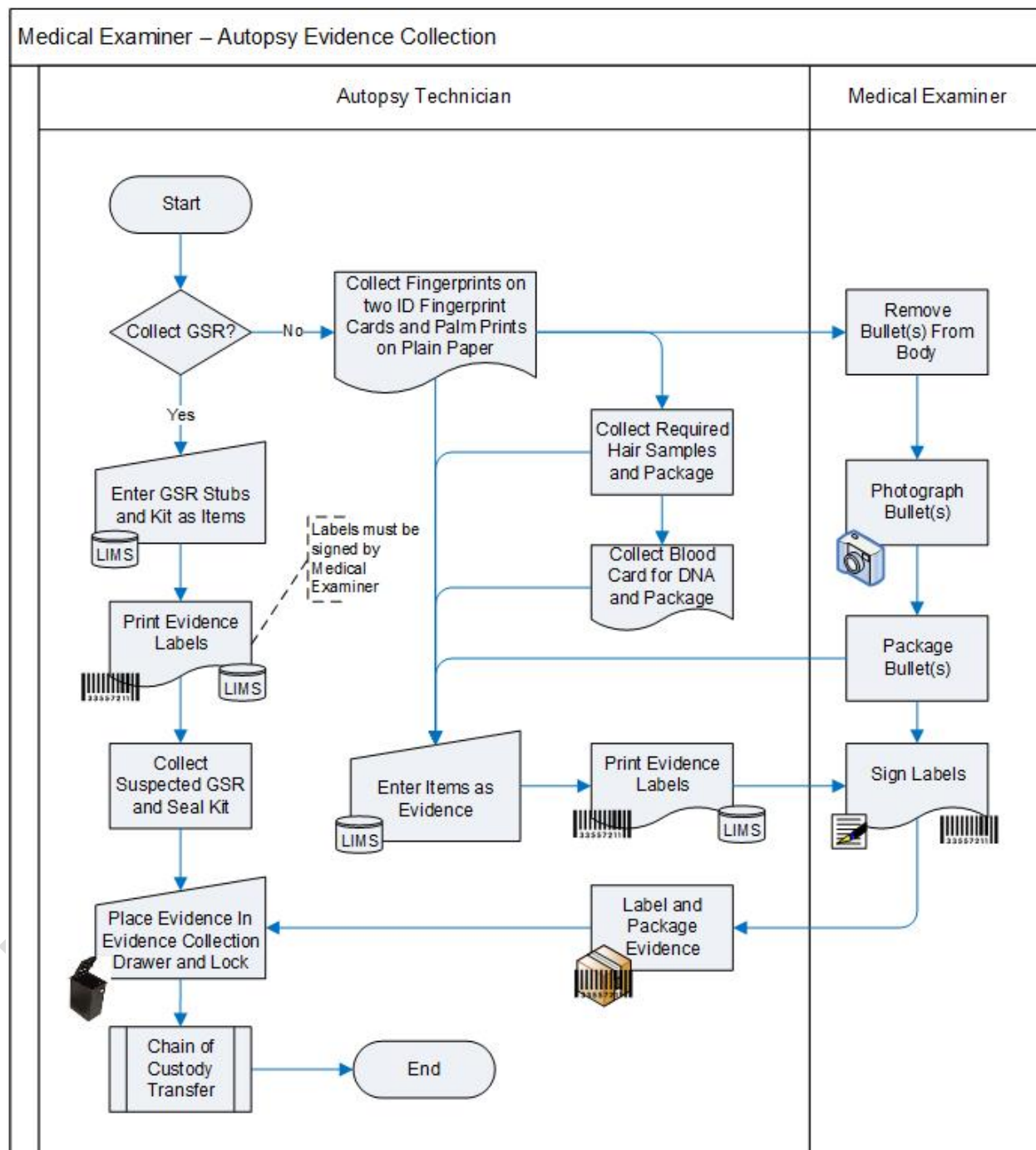


Figure 12 Medical Examiner - Autopsy Evidence Collection

Trace Examiners also come to the morgue to assist in recovering trace evidence. Section 10-1-1-2 describes this process.

6.4. COMPLETED EXAM

Both the ME and the Autopsy Technician record evidence and Service Requests

The introduction of a new LIMS would introduce the following changes to the completed exam workflow:

- Findings would be recorded in the LIMS
- Evidence items would be entered in the LIMS
- Barcode labels for the evidence would be printed from the LIMS
- Service Requests would be generated in the LIMS
- Barcode labels for the body would be printed from the LIMS
- The Body barcode label would be scanned to show a change in location of body

The following figure illustrates a conceptualized future state completed exam workflow for the ME:

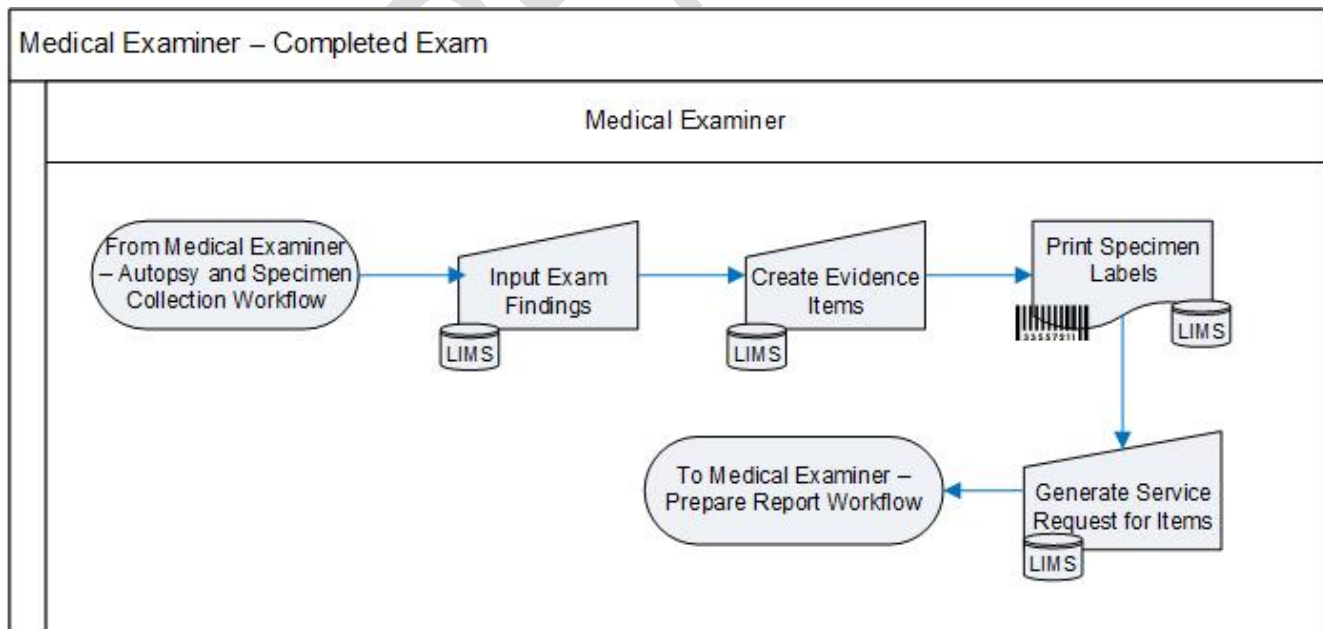


Figure 13 Medical Examiner - Completed Exam

LIMS REP Updated

The following figure illustrates a conceptualized future state completed exam workflow for the Autopsy Technician:

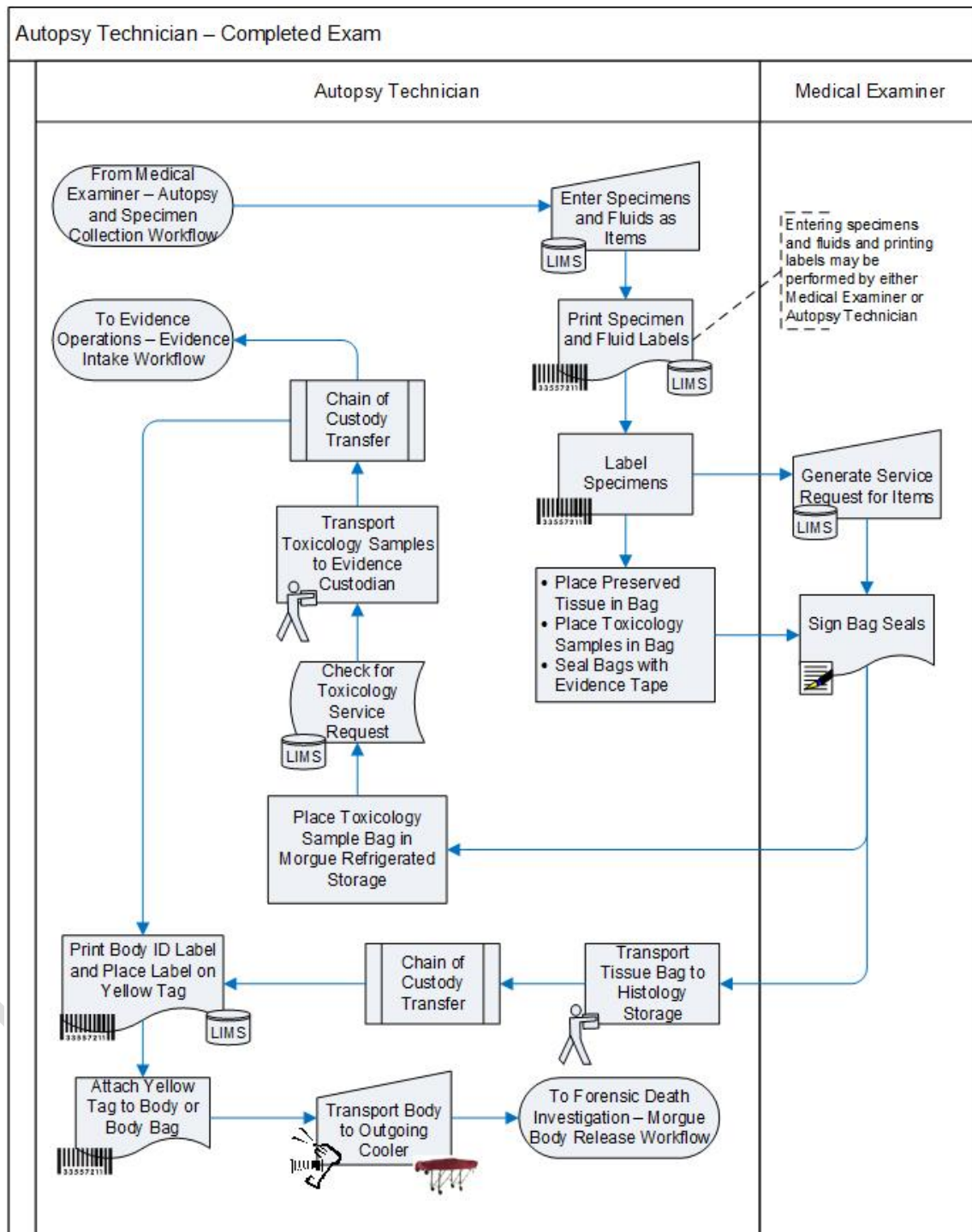


Figure 14 Autopsy Technician - Completed Exam

7. HUMAN ID

The Human ID Laboratory identifies unidentified remains using fingerprints, dental records, anthropological studies, and DNA technology, while also making use of local, state and national databases.

The Human ID Laboratory consists of three sections: Fingerprints, Forensic Anthropology, and Forensic Odontology. In addition, the Laboratory sends specimens to the University of North Texas (UNT) for identification using DNA.

7.1. CASE ASSIGNMENTS

The Chief of the Human ID Laboratory and the On-duty Fingerprint Analyst go through the morgue each morning to determine the presence of unidentified and/or decomposed bodies. Other cases that warrant examination by the Human ID Laboratory include all homicides, when a judge orders a positive identification, or upon request by the ME. Alternatively, laboratory personnel would look in the LIMS to determine if there are cases that warrant their examination. The Forensic Anthropologist may also be called to the field to recover remains.

7.2. FINGERPRINT IDENTIFICATION

Fingerprint comparison is the primary means used to determine the identity of unknown decedents. Postmortem fingerprints are obtained via a variety of standard forensic techniques. Tentative identification provided by the FDIs is used to perform a detailed records search to obtain antemortem examples for comparison. Should there be no tentative identification or no records available, an Automated Fingerprint Identification System (AFIS) search is conducted to obtain a tentative identification. If no match is found, other methods such as forensic odontology, forensic anthropology, or DNA analysis are used to obtain an identification.

The introduction of a new LIMS would introduce the following changes to the fingerprint identification workflow:

- Notification of the need for a fingerprint examination would be via LIMS*
- Whether a print is of value would be recorded in the LIMS*
- Antemortem and postmortem fingerprints would be scanned into the LIMS*
- Tentative IDs and FDI Narratives would be recorded in the LIMS*
- The Human ID Chief would be notified of results ready for review via the LIMS*

The following figure demonstrates a conceptualized future state workflow for fingerprint collections and records searches:

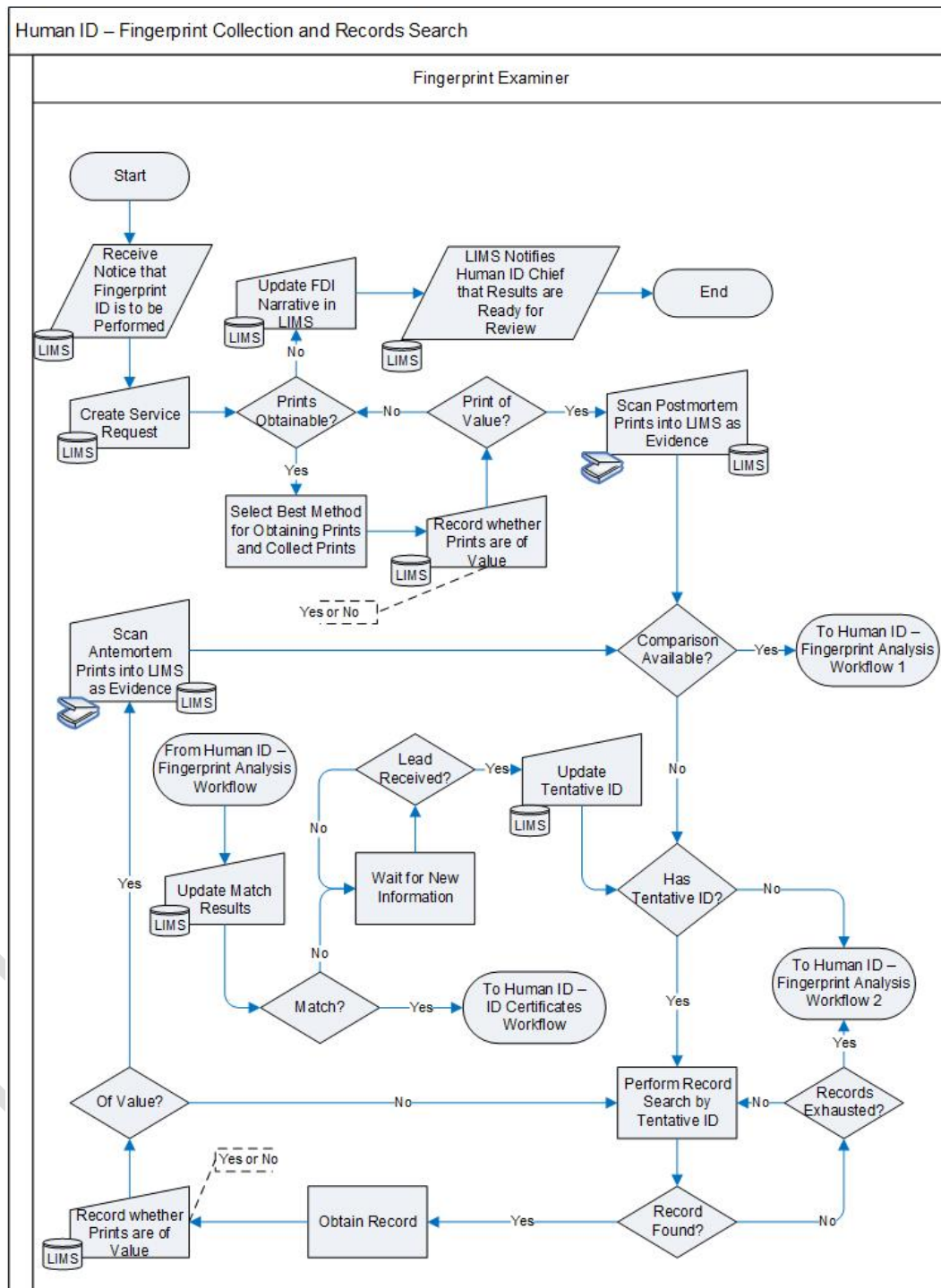


Figure 15 Human ID - Fingerprint Collection and Records Search

The following figure illustrates a conceptualized future state fingerprint analysis workflow:

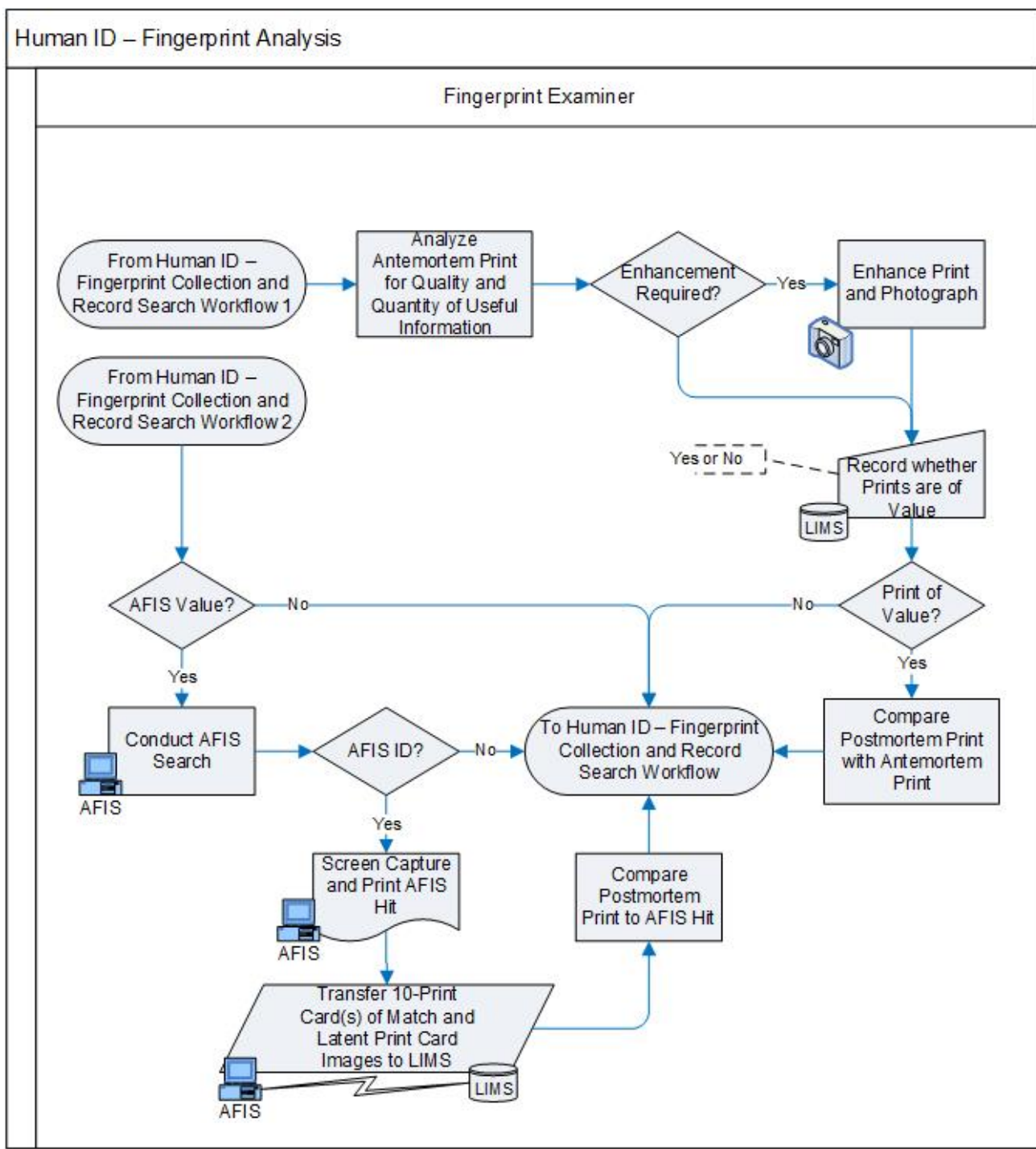


Figure 16 Human ID - Fingerprint Analysis

7.3. FORENSIC ANTHROPOLOGY

Due to their properties, bones decompose more slowly than many other tissues and organs. Thus, they are often capable of providing clues that assist examiners in determining the CoD and MoD. Skeletal remains can provide information such as the ancestry, stature, age and sex of the decedent. Evidence of trauma or natural disease may also be identified. Radiographic (X-ray) comparisons can help establish the identity of a body.

The Forensic Anthropology section performs four types of examinations:

- Examinations of skeletal remains
- Examination of the larynx
- Radiographic comparisons
- Examination of animal bones

In addition, the Forensic Anthropologist goes to the field to retrieve remains or to document remains before they are sent to the morgue.

7.3.1. Examination of Skeletal Remains

Examination of skeletal remains most often involves trauma analysis. However, where appropriate, the Forensic Anthropologist can attempt an identification of the remains by determining ancestry, sex, age and stature.

The introduction of a new LIMS would introduce the following changes to the examination of skeletal remains workflow:

- Notes taken in the morgue would be recorded in the LIMS rather than on note paper
- Items removed from the body would be recorded in the LIMS rather than on note paper
- The hold on the body would be recorded in the LIMS rather than CRYPT
- Hold signs for the body would be printed from the LIMS rather than on handwritten signs
- Examination observations in the lab would be recorded in the LIMS rather than on note paper

- *Homunculi would be incorporated into the LIMS*
- *Digital pictures would be uploaded to the LIMS*
- *Electronic signature would replace the need to print reports for the sole purpose of applying a signature*
- *Recording of examination observations in the LIMS would eliminate the need to scan observation notes for delivery to the external reviewer via Dropbox*
- *The Human ID Chief would be notified by the LIMS when a report was ready for review*
- *The Pathologist and Forensic Anthropologist would be notified by the LIMS when the Human ID Chief has approved the report*
- *Electronic records would eliminate the need to maintain a log book*
- *Completion of the approved examination would be recorded in the LIMS by the action of the Human ID Chief approving the report thereby eliminating the need to record this in a log book*

Examination of skeletal remains begins in the morgue as shown in the following conceptualized future state figure:

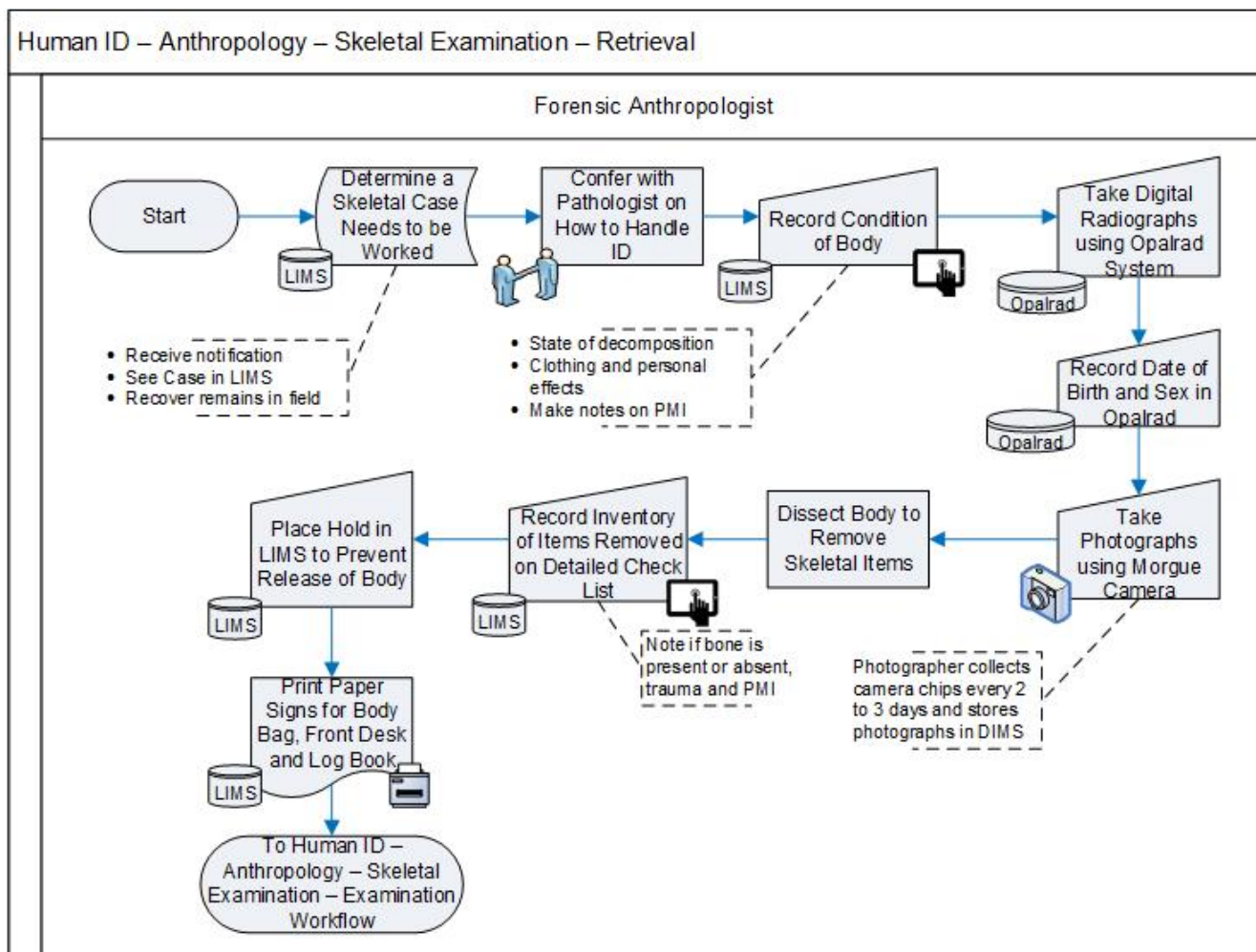


Figure 17 Human ID – Forensic Anthropology – Skeletal Examination – Retrieval

Notes taken in the morgue include:

- Condition of the body as it is first received, e.g., fresh, decomposed, mummified, skeletal, or a combination of these conditions
- Indication of postmortem interval (PMI), e.g., odor, presence and condition of soft tissue and organs, bone bleaching, bone degradation, and, if present, type of insects
- Clothing and personnel effects (sometimes occurs in the laboratory)

The Forensic Anthropologist then takes the bones to the Anthropology Laboratory to continue the examination process. The purpose of the examination is to determine:

- *Condition of body - repeating the work in the morgue*
- *Sex - male/female/undetermined including method used*
- *Age at death - reported as a range including method used and confidence interval*
- *Ancestry - white, black, Asian, Hispanic, mixed, undetermined including method used*
- *Range of stature including formulae used*
- *PMI - reported as a minimum or a range repeating work from the morgue work*
- *Trauma - including written description and diagrams of injuries*
- *Antemortem conditions, e.g., fractures, disease processes, dental conditions, medical hardware, skeletal anomalies, osteoarthritis, and spinal degeneration*
- *Postmortem modifications, e.g., evidence of animal scavenging including which bones and type of evidence such as gnaw marks, tooth punctures, or frayed fractured margins*
- *Reports would be written in the LIMS rather than using a Word template*

The next figure illustrates a conceptualized future state examination process in the Forensic Anthropology laboratory:

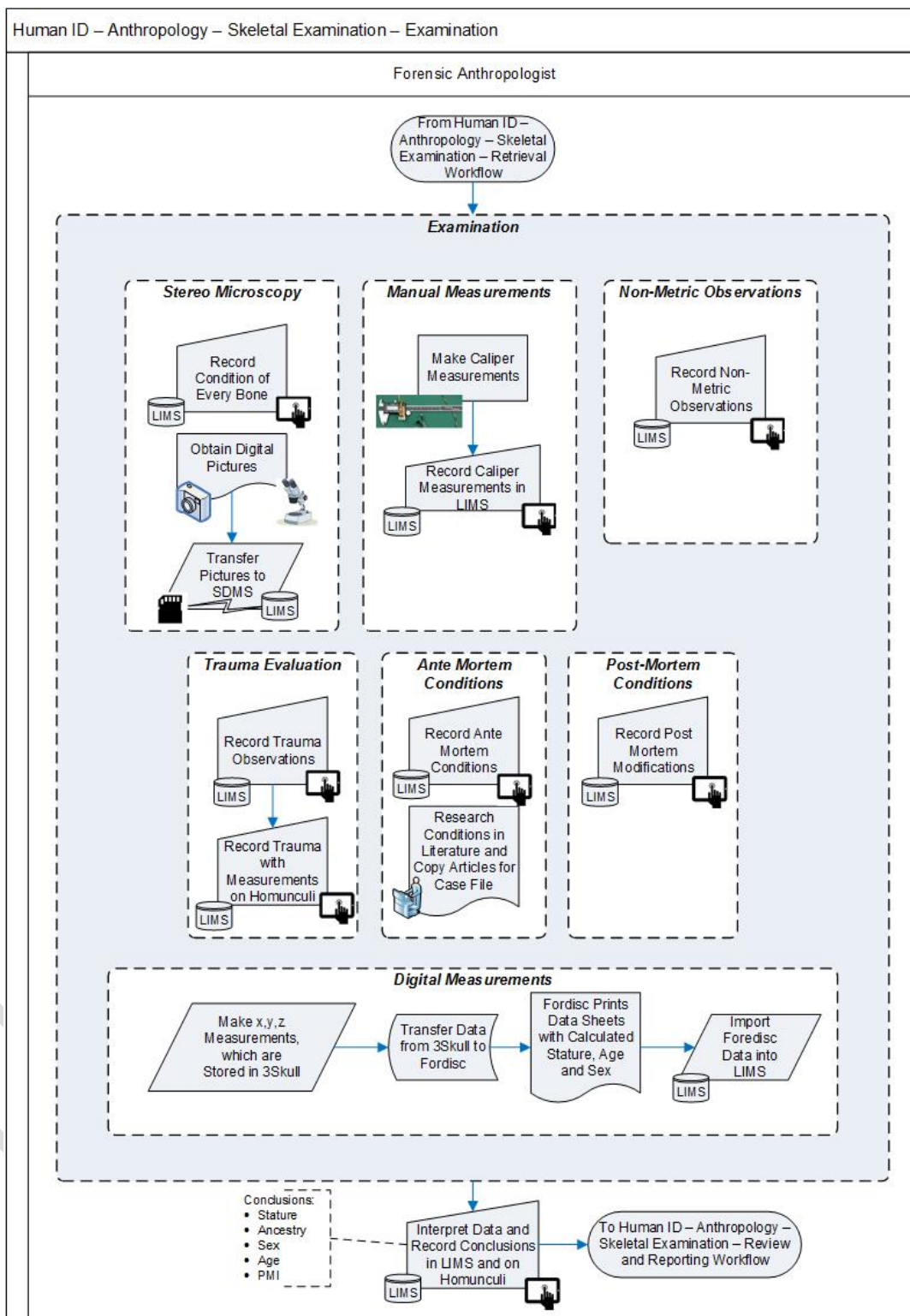


Figure 18 Human ID - Forensic Anthropology - Skeletal Examination - Examination

During the examination, the Forensic Anthropologist makes notes on diagrams of skeletal features known as homunculi. The following figure illustrates an example of a homunculus:

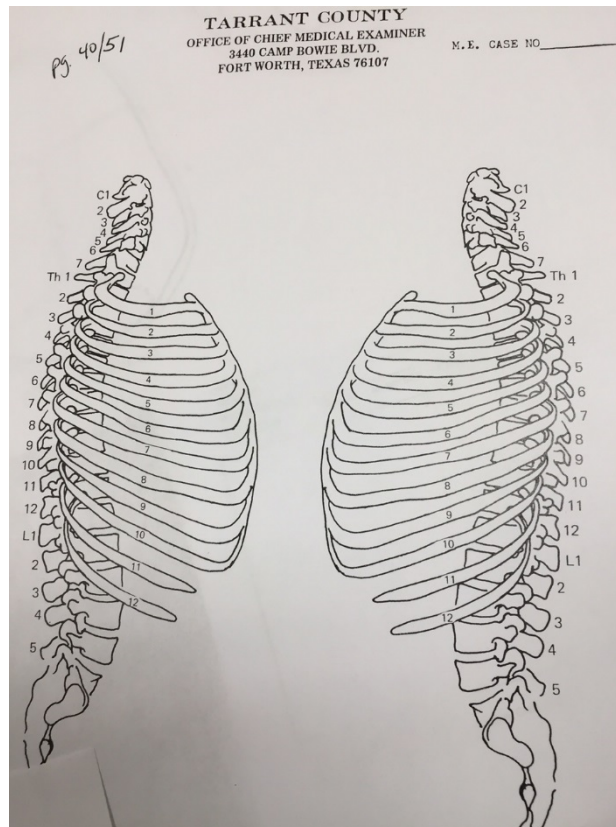


Figure 19 Human ID - Forensic Anthropology - Skeletal Examination - Example of Homunculus

Upon completion of the examination and interpretation of results, the Forensic Anthropologist writes a report, which is technically reviewed by an external peer reviewer, administratively reviewed, and then issued, as shown in the following conceptualized future state figure:

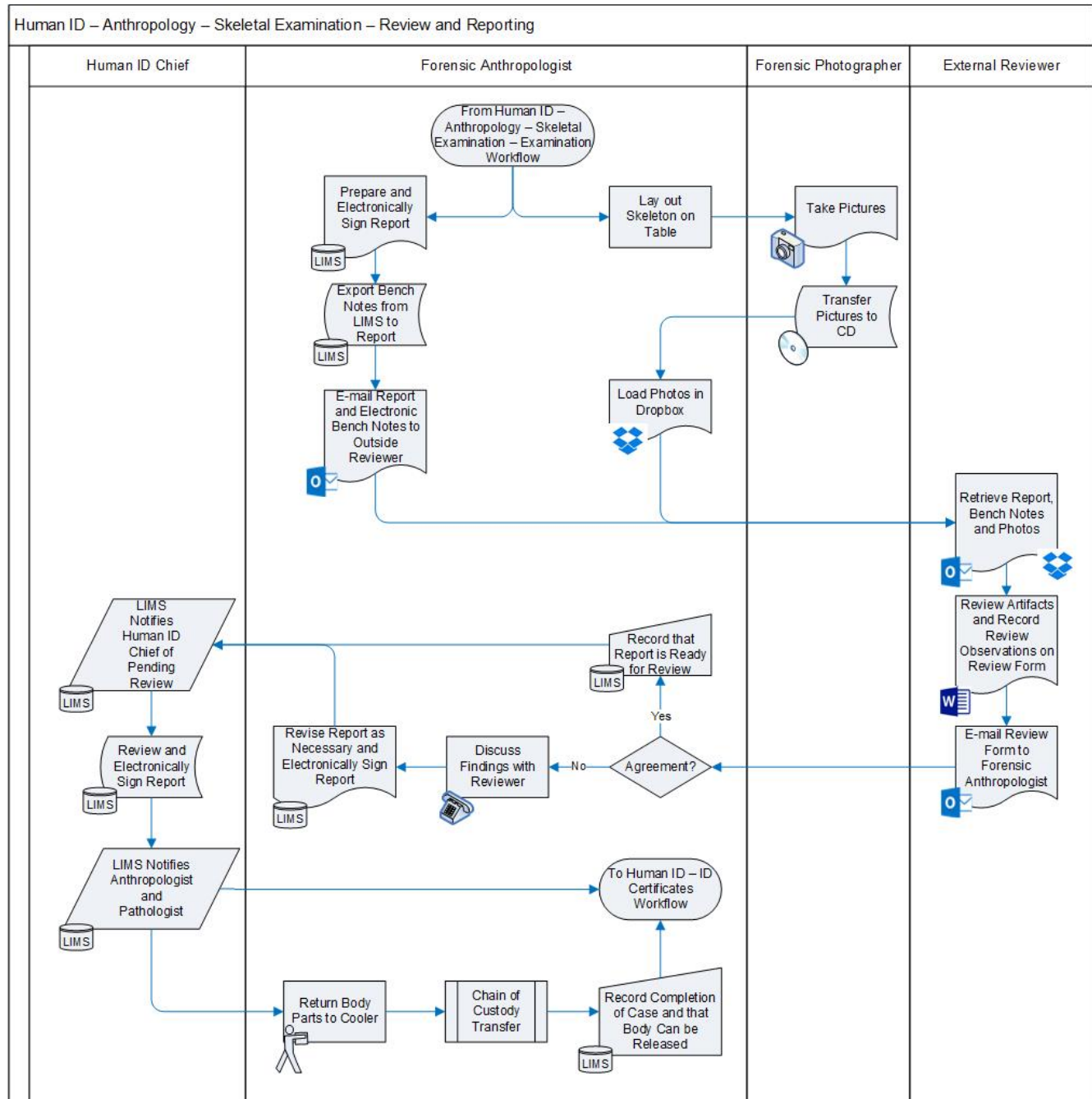


Figure 20 Human ID - Forensic Anthropology - Skeletal Examination - Review and Reporting

7.3.2. Examination of the Larynx

The introduction of a new LIMS would introduce the following changes to the examination of the larynx workflow:

- Examination observations would be recorded in the LIMS rather than on note paper
- Diagrams would be incorporated into the LIMS
- Electronic signature would replace the need to print reports for the sole purpose of applying a signature
- Reports would be written in the LIMS rather than using a Word template
- The Human ID Chief would be notified by the LIMS when a report was ready for review
- The Pathologist and Forensic Anthropologist would be notified by the LIMS when the Human ID Chief has approved the report

The following figure illustrates a conceptualized future state process for examining larynges to determine trauma:

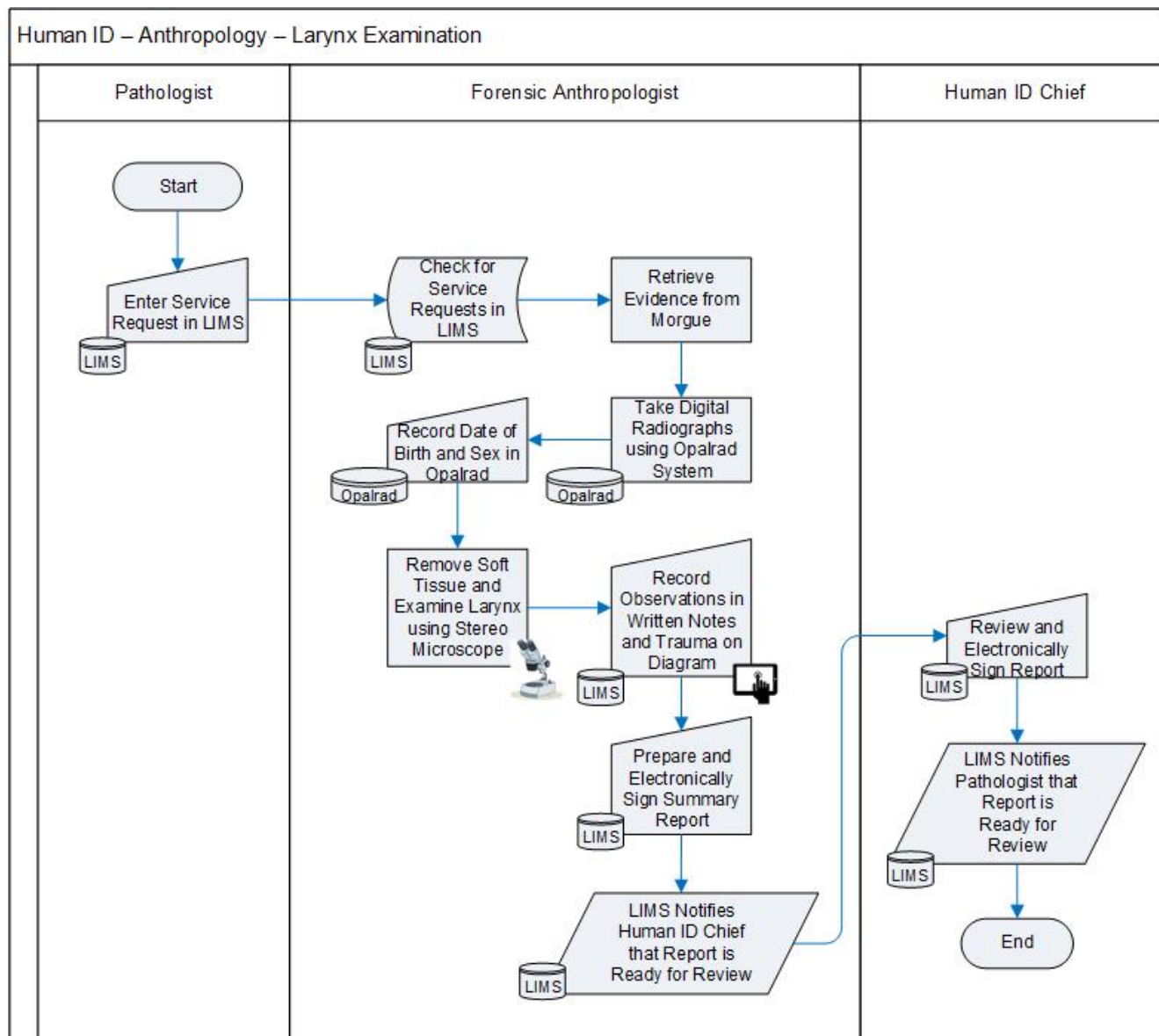


Figure 21 Human ID - Forensic Anthropology - Larynx

7.3.3 Radiographic Comparisons

Radiographic comparisons involve comparing radiographs of the postmortem skeleton to antemortem radiographs received by the Human ID Chief from outside sources such as medical records for possible matches.

The introduction of a new LIMS would introduce the following changes to the radiographic comparison workflow:

- Examination observations, including congruence or lack of congruence, would be recorded in the LIMS rather than on note paper
- Electronic signature would replace the need to print reports for the sole purpose of applying a signature
- Reports would be written in the LIMS rather than using a Word template
- The Human ID Chief would be notified by the LIMS when a report was ready for review
- The Pathologist and Forensic Anthropologist would be notified by the LIMS when the Human ID Chief has approved the report

The following figure illustrates a conceptualized future state process for radiographic comparisons:

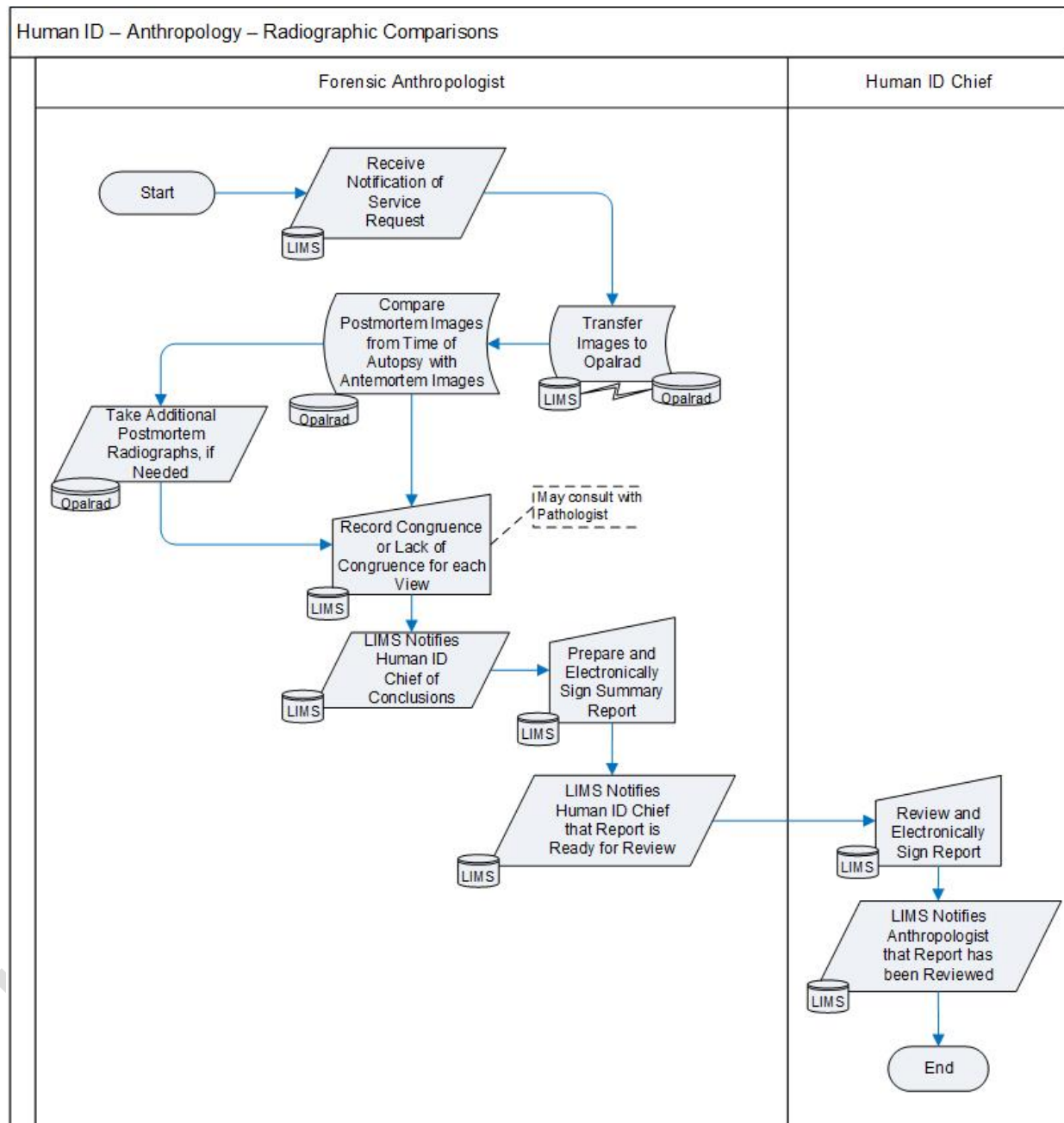


Figure 22 Human ID – Forensic Anthropology – Radiographic Comparisons

7.3.4. Examination of Animal Bones

The Forensic Anthropologist examines animal bones to confirm that they are non-human and to identify the family group.

The introduction of a new LIMS would introduce the following changes to the examination of animal bones workflow:

- Examination observations would be recorded in the LIMS rather than on note paper*
- Electronic signature would replace the need to print reports for the sole purpose of applying a signature*
- Reports would be written in the LIMS rather than using a Word template*
- The Human ID Chief would be notified by the LIMS when a report was ready for review*
- The ME and Forensic Anthropologist would be notified by the LIMS when the Human ID Chief has approved the report*

The following figure illustrates a conceptualized future state workflow for examination of animal remains:

LIMS REP Updated

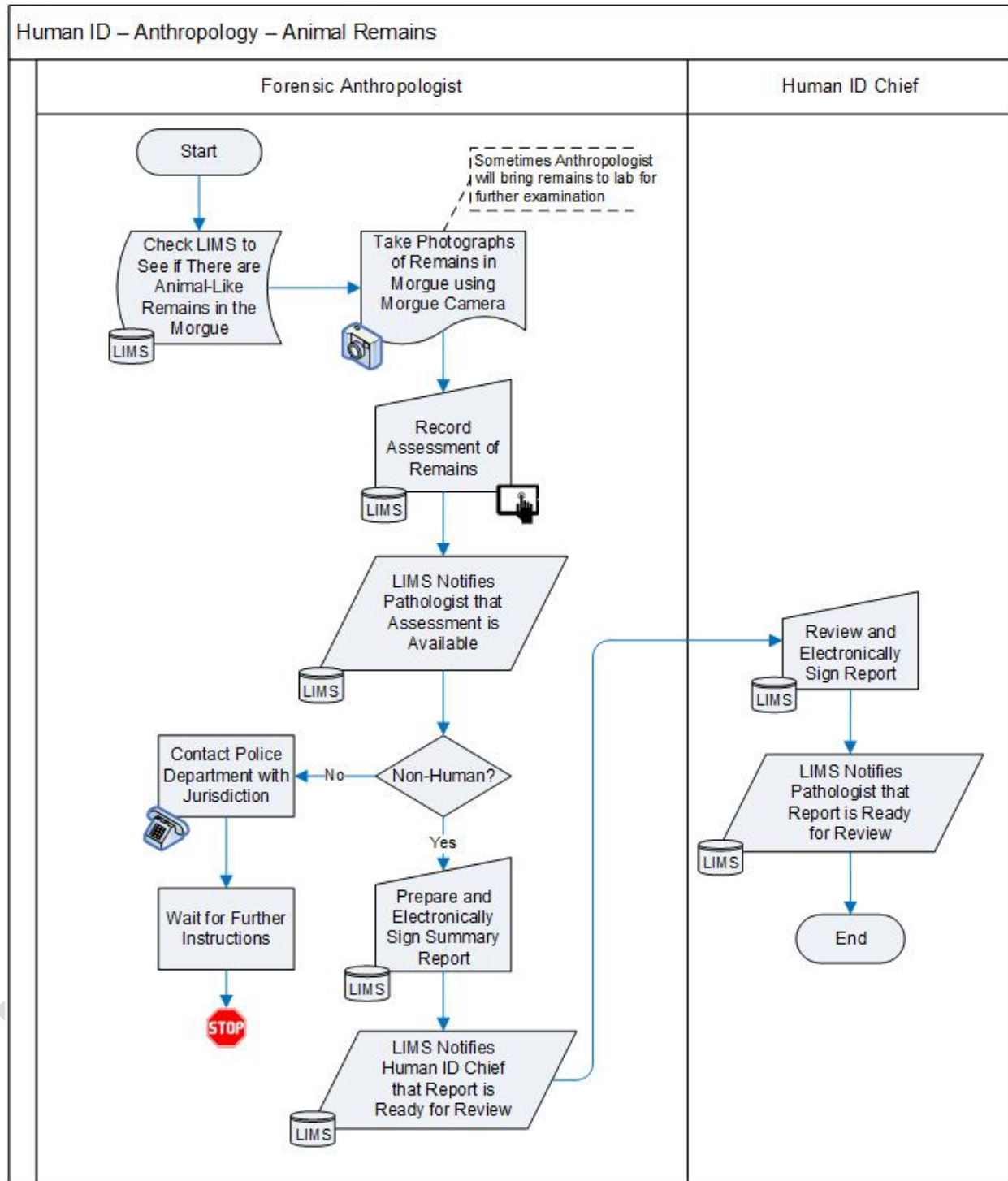


Figure 23 Human ID – Forensic Anthropology – Animal Remains

7.3.5. Field Recovery Work

When doing field recovery work, the Forensic Anthropologist records the following information:

- *Evidence inventory*
- *Date and time*
- *Location including a map*
- *Data coordination to facilitate creating a map of the scene*
- *Date and time of arrival and departure per day*
- *Team members per day*
- *Mileage to scene*
- *County of scene*
- *Police agency of scene*

Use of a LIMS-integrated tablet PC would eliminate the need to take notes in the field and then having to enter the notes into a report upon return to TCME.

7.3.6. Statistical Reporting

Annually, the Forensic Anthropologist reports how many of each type of exam, the originating county and cases for each county. This information would be extracted from the LIMS using a query.

7.4. DNA ANALYSIS

The Forensic Anthropologist may dissect bones for identification by DNA analysis. DNA specimens are sent to UNT, which compares DNA of remains to reference specimens provided by the family directly to UNT.

The introduction of a new LIMS would introduce the following changes to the DNA analysis workflow:

- *Results and the CoC would be scanned into the LIMS rather than into CRYPT*
- *The Pathologist would be notified by the LIMS when results were available*

The following figure illustrates a conceptualized future state workflow for identification of remains using DNA comparison analysis at UNT:

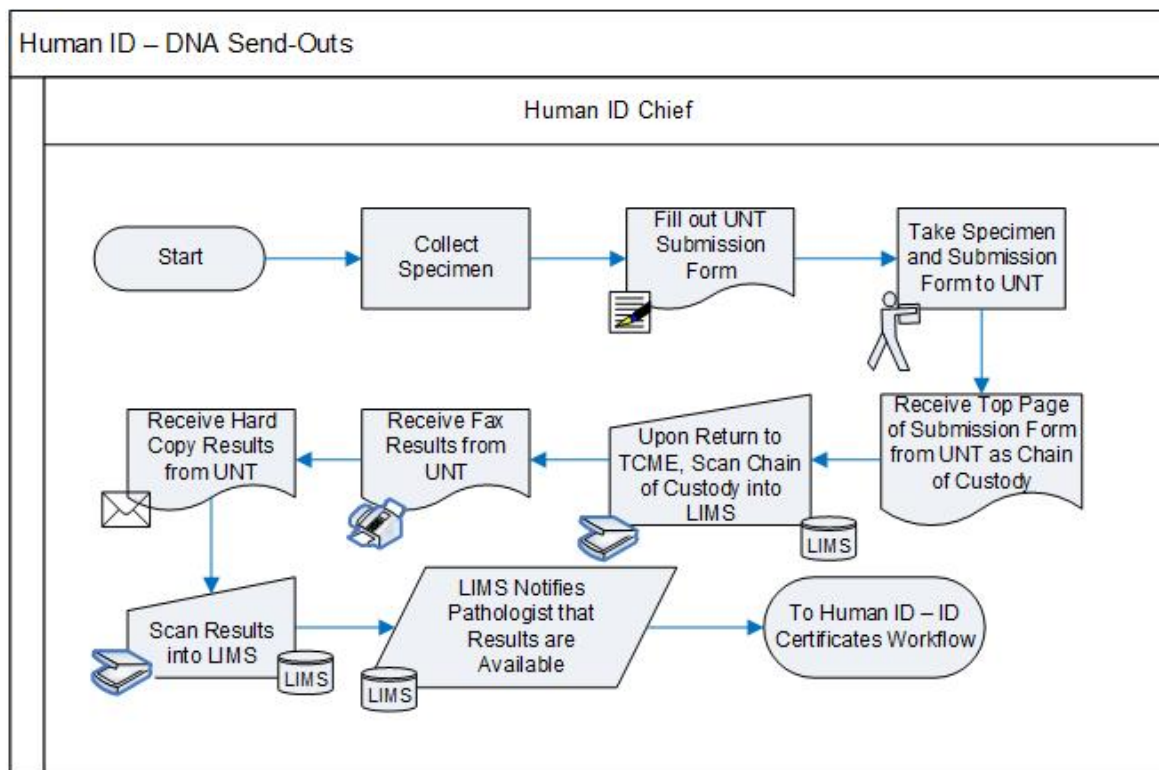


Figure 24 Human ID - DNA Send-Outs

7.5. FORENSIC ODONTOLOGY

Postmortem dental examination of human remains involves charting dental and cranial features and radiographic (X-ray) documentation of these features. Examination by forensic odontology is usually preceded by an attempt to identify remains using fingerprints. When appropriate, the Forensic Odontologist works in parallel with the Forensic Anthropologist.

The introduction of a new LIMS would introduce the following changes to the forensic odontology workflow:

- Requests for forensic odontology would be received via the LIMS
- Digital x-rays would be transferred directly to and stored in an SDMS component in the LIMS

- *Antemortem dental charts would be scanned into an SDMS component in the LIMS*
- *Examination observations would be recorded in the LIMS rather than on a paper worksheet*

LIMS REP Updated

The following figure illustrates a conceptualized future state workflow for forensic odontology:

LIMS REP Updated

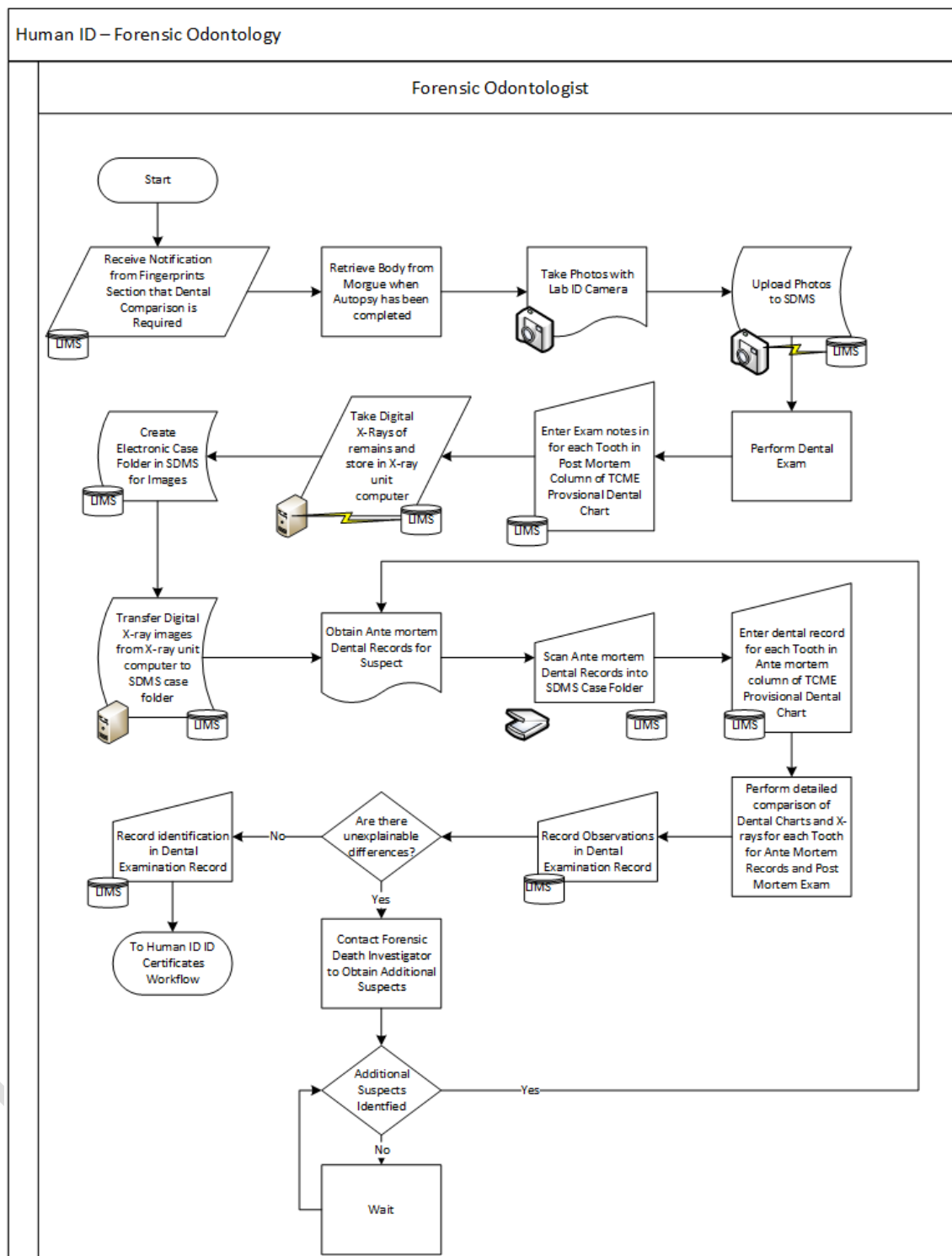


Figure 25 Human ID - Forensic Odontology

7.6. ID CERTIFICATES

Upon confirmed identification of remains, the Chief of the Human ID laboratory issues an ID certificate.

The introduction of a new LIMS would introduce the following changes to the ID certificate workflow:

- The Human ID Chief would be notified that an identification has been made via the LIMS
- Electronic signatures would eliminate the need to print a certificate solely for the purpose of applying a signature
- An electronically signed ID certificate would eliminate the need to :
 - o Scan the certificate for storage
 - o Change the name in the morgue and FDI logbooks, since these would be recorded in LIMS
 - o Store fingerprints on digital media, since these would be scanned into the SDMS component of the LIMS

The following figure illustrates a conceptualized future state workflow for issuing an ID certificate.

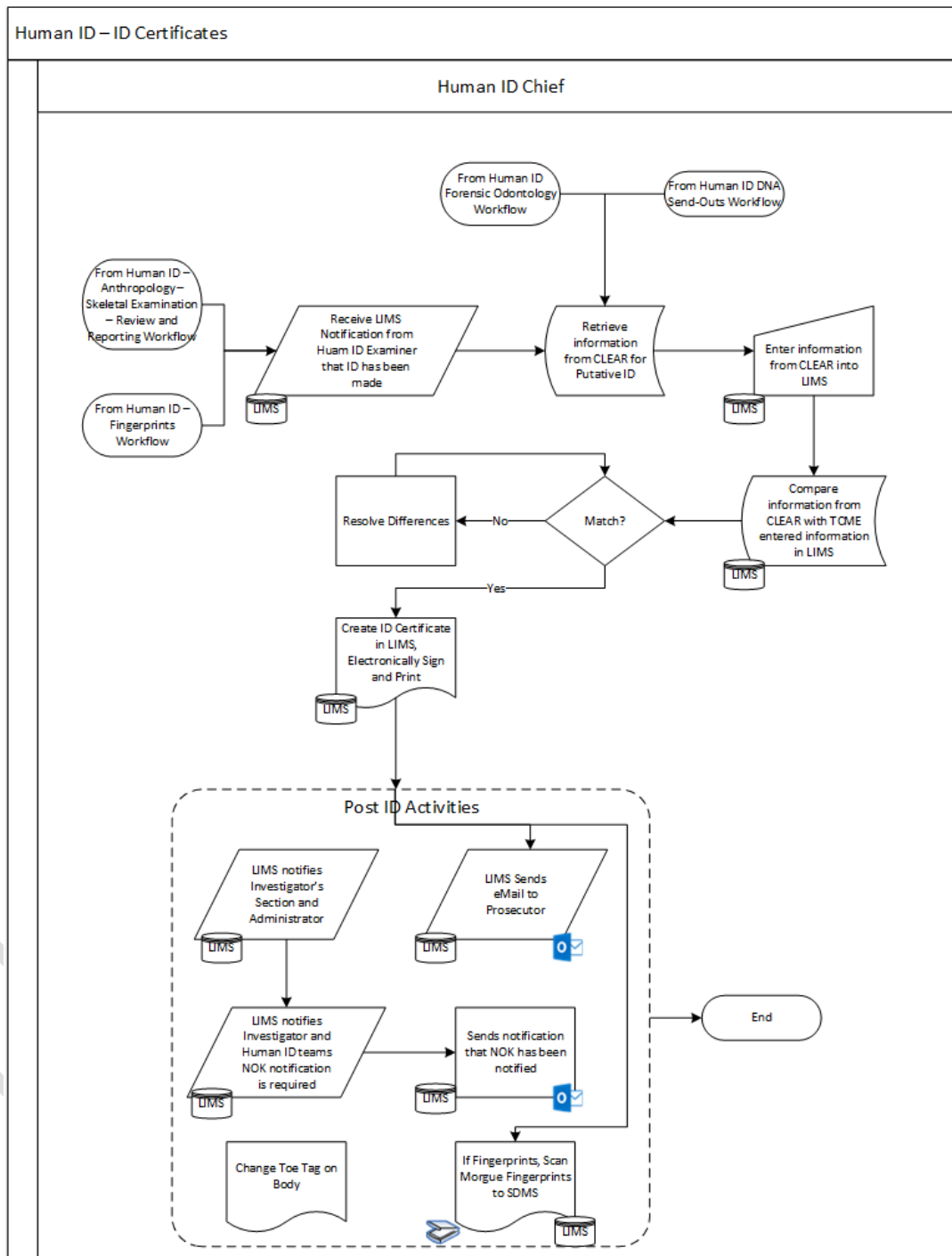


Figure 26 Human ID - ID Certificates

8. HISTOLOGY

Many CoD determinations rely upon the examination of a decedent's tissues and organs. The Histology section prepares slides from tissue specimens for use by the MEs as part of the determinations of the CoD.

8.1. PRODUCTION OF SLIDES AND BLOCKS

The Histologist receives requests to make slides of tissues in cassettes, to make slides from tissues embedded in wax blocks, and to make blocks from tissues. The request for slide preparation includes a request to stain the slides to enhance visualization of the tissue pathology. Although the Histologist has a number of different types of stains available, he may not have certain stains requested by the ME. In these situations, the Histologist sends the specimens to contract laboratories, including, but not limited to: Harris Methodist Hospital or John Peter Smith (JPS) County Hospital. The Histologist may send either a wax block or an unstained slide.

The introduction of a new LIMS would introduce the following changes to the workflow for production of slides and blocks:

- Service Requests would be via the LIMS rather than CRYPT
- Processing notes and QC data would be recorded in the LIMS rather than on paper worksheets and ledgers
- Send-outs would be recorded as a Service Request in the LIMS
- Notifications to Pathologists that their request needs to be sent out would be via the LIMS
- The LIMS would notify Pathologists when their slides are ready

The following two figures show conceptualized future state workflows for creating slides and blocks and for sending specimens to a contract laboratory, respectively:

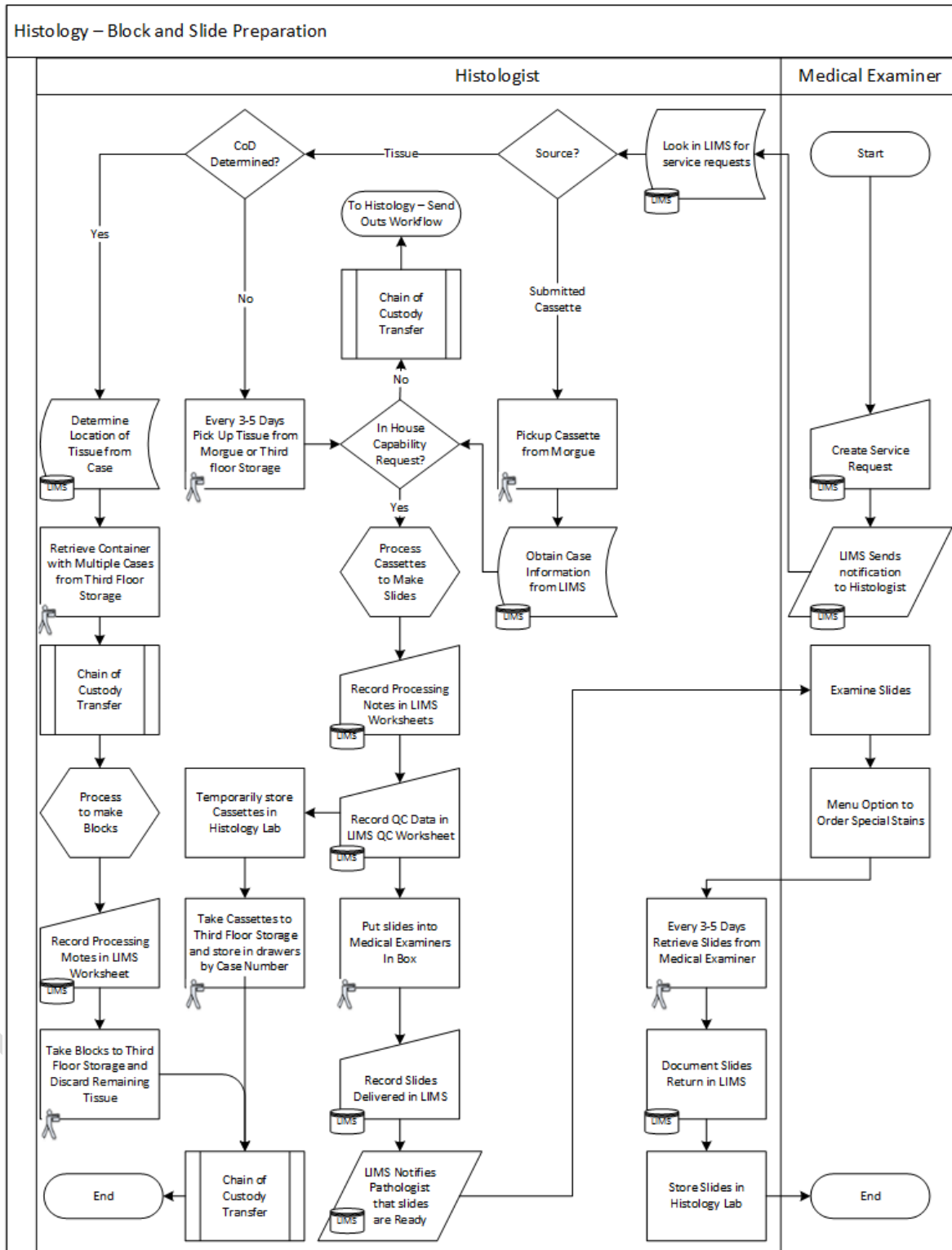


Figure 27 Histology - Block and Slide Preparation

LIMS REP Updated

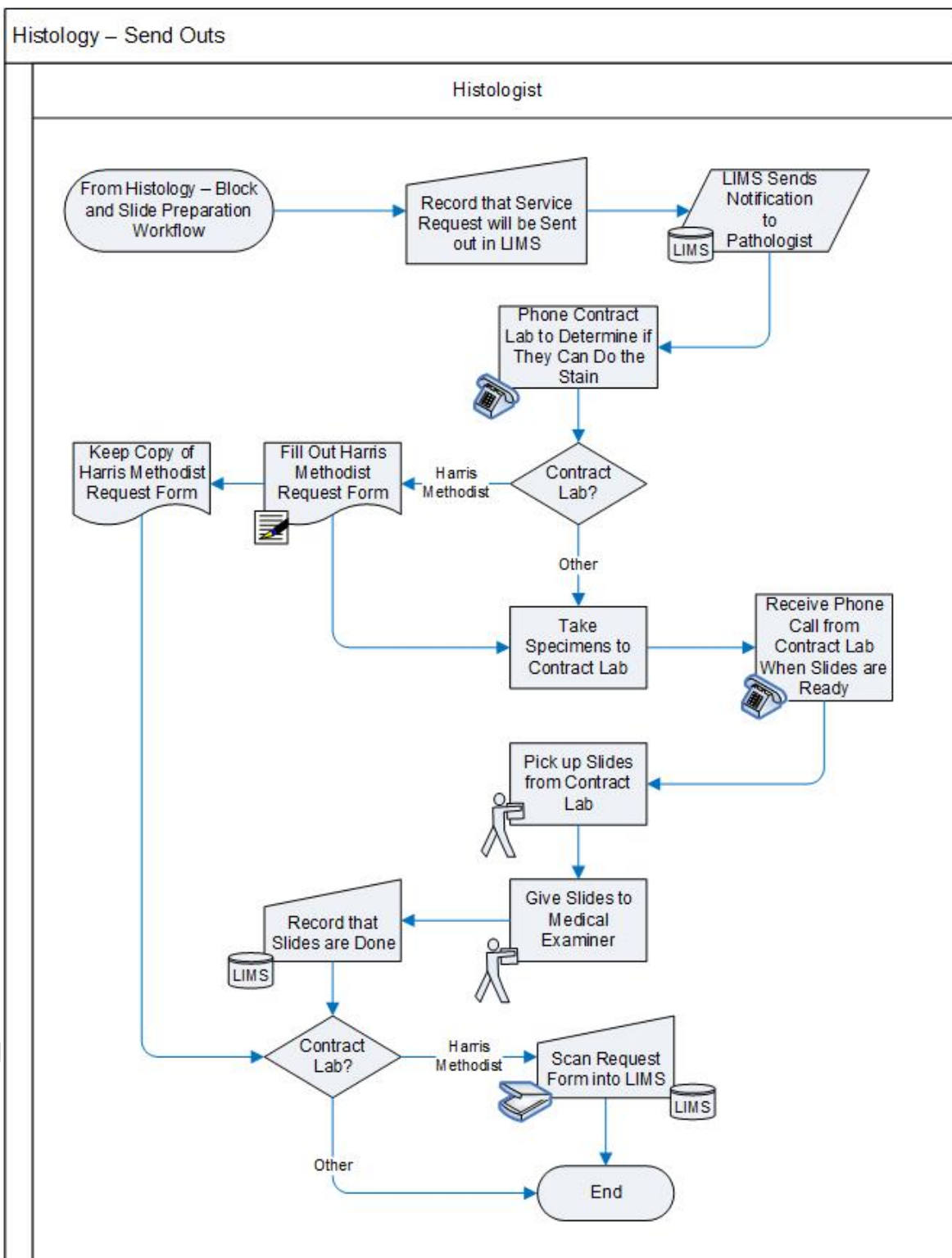


Figure 28 Histology - Send Outs

8.2. REQUESTS FROM THE DISTRICT ATTORNEY (DA) AND OTHERS

The Tarrant County DA (and others) may send requests concerning slides to TCME. In some situations, the DA wants to know if slides have already been prepared for a specific case, and if so, how many. If slides have not been prepared, the DA may request that the Histologist prepare slides relating to a case.

The introduction of a new LIMS would introduce the following changes to the workflow for handling requests from the DA:

- The Records Department would generate a Service Requests in LIMS, which would automatically generate a notification to the Histologist
- The Histologist would enter whether or not slides had already been made in the LIMS, which would automatically generate a notification to the Records Department
- Processing notes and QC data would be recorded in the LIMS rather than on paper worksheets and ledgers
- Chain of Custody procedures would be implemented to track the movement of blocks in and out of storage.

The following two figures illustrate conceptualized future state workflows for handling requests from the DA:

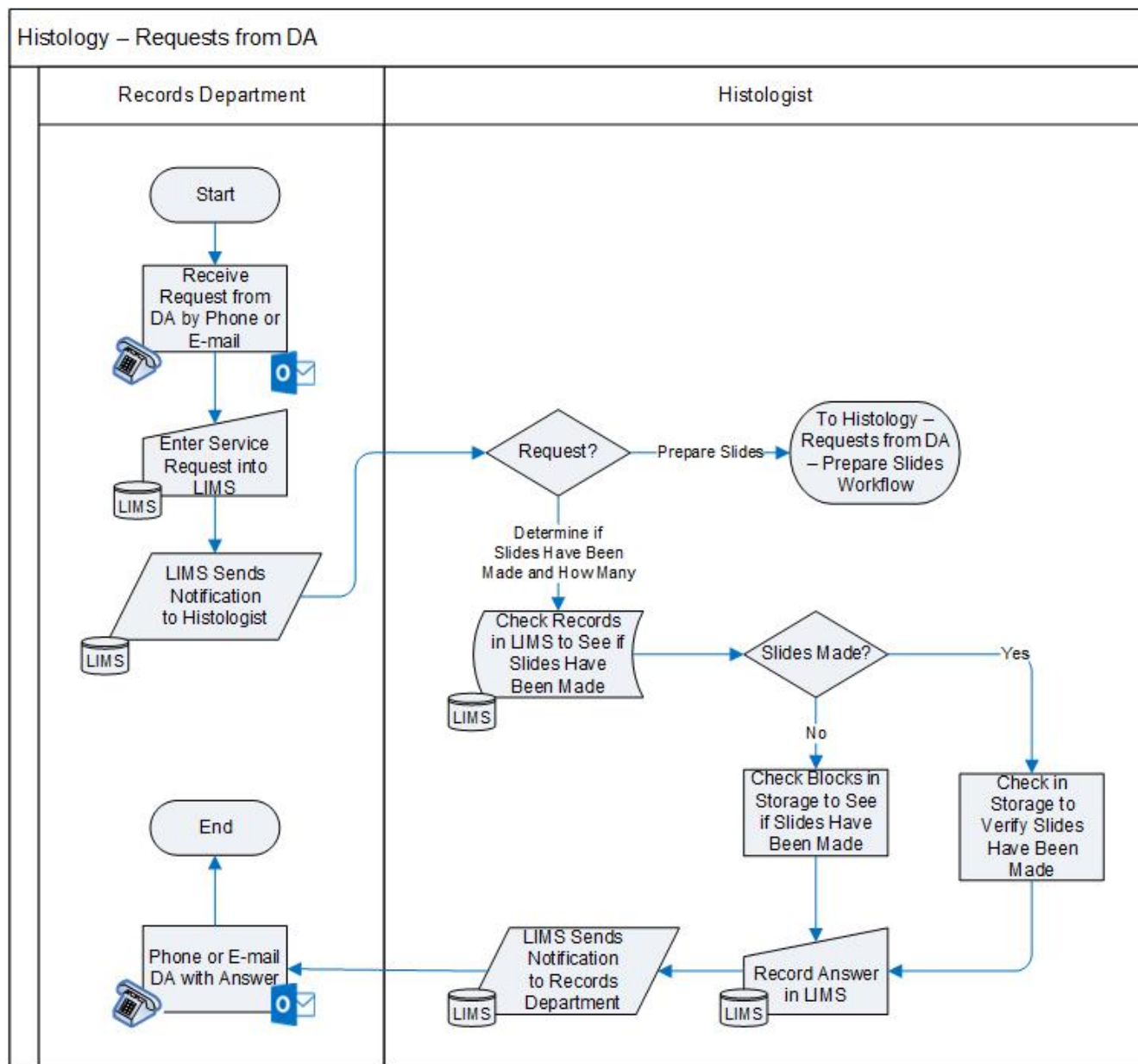


Figure 29 Histology – Requests from DA

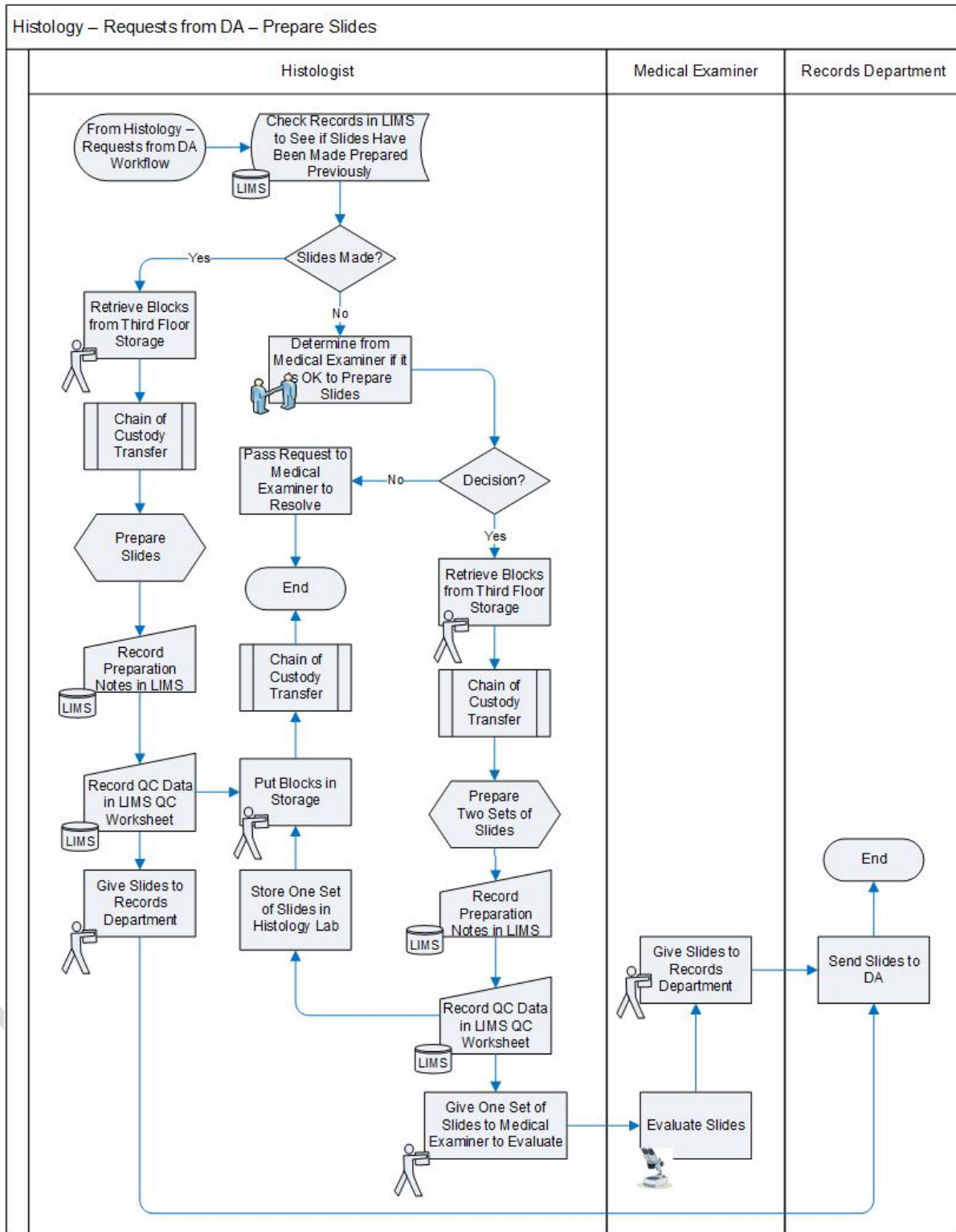


Figure 30 Histology - Requests from DA - Prepare Slides

9. RECEIVE AND TRANSFER EVIDENCE

Evidence Operations serves as a central receiving and storage location for evidence submitted to the TCME for processing. Evidence may be submitted by TCME MEs, FDIs, or an outside agency.

The Evidence Custodian receives evidence, verifies or generates the requested Service Requests and notifies the appropriate Analyst or Examiner to retrieve the evidence for processing. Should the Analyst or Examiner not be available, the Evidence Custodian places the evidence into long-term storage.

The introduction of a new LIMS would introduce the following changes to the workflow for evidence intake:

- External CoCs would be scanned into the LIMS
- Barcode labels would be printed from the LIMS

The following figure illustrates a conceptualized future state evidence intake workflow:

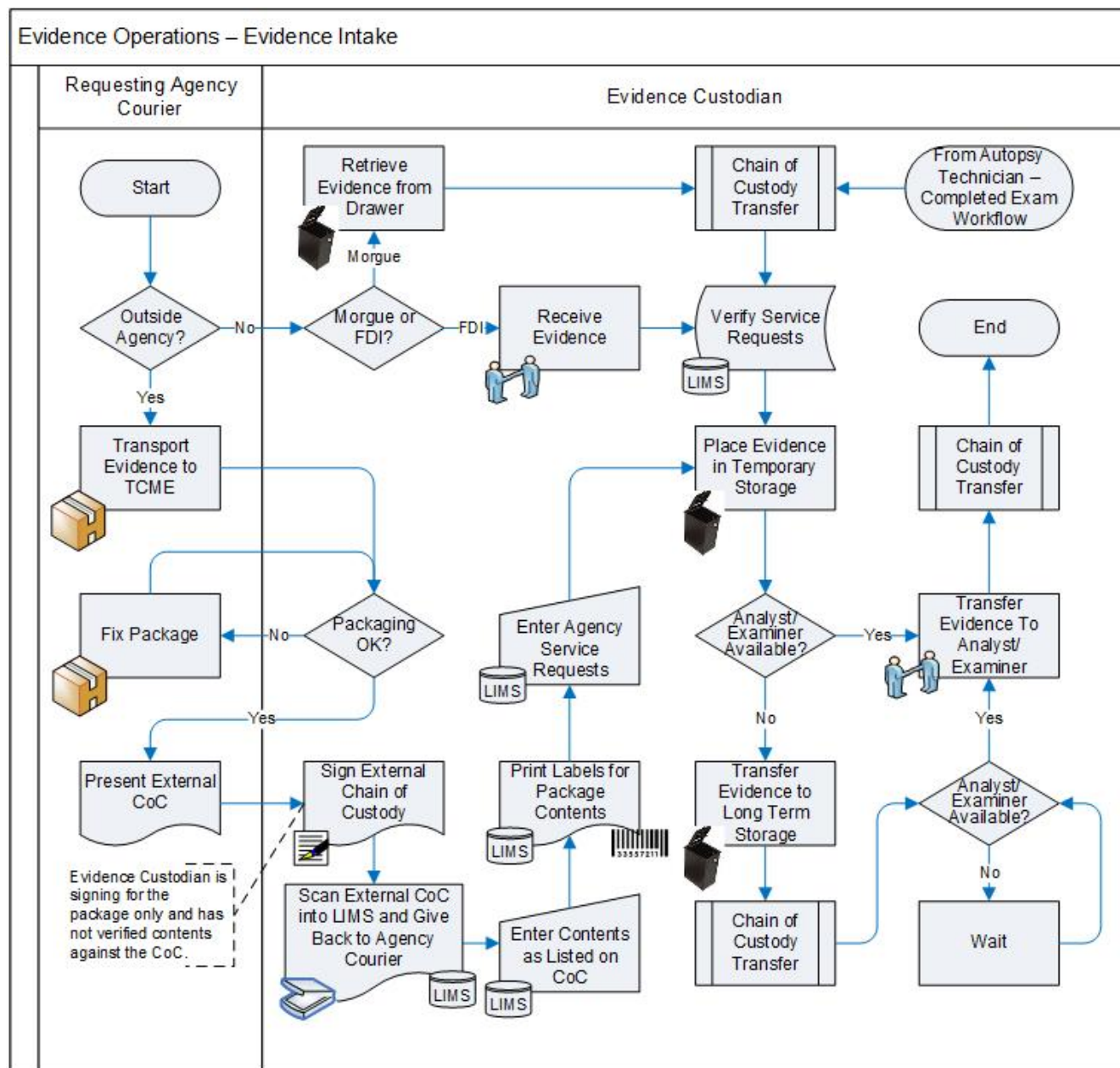


Figure 31 Evidence Operations - Evidence Intake

10. ANALYZE AND EXAMINE EVIDENCE

Two ASCLD/LAB accredited laboratory sections - Crime Laboratory and Toxicology Laboratory - provide support to the ME for identifying the CoD and MoD, as well as provide fee-for-service testing for other agencies.

10.1. CRIME LABORATORY

The Crime Laboratory consists of the following laboratory sections:

- Trace Evidence - Section 10.1.1
- Forensic Biology - Section 10.1.2
- Latent Fingerprints - Section 10.1.3
- Firearms and Tool Marks (FATM) - Section 10.1.4
- Forensic Photography - Section 10.1.5

If services from multiple laboratory sections are requested for a single item of evidence, the easily transferrable nature of trace evidence requires that items be submitted for trace evidence processing prior to the Latent Fingerprints and FATM Sections and either concurrent or prior to Forensic Biology as required by the nature of the evidence.

After a report is written by a Crime Lab Section, the case passes through a technical review by a peer analyst and an administrative review by the Crime Lab Director. Upon completion of the reviews, reports are distributed and bills are prepared. Section 10.1.6 describes the process for reviewing cases worked in the Crime Lab and for distributing reports.

10.1.1. Trace Evidence

Trace evidence is material that, because of its size or weight, can be transferred easily from one individual or object to another.

The Trace Evidence Section provides services to the TCME and its customer agencies. These services currently include gunshot residue (GSR) testing and hair screening for DNA suitability. The Trace Evidence Section is in the process of developing the capability to examine footwear and tire tread impressions but has yet to promulgate formal work procedures related to this expanded capability.

The Trace Evidence Section also provides trace recovery services for bodies brought into the morgue when it is determined that such evidence might exist and from vehicles or other items of evidence brought to TCME.

Service Requests for trace evidence analysis are communicated 1) by the FDIs when bodies that require trace evidence recovery are brought into the morgue, 2) when the on-call Trace Evidence Examiner creates a Service Request, and 3) by Service Requests generated by the MEs when trace evidence analysis is required for items recovered during their examinations. The various customer agencies of the TCME also submit evidence to Evidence Operations, and Evidence Custodians generate the Service Requests for these items.

The introduction of a new LIMS would introduce the following changes to the trace evidence workflows:

- The LIMS would provide the Trace Examiner with a worklist and notify the Examiner when new Service Requests for Trace Evidence services are entered into the system
- Items would be entered into the LIMS as evidence rather than into CRYPT
- The LIMS would generate barcode labels for newly entered evidence items
- The on-call Trace Examiner and Crime Lab Director would be notified via by text message from the LIMS when a Service Request for trace evidence recovery is entered into the system
- All work in the Trace Laboratory and when recovering trace evidence from vehicles would be documented in the LIMS using a tablet PC rather than on paper worksheets
- The LIMS would provide warnings when QC results are out of specification
- Photographs would be directly imported into the SDMS component of the LIMS for use in reports
- The LIMS would enable creation of batches
- Reports would be written in the LIMS rather than using a Word template
- Electronic signatures would eliminate the need for printing reports solely for the purpose of applying a signature
- Applying an electronic signature would cause the LIMS to notify the Technical Reviewer that a case is ready for review

10.1.1.1. Evidence Receiving

The following figure illustrates a conceptualized future state evidence receiving workflow:

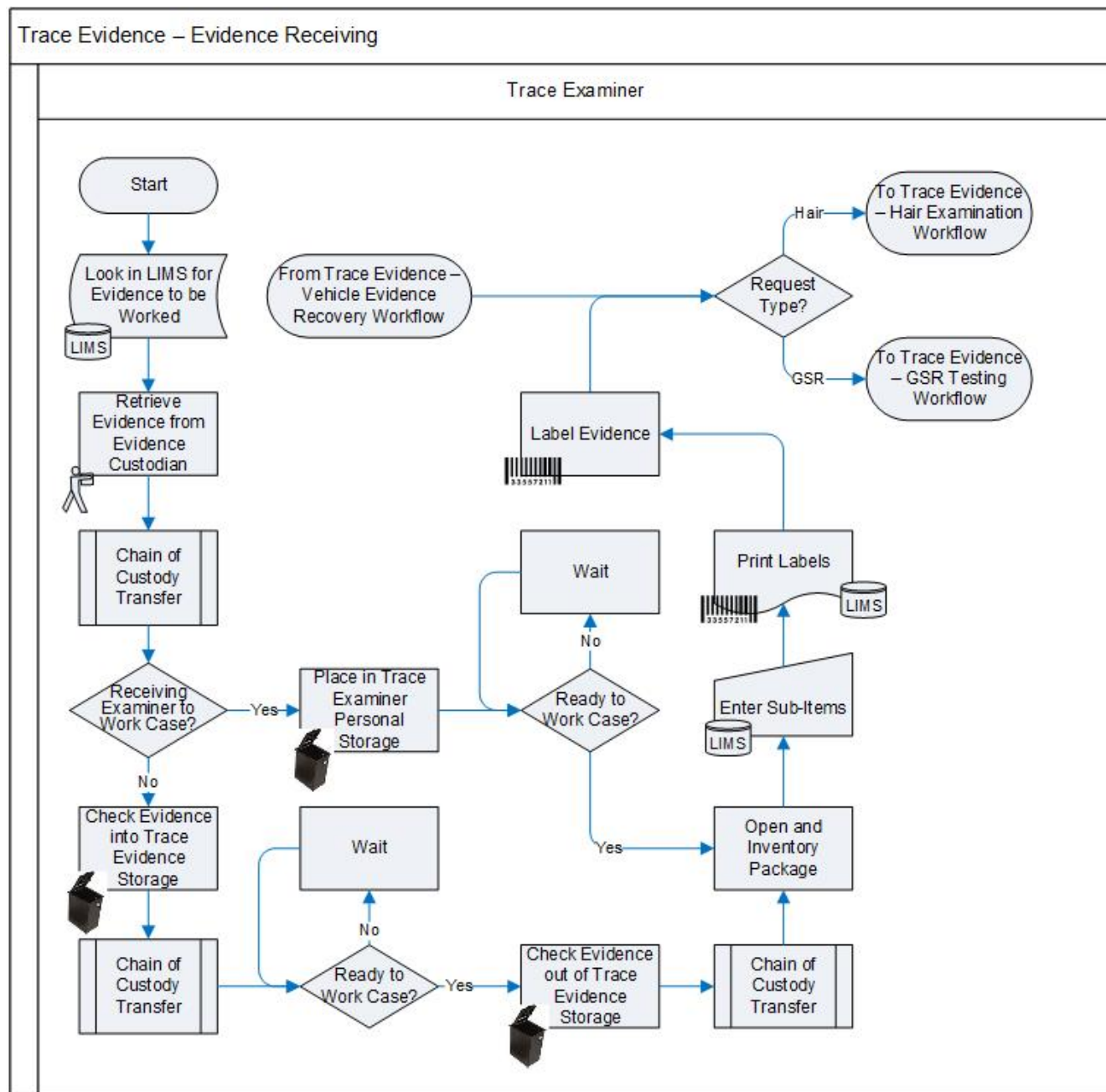


Figure 32 Trace Evidence - Evidence Receiving

10.1.1.2. Trace Evidence Recovery

The Trace Analysis Section is called upon to recover trace evidence from bodies or vehicles brought to the TCME when it is known or suspected that such evidence may exist. Requests for trace evidence recovery are communicated by: 1) a FDI or ME in the case of recovery from bodies, and 2) by an LEA when trace evidence is to be recovered from a vehicle. The assigned Trace Evidence Examiner documents the evidence retrieval and creates the Service Request for recovered evidence for both of these scenarios. After finishing their work, the Trace Evidence Examiner returns to the lab for further processing of the evidence and the body is released to the morgue staff for their examination.

1. Morgue Trace Evidence Recovery

The following figure illustrates a conceptualized future state morgue trace evidence recovery workflow:

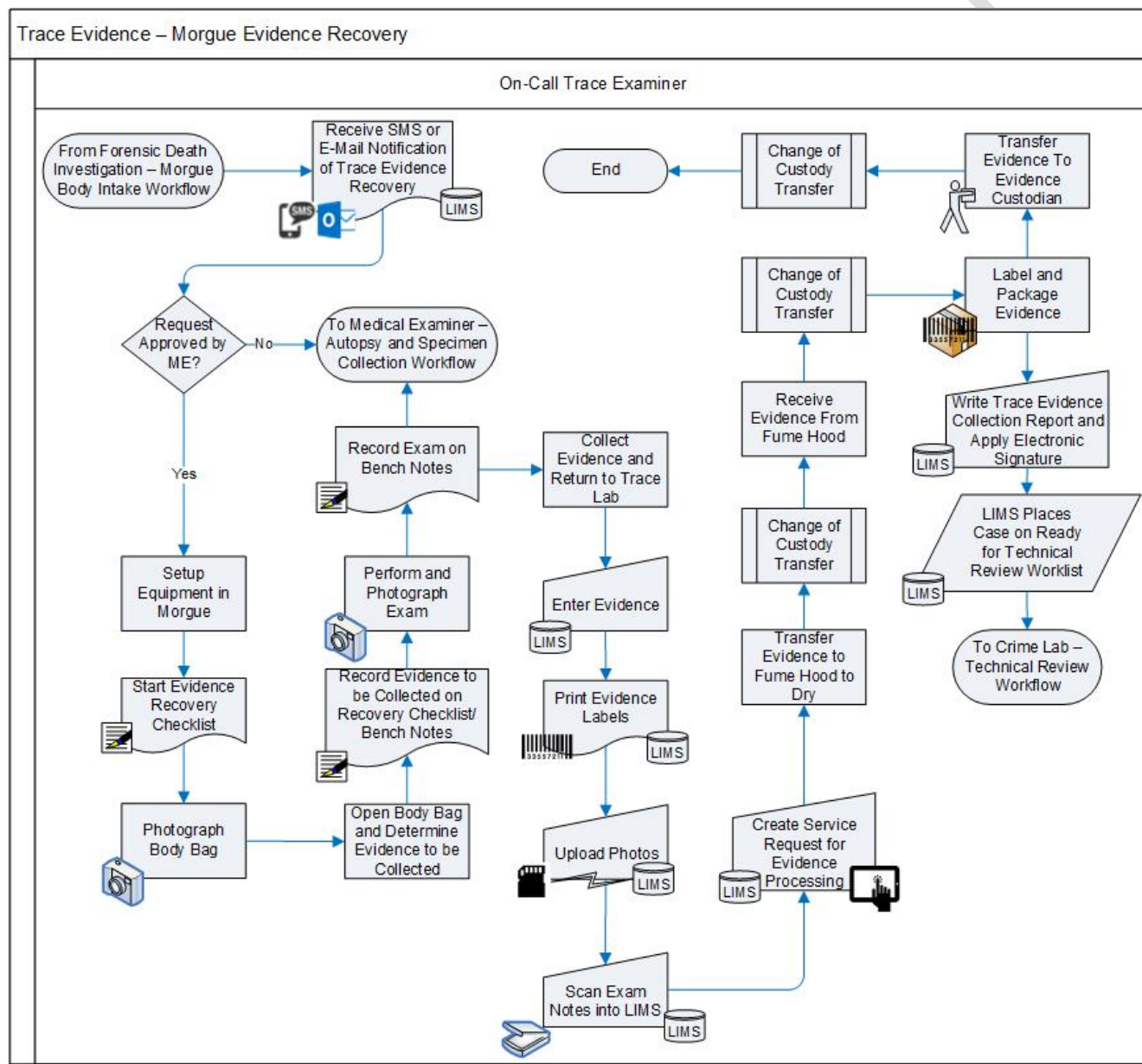


Figure 33 Trace Evidence - Morgue Trace Evidence Recovery

2. Vehicle Evidence Recovery

In addition to morgue trace evidence recovery, the Trace Evidence Section may also be called upon to recover evidence from a vehicle.

LIMS REP Updated

The following figure illustrates a conceptualized future state vehicle trace evidence recovery workflow:

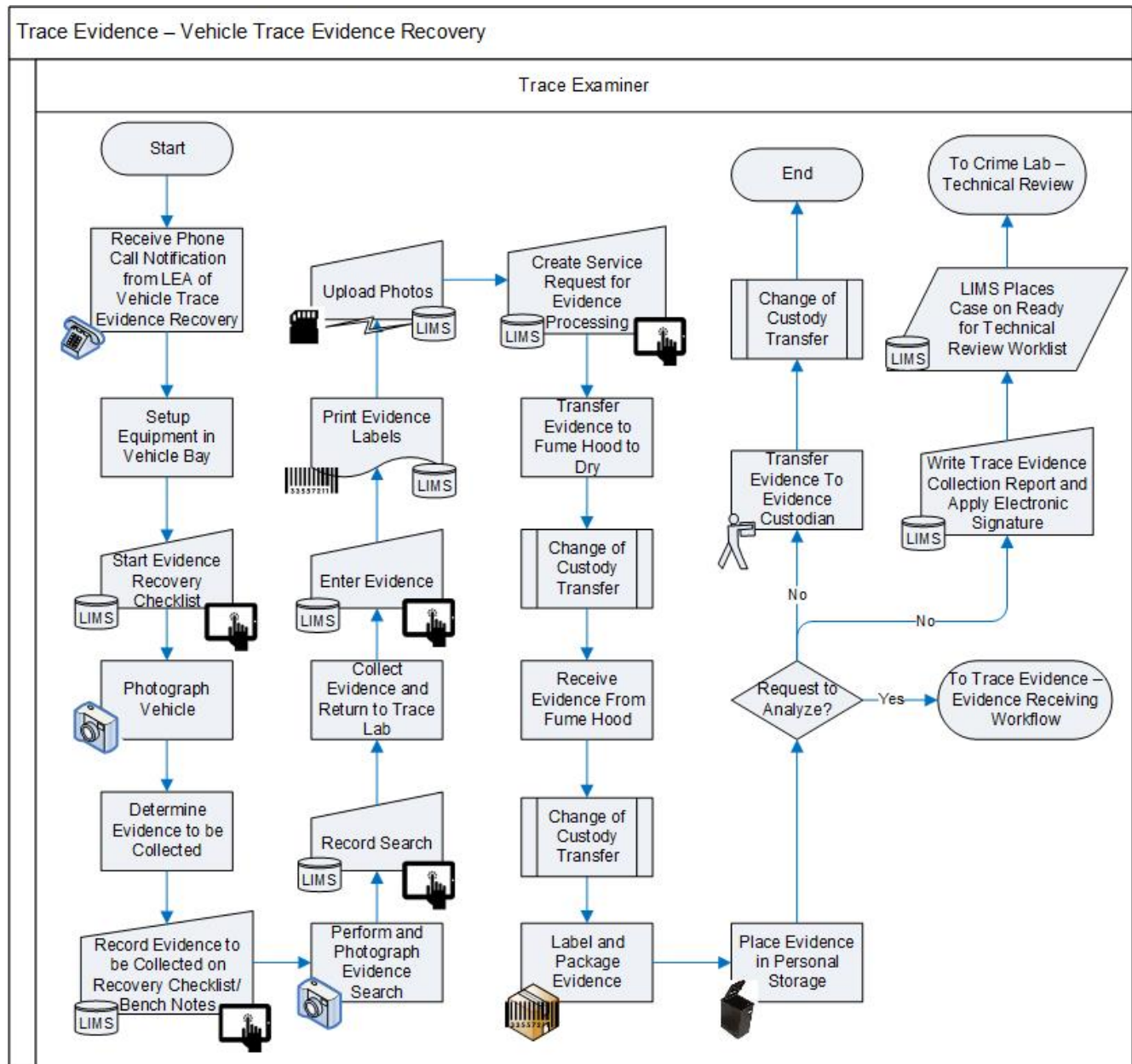


Figure 34 Trace Evidence - Vehicle Trace Evidence Recovery

10.1.1.3. Gunshot Residue (GSR) Testing and Analysis

Gunshot residue (GSR) testing is performed using scanning electron microscopy/energy dispersive X-ray spectrometry (SEM/EDX). Particles containing lead (Pb), antimony (Sb) and barium (Ba) with morphology and size characteristics consistent with GSR is considered evidence of GSR.

The following two figures illustrate conceptualized future state GSR testing and analysis workflows:

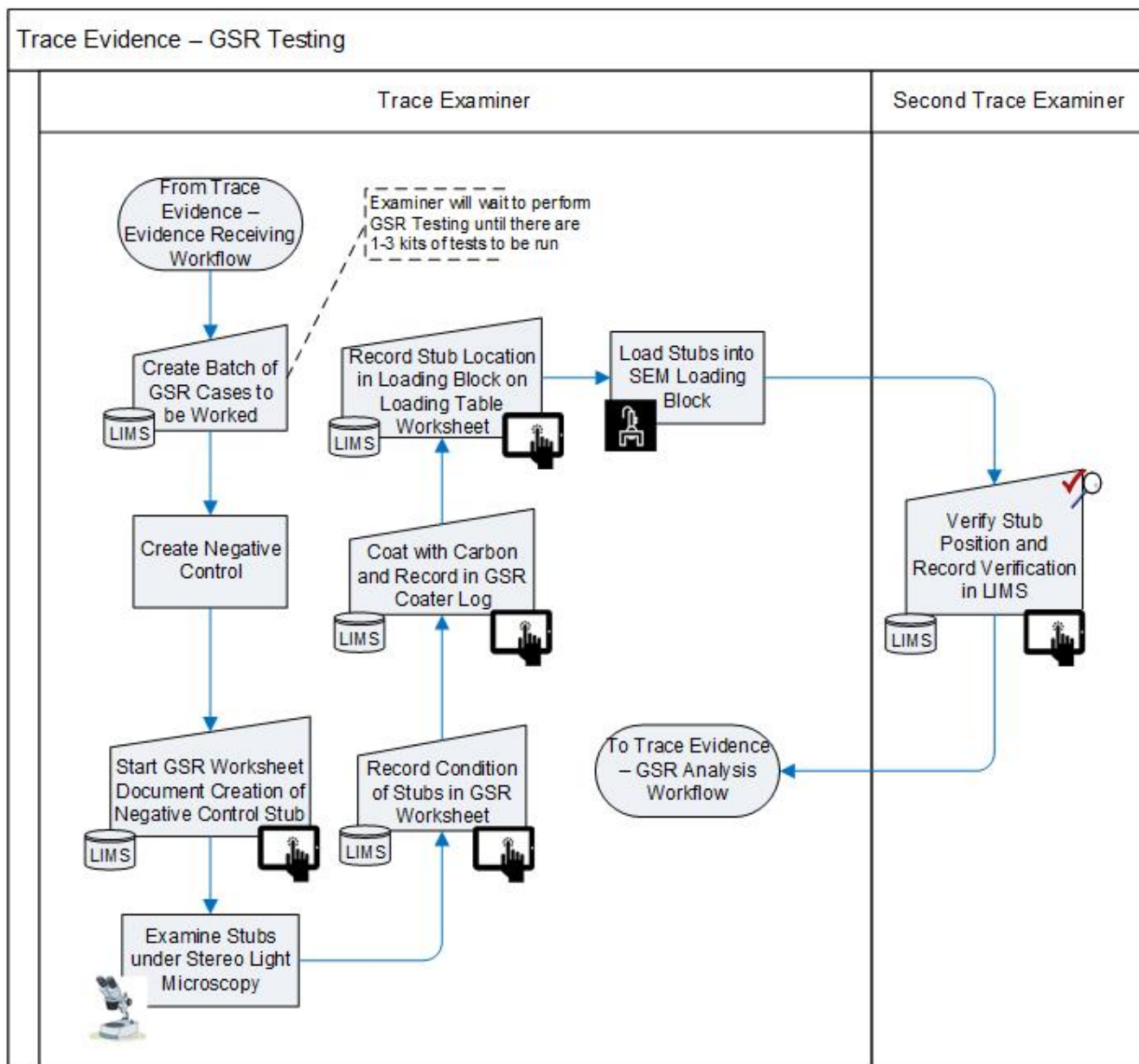


Figure 35 Trace Evidence - GSR Testing

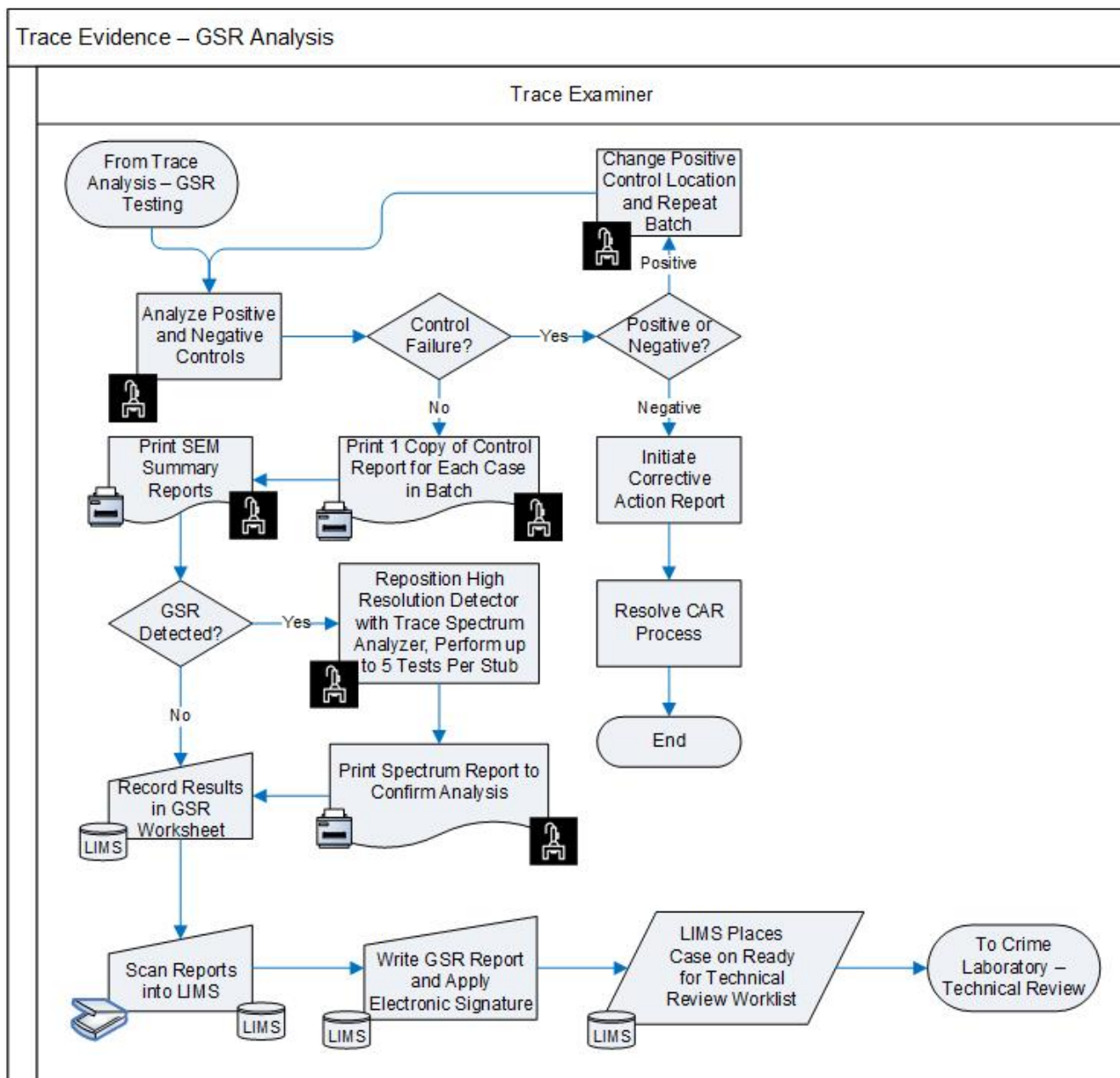


Figure 36 Trace Evidence – GSR Analysis

10.1.1.4. Hair Examination

Hair examination is performed by light microscopy. An item of evidence is examined and its characteristics recorded. Photomicrographs are used to document the appearance of the item

of evidence. Evidence consistent with hair is determined to be of either human or animal origin. Detailed fiber analysis is beyond the scope of the TCME Trace Analysis Section.

LIMS REP Updated

The following figure illustrates a conceptualized future state hair examination workflow:

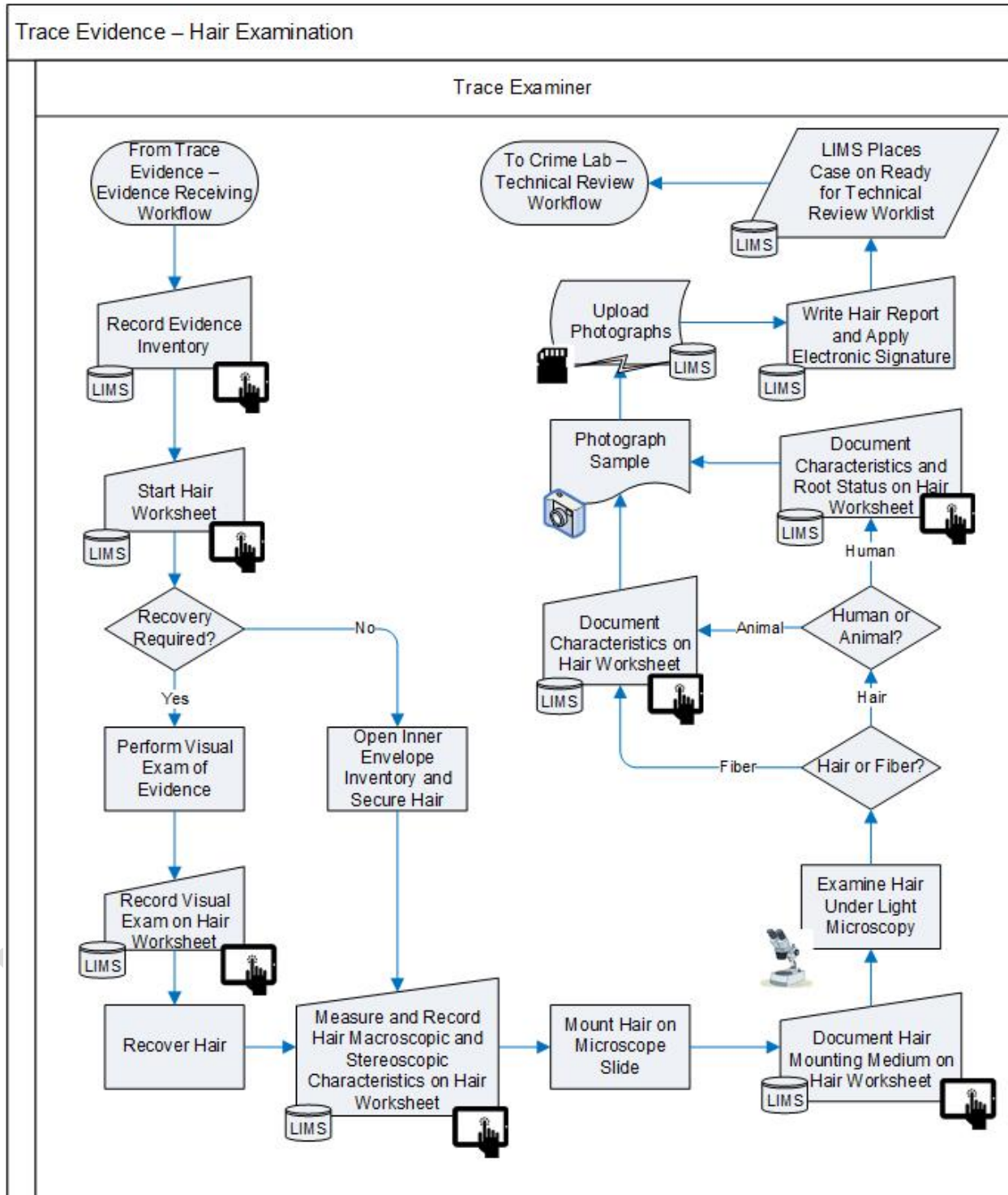


Figure 37 Trace Evidence - Hair Examination

10-1-2- Forensic Biology

The Forensic Biology Section examines evidence for the presence of biological material (e.g., blood, and semen) and performs DNA testing. DNA analysis provides the ability to restrict potential populations of persons to which a biological sample might belong to a much smaller subset of suspects. Such a determination is useful in identifying the source and, subsequently, connecting that source to a particular death or crime scene.

Additionally, the DNA laboratory is a designated CODIS (Combined DNA Index System) laboratory. CODIS is the FBI's DNA database that links all 50 states and 18 countries to provide a means of comparing forensic casework profiles. The database search may result in linking unsolved cases to a single perpetrator and can provide significant investigative leads.

In addition to examining evidence for biological materials and performing DNA Analysis, the Forensic Biology Section collects blood cards from the morgue and stores these cards.

10-1-2-1. Case Assignment

The Forensic Biology Technical Leader assigns cases to specific analysts. This practice differs from the other Crime Lab sections where the section members informally decide who will work a case. Cases are not assigned until the TCME receives approval to work the case from the involved LEA.

The introduction of a new LIMS would introduce the following changes to the workflow for case assignment in the Forensic Biology Section:

- Cases would be assigned to Analysts in the LIMS
- Analysts would receive notification of the assignment via the LIMS
- The Evidence Custodian would be notified of evidence requests via the LIMS
- Attempted dates of contact to the LEA would be recorded in the LIMS
- LEA approvals and refusals for analysis would be recorded in the LIMS instead of a spreadsheet
- Case cancellations would be recorded in the LIMS instead of a spreadsheet
- Electronic case files would replace paper case files

The following two figures illustrate conceptualized future state workflows for assigning cases in the Forensic Biology Section:

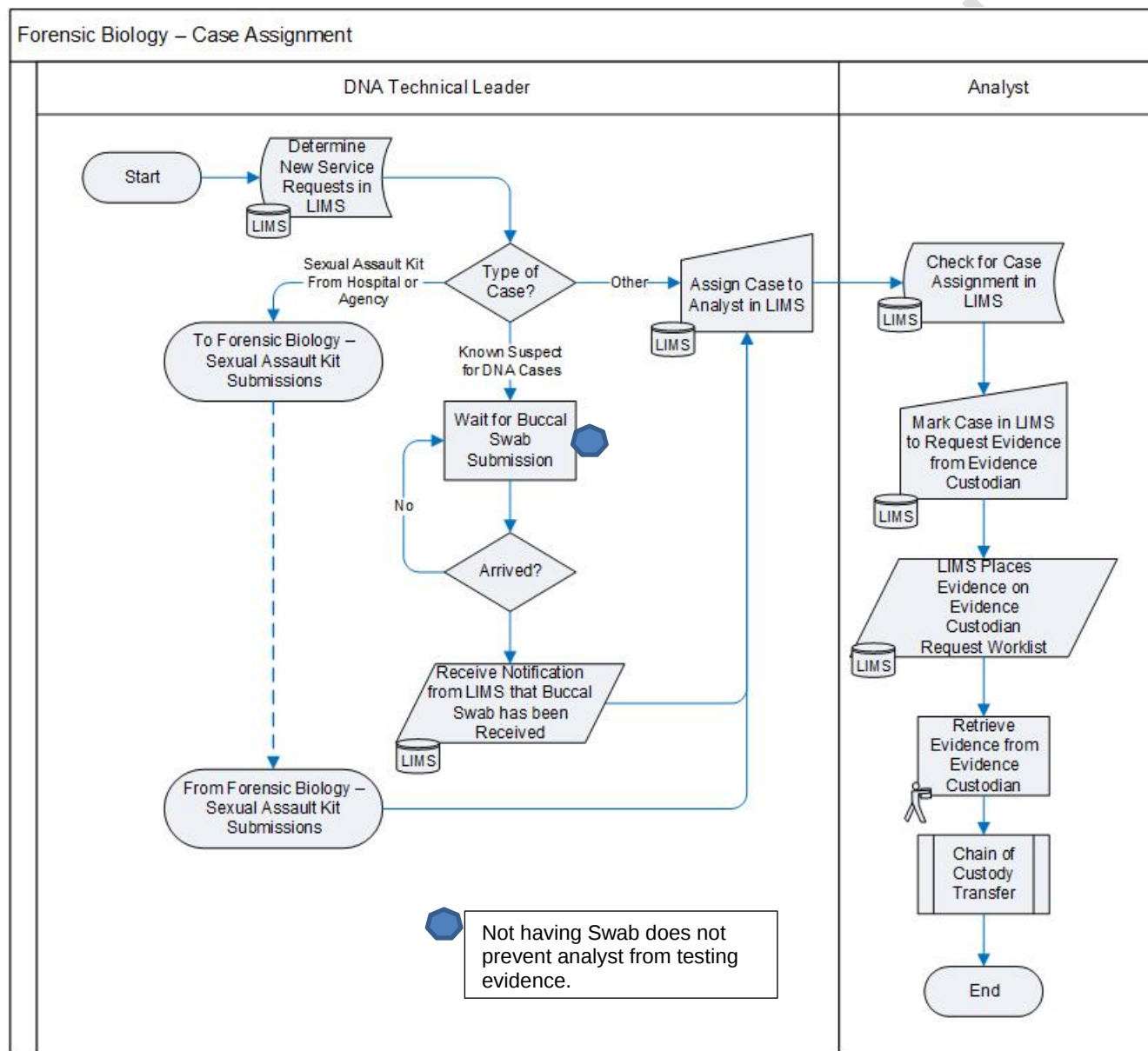


Figure 38 Forensic Biology – Case Assignment

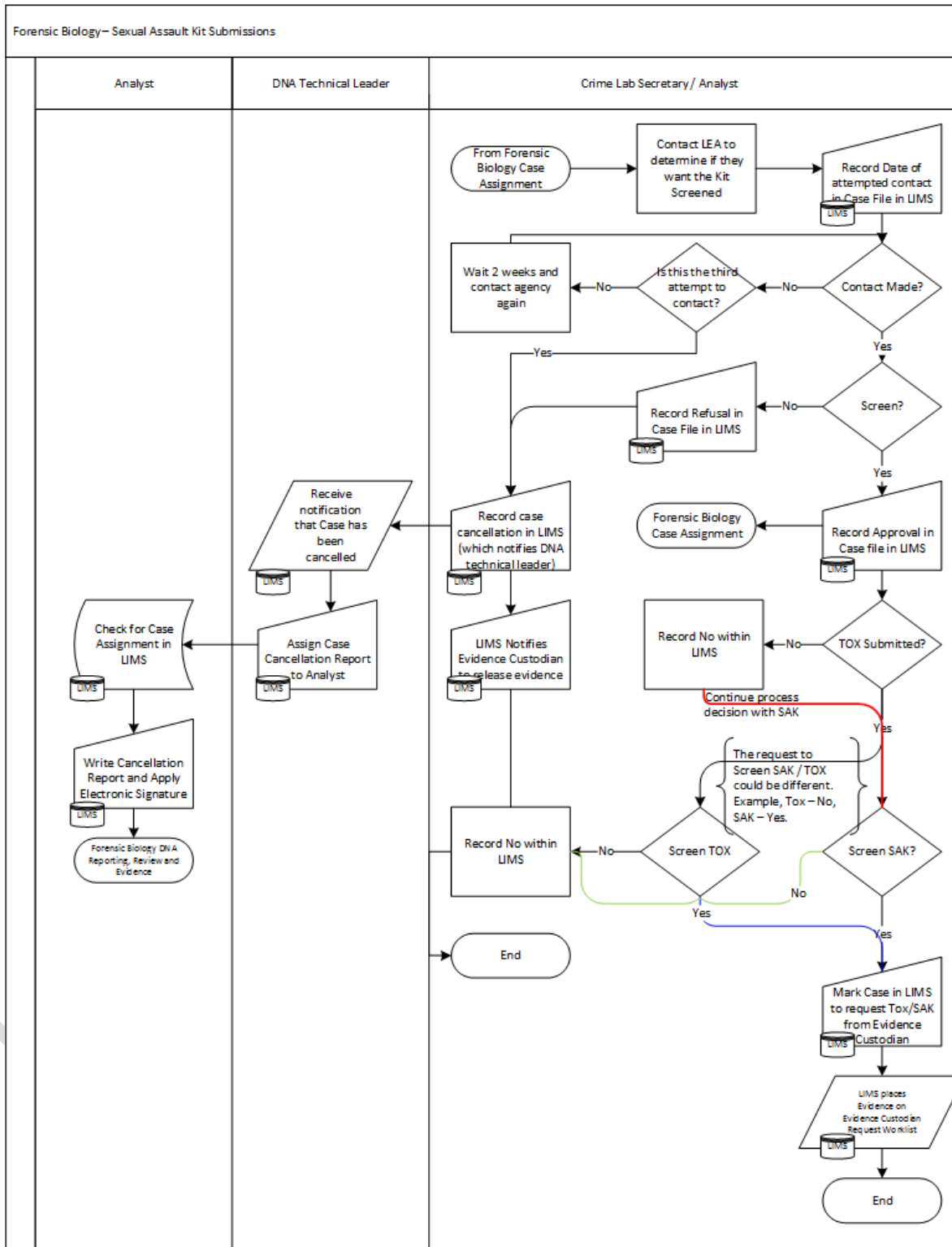


Figure 39 Forensic Biology - Sexual Assault Kit Submissions

10.1.2.2. Serology

The Forensic Biology Section searches evidence for the presence of semen in specimens obtained from sexual assault kits. The specimens may consist of slides, swabs or clothing. Analysts perform a series of tests until they can rule out the presence of semen or confirm the presence of semen. When semen is detected, the Forensic Biology Section retains the applicable specimens for DNA testing. The Forensic Biology Section also contacts the applicable LEA to request a buccal specimen if possible suspects have been identified by the LEA.

The introduction of a new LIMS would introduce the following changes to the serology workflows:

- All sample results and QC results would be recorded in the LIMS instead of on paper worksheets
- The LIMS would provide warnings when QC results are out of specification

The following figure illustrates a conceptualized future state process for searching for semen:

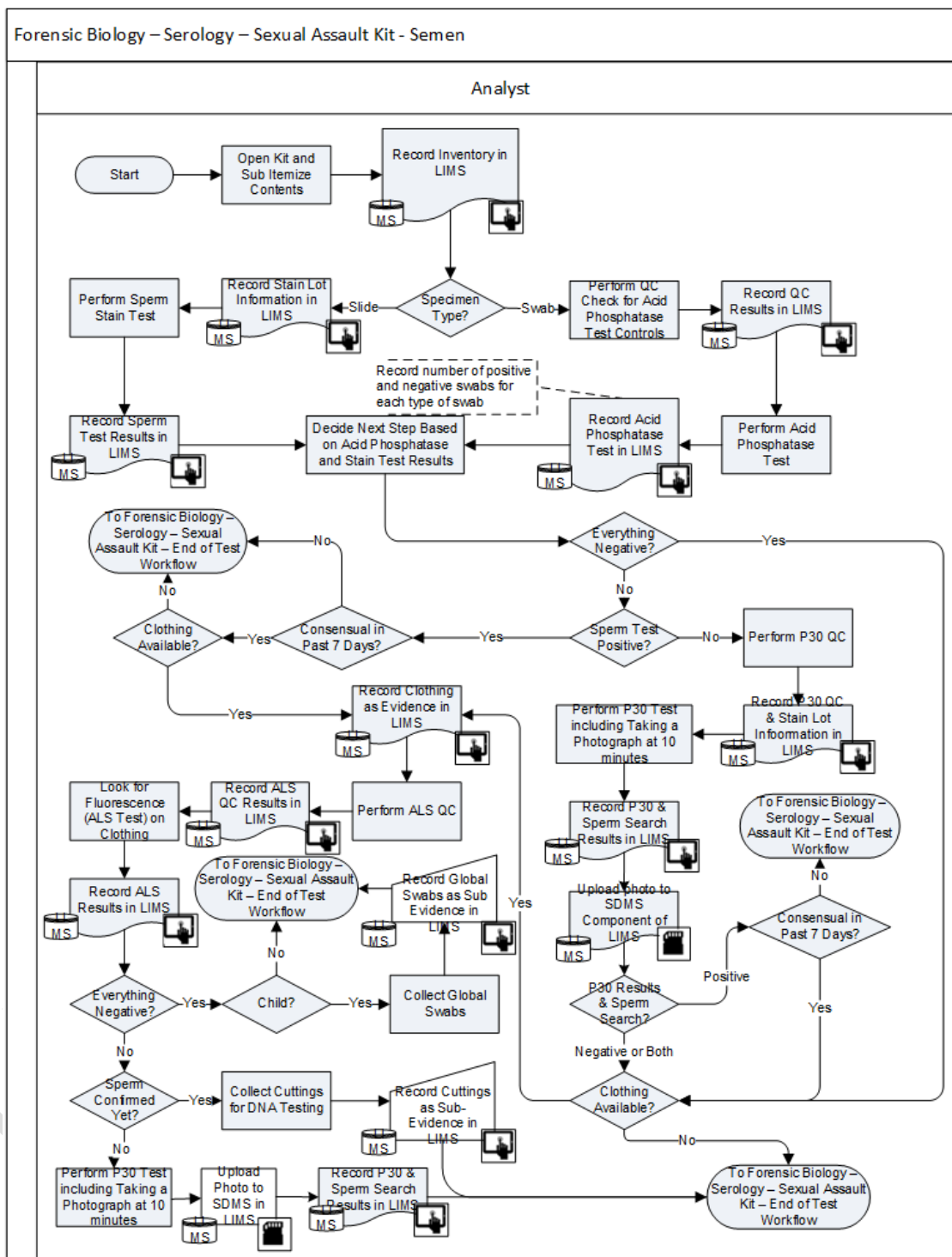


Figure 40 Forensic Biology - Serology - Sexual Assault Kit - Semen

The Forensic Biology Section also searches for the presence of blood on clothing. If human blood is detected, the Analyst takes a cutting of the clothing so that the DNA profile of the blood can be determined.

LIMS REP Updated

The following figure illustrates a conceptualized future state process for searching for human blood on clothing:

LIMS REP Updated

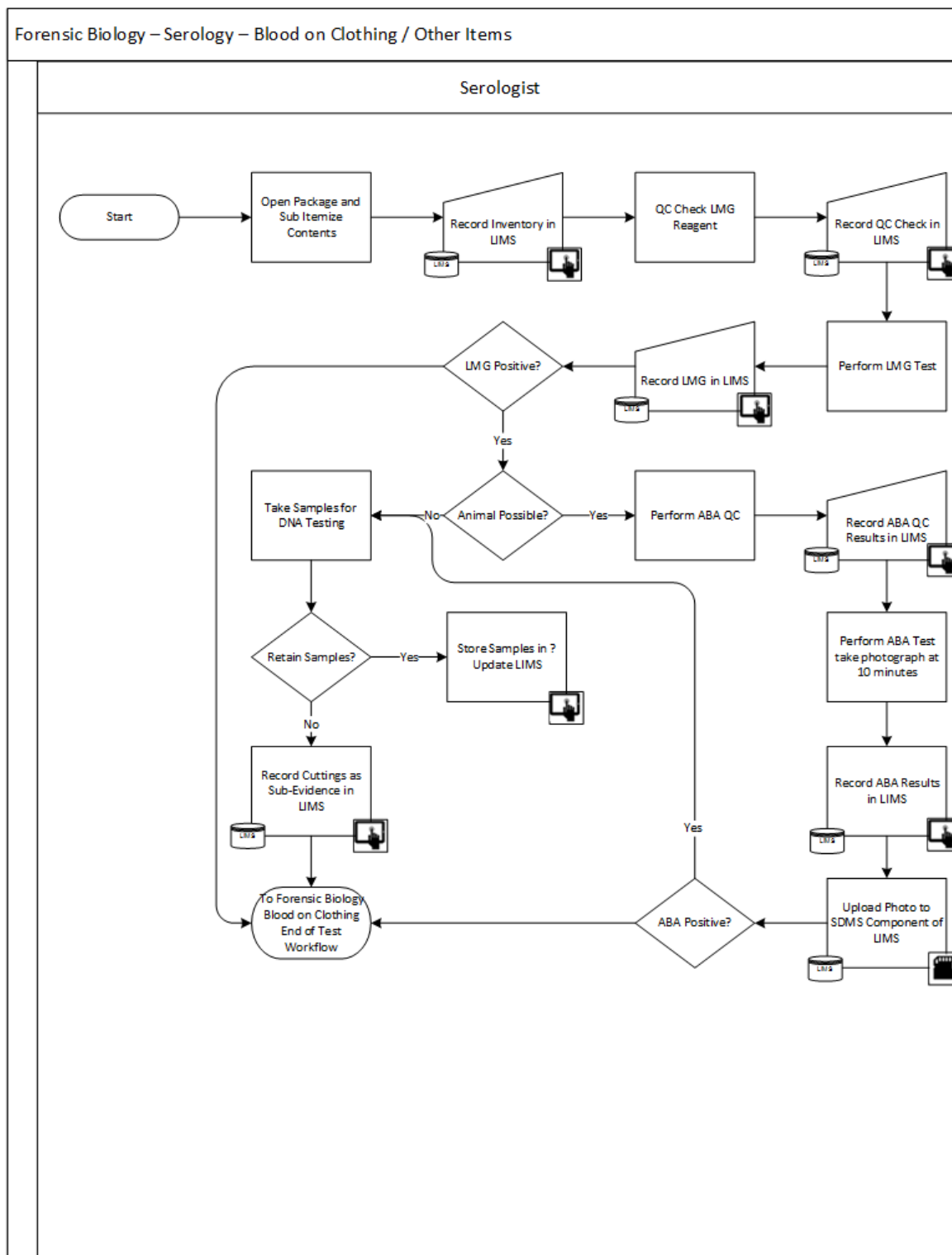


Figure 41 Forensic Biology - Serology - Blood on Clothing

The following figure illustrates a conceptualized future state end of test process referred to in the previous two figures:

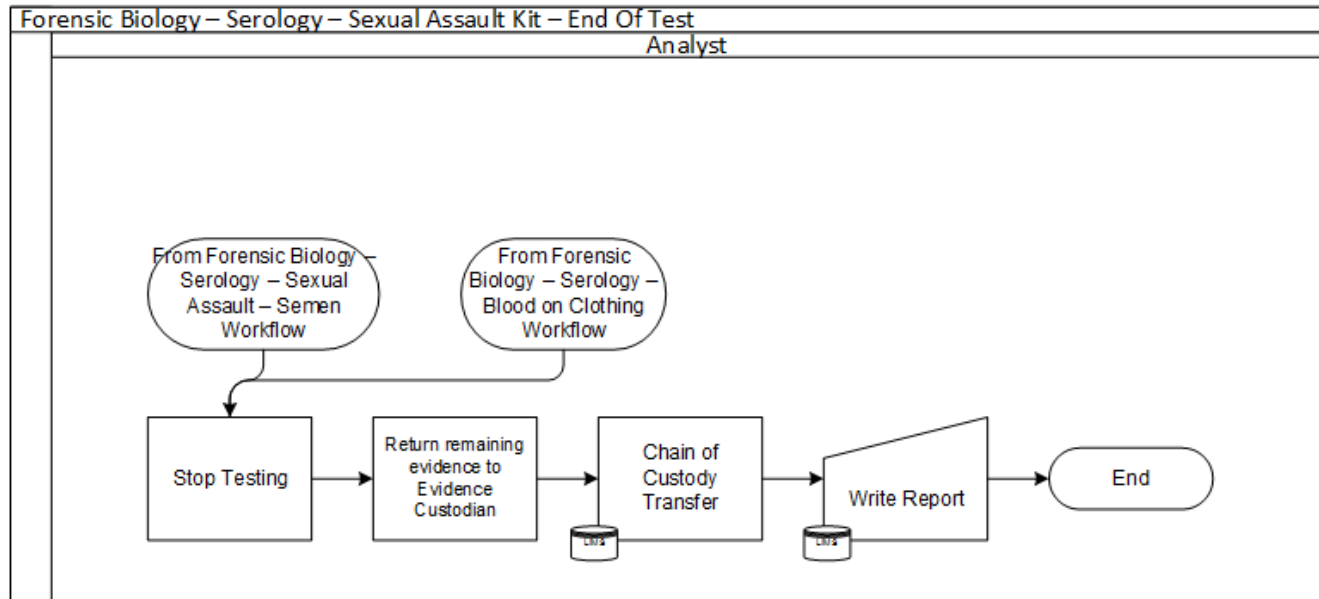


Figure 42 Forensic Biology - Serology - Sexual Assault Kit - End of Test

10.1.2.3. DNA Testing

DNA analysis is a five-step process:

1. Extraction
2. Quantitation
3. Amplification
4. Electrophoresis
5. Analysis - Typing

The introduction of a new LIMS would introduce the following changes to the DNA testing workflows:

- All sample results and QC results would be recorded in the LIMS instead of on paper worksheets
- The LIMS would provide warnings when QC results are out of specification

- Reagent lot numbers and master mix components would be recorded in the LIMS instead of on paper worksheets
- Photographs would be uploaded to the SDMS component of the LIMS
- Tube/Deck checks would be recorded in the LIMS instead of on paper worksheets
- Start and stop times would be recorded in the LIMS instead of on paper worksheets
- Plate locations of samples would be entered into the LIMS and then directly transferred to the robot liquid handlers via an electronic interface
- Reports from the robot liquid handlers would be directly transferred to the LIMS via an electronic interface
- RT PCR (7500) ID (A,B) Would be recorded in LIMS
- Thermal Cycler (9700) ID (A, B, C, D) would be recorded in LIMS
- Provision to Record in LIMS - When Set-ups are manual, Quant/Amp/CE
- Standard curve and plat layout assignments would be directly transferred from the quantitation software into the LIMS via an electronic interface
- Well plate positions would be entered into the LIMS and then transferred directly from the LIMS into the capillary electrophoresis collection software via an electronic interface
- Calculations that are currently performed using a calculator would be performed by the LIMS
- Barcode labels would be printed from the LIMS

The following workflows refer to 'tube or deck checks'. These checks are performed by a second analyst.

1. Extraction

The following figure illustrates a conceptualized future state DNA extraction process in the Forensic Biology Section:

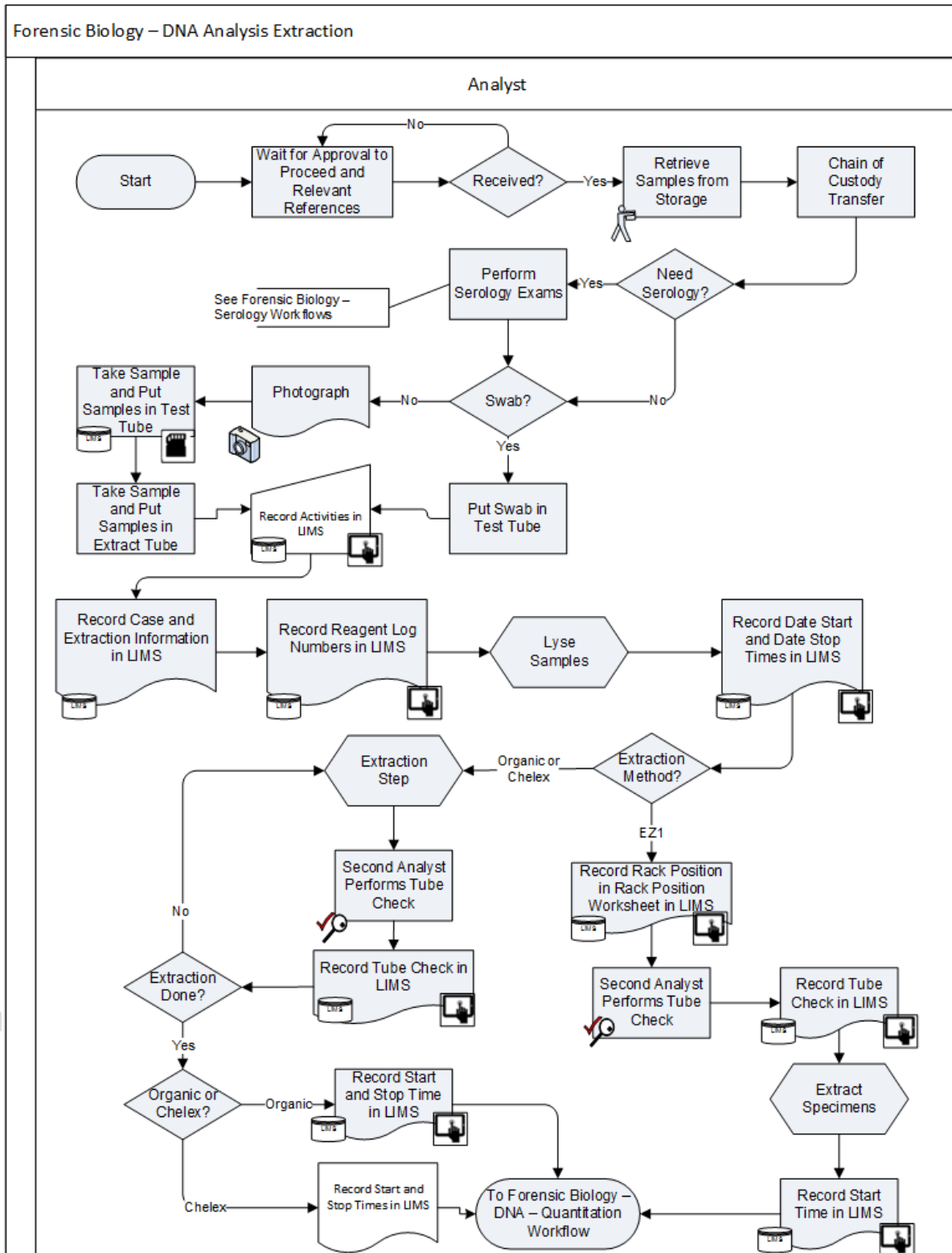


Figure 43 Forensic Biology - DNA - Extraction**2. Quantitation**

After extraction, it is essential to assess the quantity of DNA present in the extract prior to amplification in order to obtain the most conducive results. A real-time polymerase chain reaction (PCR) assay uses a small portion of an extract to determine its capability to amplify and thereby estimate the quantity of human and male DNA present in the sample.

The following figure illustrates a conceptualized future state quantitation process:

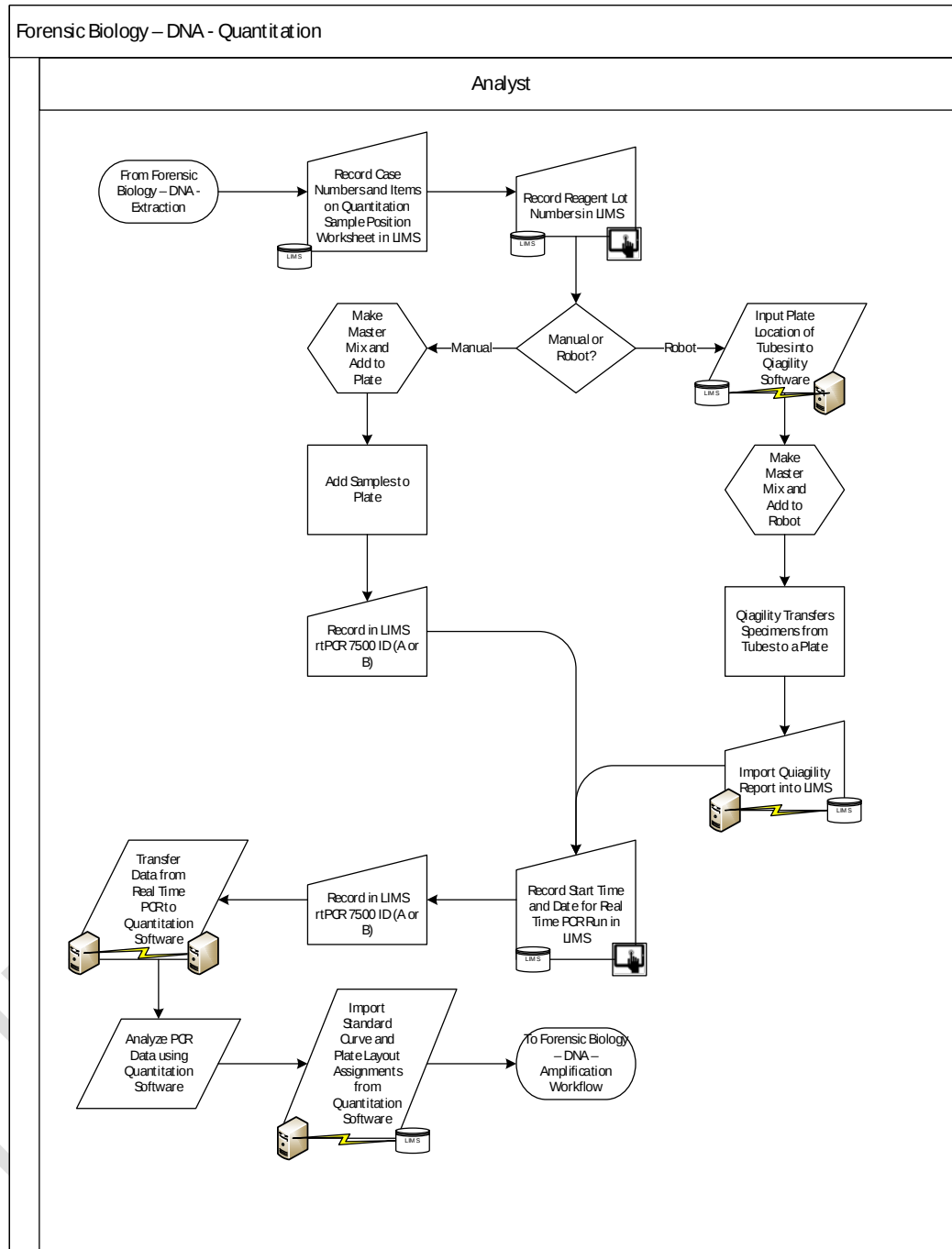


Figure 44 Forensic Biology - DNA - Quantitation

3. Amplification

In order to ascertain if a profile(s) is present in a sample's extract, the purified DNA is replicated and labeled for detection using PCR. The following figure illustrates a conceptualized future state amplification process:

LIMS REP Updated

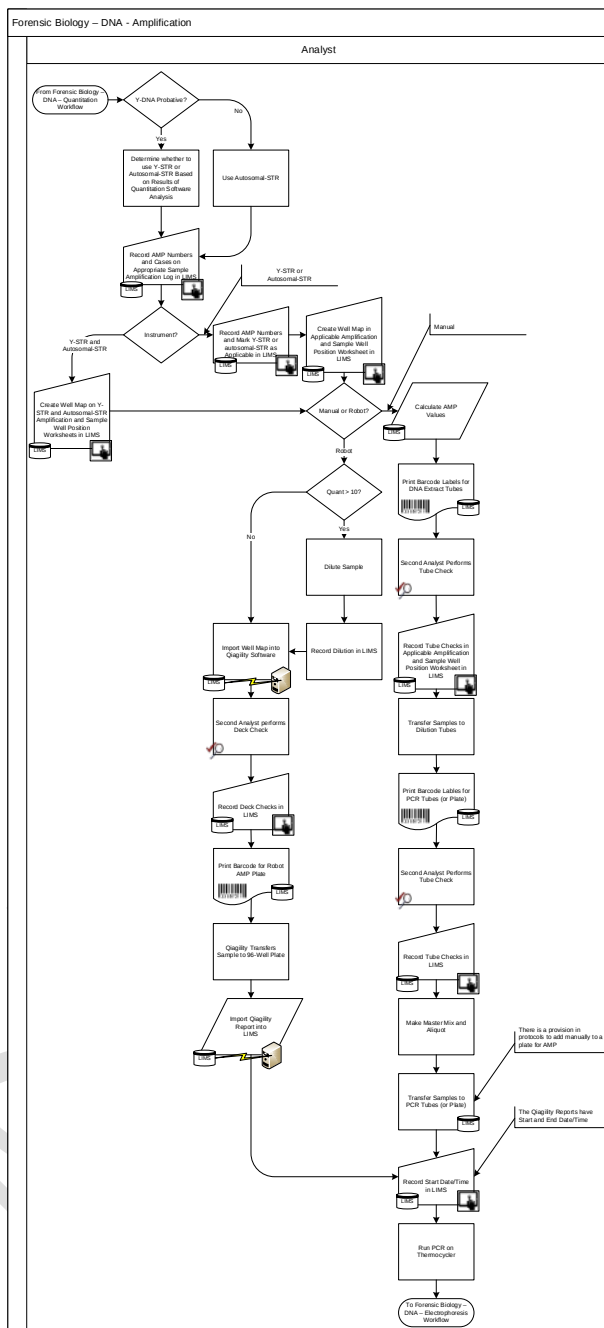


Figure 45 Forensic Biology - DNA - Amplification

4. Electrophoresis

A capillary electrophoresis instrument converts amplified DNA into an interpretable, graphical display called an electropherogram. The data are used to facilitate the deduction of results to determine the potential contributor(s) to a DNA profile associated with an item of evidence.

The following figure illustrates a conceptualized future state electrophoresis process:

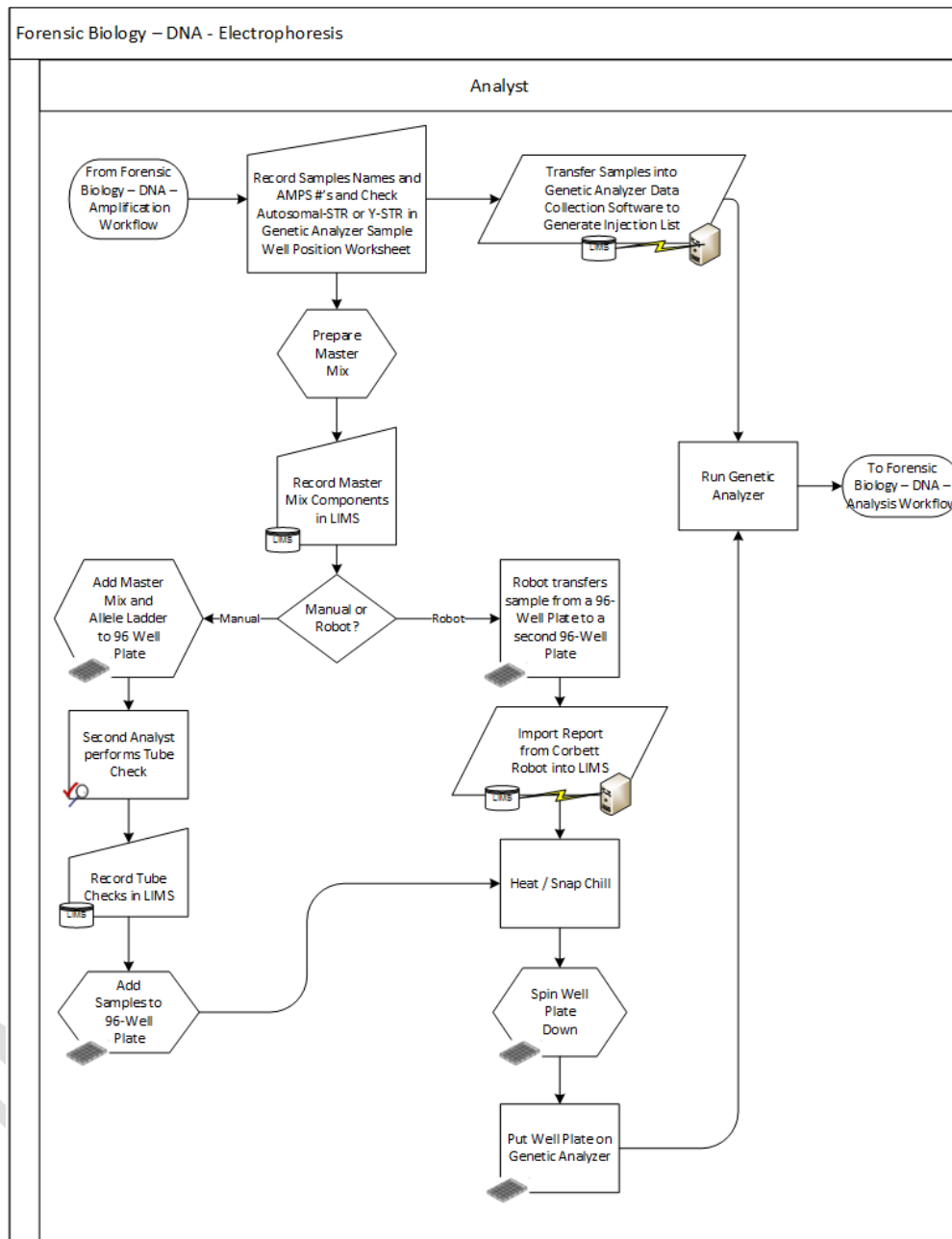


Figure 46 Forensic Biology – DNA – Electrophoresis

5. Analysis

Upon completion of the electrophoresis run, the data file generated by the Genetic Analyzer is imported into the AB GeneMapper ID-X®. The GeneMapper ID-X® software generates an electropherogram for each sample, which is a plot of the relative fluorescence units (rfu) signal versus retention time. Each peak of the electropherogram is called an allele. Each amplified DNA fragment produces zero to many alleles. The electropherograms are printed from GeneMapper ID-X®. Each electropherogram includes the sample name, the DNA locus and the allele designation, height, and size in base pairs of alleles at each locus.

All electropherograms are evaluated for quality, and determinations are made regarding whether a sample needs rework e.g., re-extract, re-quantitate, re-amplify, or re-run/re-inject. Finally, the Analyst evaluates the generated DNA profile to determine how many contributors are present and whether a match/inclusion/exclusion can be made based on the DNA profiles obtained from known (reference) samples submitted with the case. If a match or inclusion is made, i.e., there is consistency between the evidence and the reference, statistical calculations are made to determine the significance (probability) of the match or inclusion. The results may also be entered into CODIS.

The following figure illustrates a conceptualized future state analysis process:

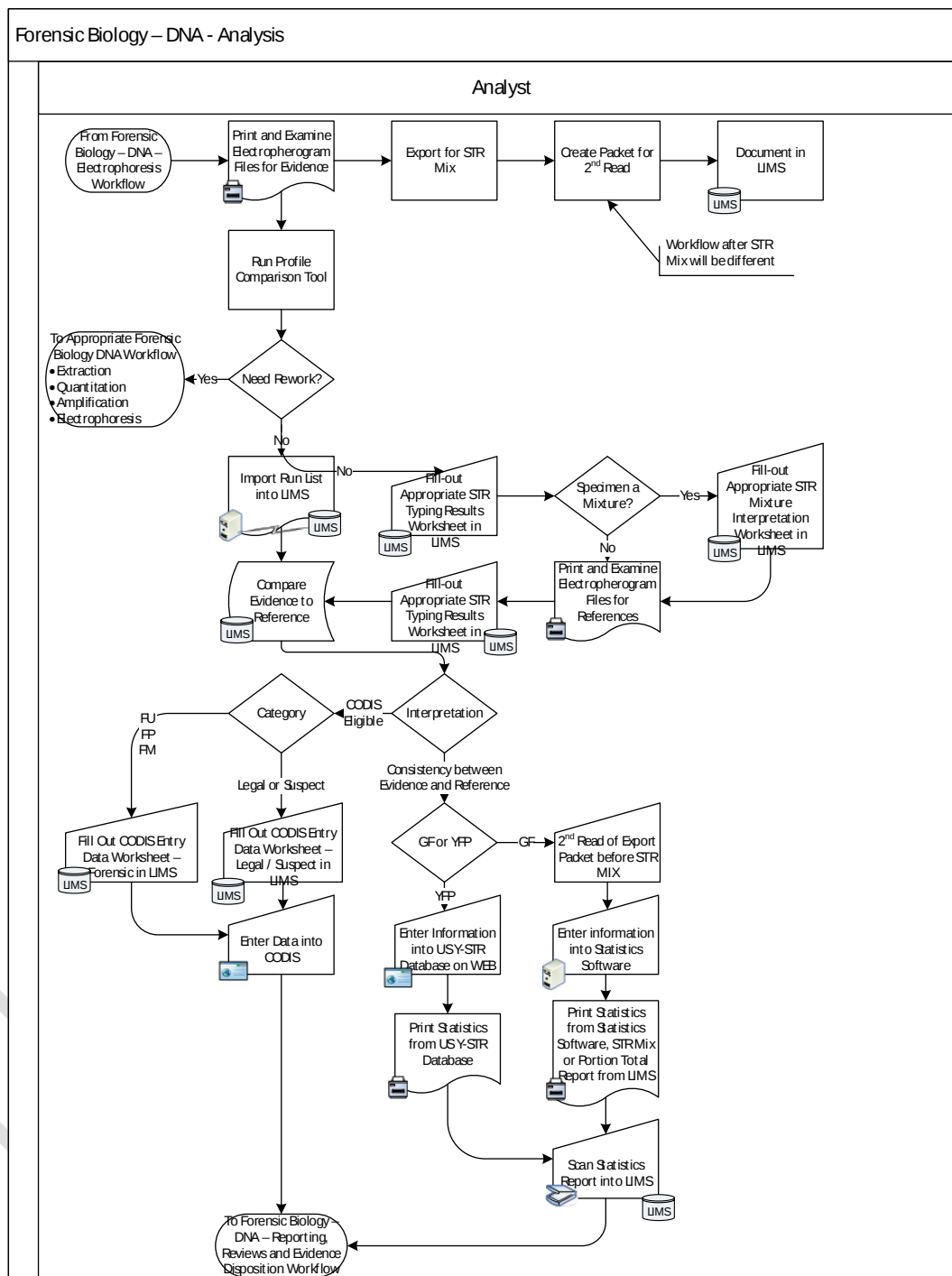


Figure 47 Forensic Biology - DNA - Analysis

10.1.2.4. Reporting, Technical and Administrative Reviews

The introduction of a new LIMS would introduce the following changes to the DNA reporting and review workflow:

- DNA extracts would be recorded in the LIMS instead of CRYPT
- Barcode labels for the DNA extracts would be printed from the LIMS
- CoC transfers to the Evidence Department would be via the formal LIMS CoC capability
- Reports would be written in the LIMS rather than using a Word template
- The Technical Leader would receive notification when a case is ready for review
- The Technical Leader would assign reviewers via the LIMS
- Reviewers would be notified of pending reviews via the LIMS
- Electronic review forms in the LIMS would replace paper review forms
- Completion of review forms would create notifications for the next activity
- The Crime Lab secretary would be notified when reports are ready for distribution via the LIMS

The following figure illustrates conceptualized future state processes for creating a report and for the subsequent technical and administrative reviews for completed cases, as well as the storage of DNA extracts and return of evidence to the Evidence Custodian:

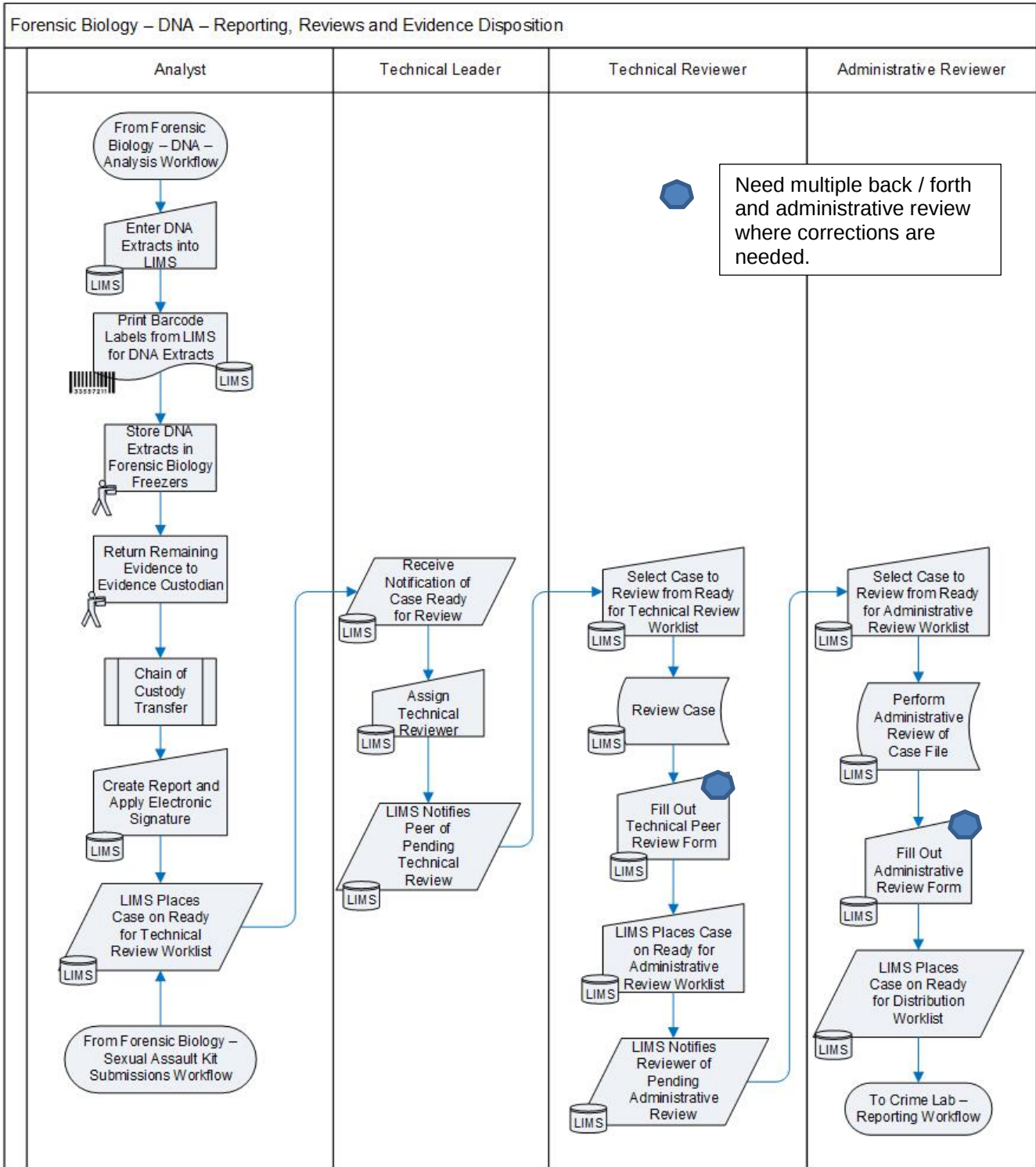


Figure 48 Forensic Biology - DNA - Reporting, Reviews and Evidence Disposition

10-1-2-5- Blood Cards

The following figure illustrates a conceptualized future state process for collecting and storing blood cards:

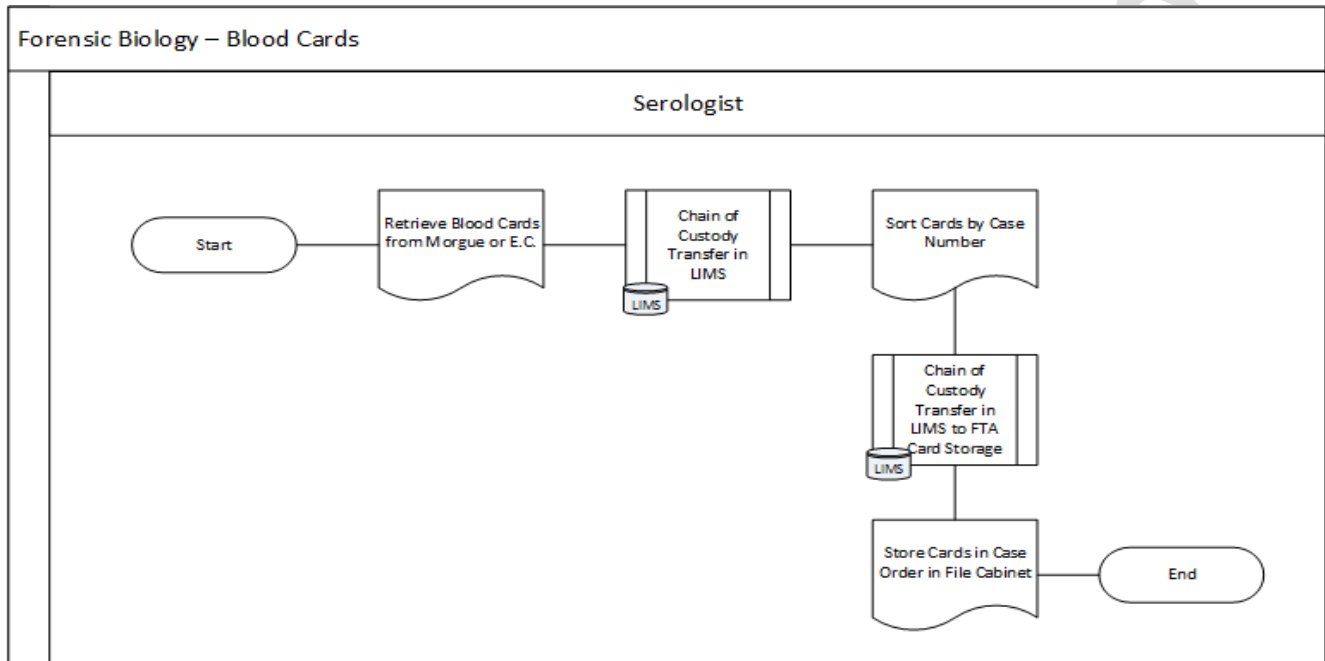


Figure 49 Forensic Biology - Blood Cards

10-1-3-Latent Fingerprints

Latent fingerprint examination is a fundamental tool of the ME's Office. Fingerprints can also be retrieved from submitted evidence and used to assist in identifying a crime suspect.

The introduction of a new LIMS would introduce the following changes to the latent fingerprints workflows:

- The Fingerprint Examiner would be notified by the LIMS when a new Service Request is received
- All documentation would be entered directly into the LIMS using a Tablet PC
- Photographs would be directly uploaded to the SDMS component of the LIMS for use in comparisons and reports

- 10-Print cards and latent print card images resulting from AFIS hits would be imported directly into the SDMS component of the LIMS for comparisons and reports
- The LIMS would provide warnings when QC results are out of specification
- Reports would be written in the LIMS rather than using a Word template
- Completed case reports would be E-mailed to an external qualified examiner for verification of comparisons and technical review thereby eliminating the need for travel

10.1.3.1. Case Assignments

The majority of cases for the Latent Fingerprints Section are generated through Service Requests for agencies submitting evidence to the Evidence Custodian. The requesting agency details the testing desired and submits evidence for the examiners to process. Service Requests are also generated by the FDIs when evidence is recovered in the course of their work.

10.1.3.2. Latent Fingerprint Examinations

The Latent Fingerprints Section follows a number of protocols to extract fingerprint impressions from a wide variety of surfaces. Once obtained, the fingerprints can be compared with known examples. Should no examples be available, the fingerprints may be submitted for an AFIS search in an effort to locate a match. AFIS results are used to obtain fingerprint records for comparison.

The Latent Print Section also plays an important role in the Human ID Laboratory (See Section 7.2). Fingerprints serve as the primary means of identifying unknown decedents and homicide victims.

1. Fingerprint Packaging Documentation

When evidence is received and ready to be processed by the Latent Fingerprints Section, the packaging of the items is first inspected and documented. The contents of the package are verified against the inventory on the CoC. Any discrepancies are documented and additional items are recorded on the CoC.

The following figure illustrates a conceptualized future state packaging documentation workflow:

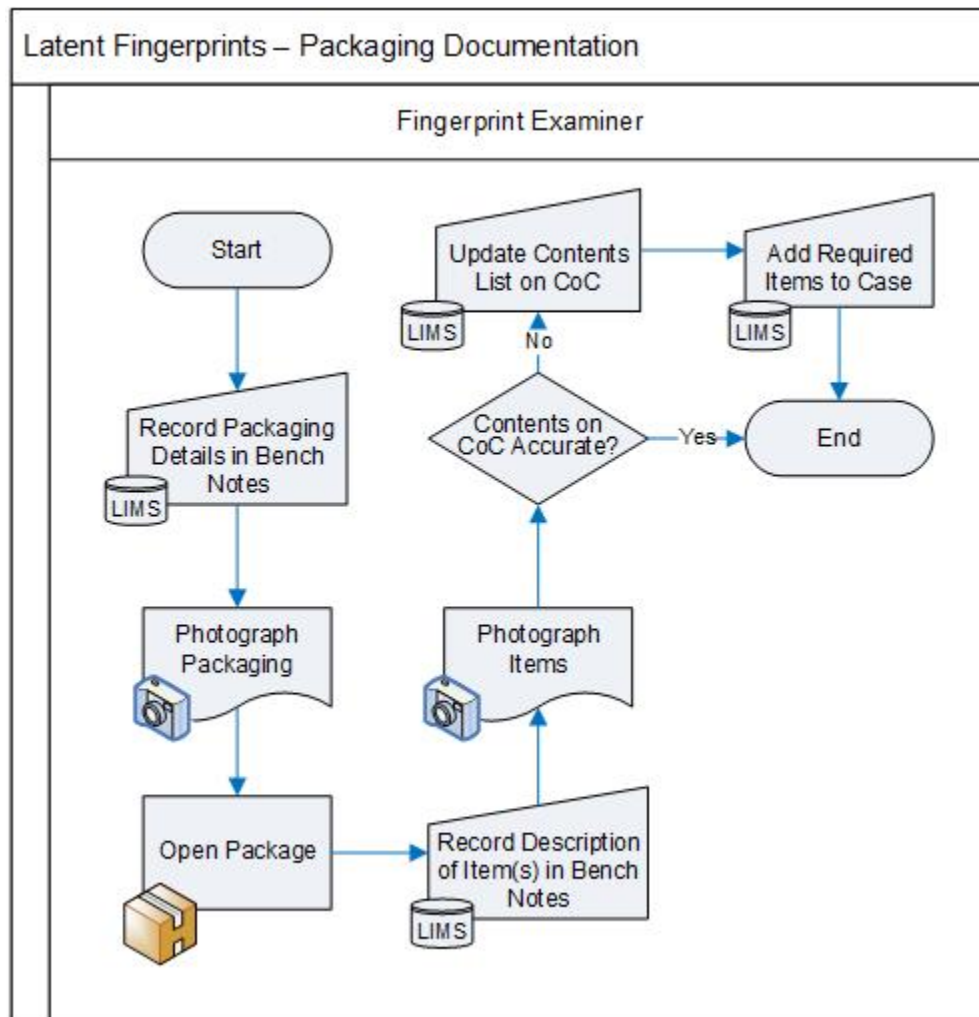


Figure 50 Latent Fingerprints – Packaging Documentation

2. Latent Fingerprint Processing

Evidence is received from the Evidence Custodian. Fingerprints can be developed by multiple techniques. The Latent Fingerprint Examiner determines the best protocol(s) to obtain usable fingerprints and determines the order in which these protocols should be executed. A single item of evidence may consist of multiple surface types requiring the same item to be processed multiple times. As each protocol is executed, any fingerprints that are developed are retained for analysis.

Along with evidence from processing, fingerprints developed by outside agencies may be directly submitted into evidence and subject to analysis without further processing.

A report is generated after all fingerprints have been obtained from an item and all comparisons have been made on an item of evidence.

LIMS REP Updated

The following figure illustrates a conceptualized future state latent fingerprint processing workflow:

LIMS REP Updated

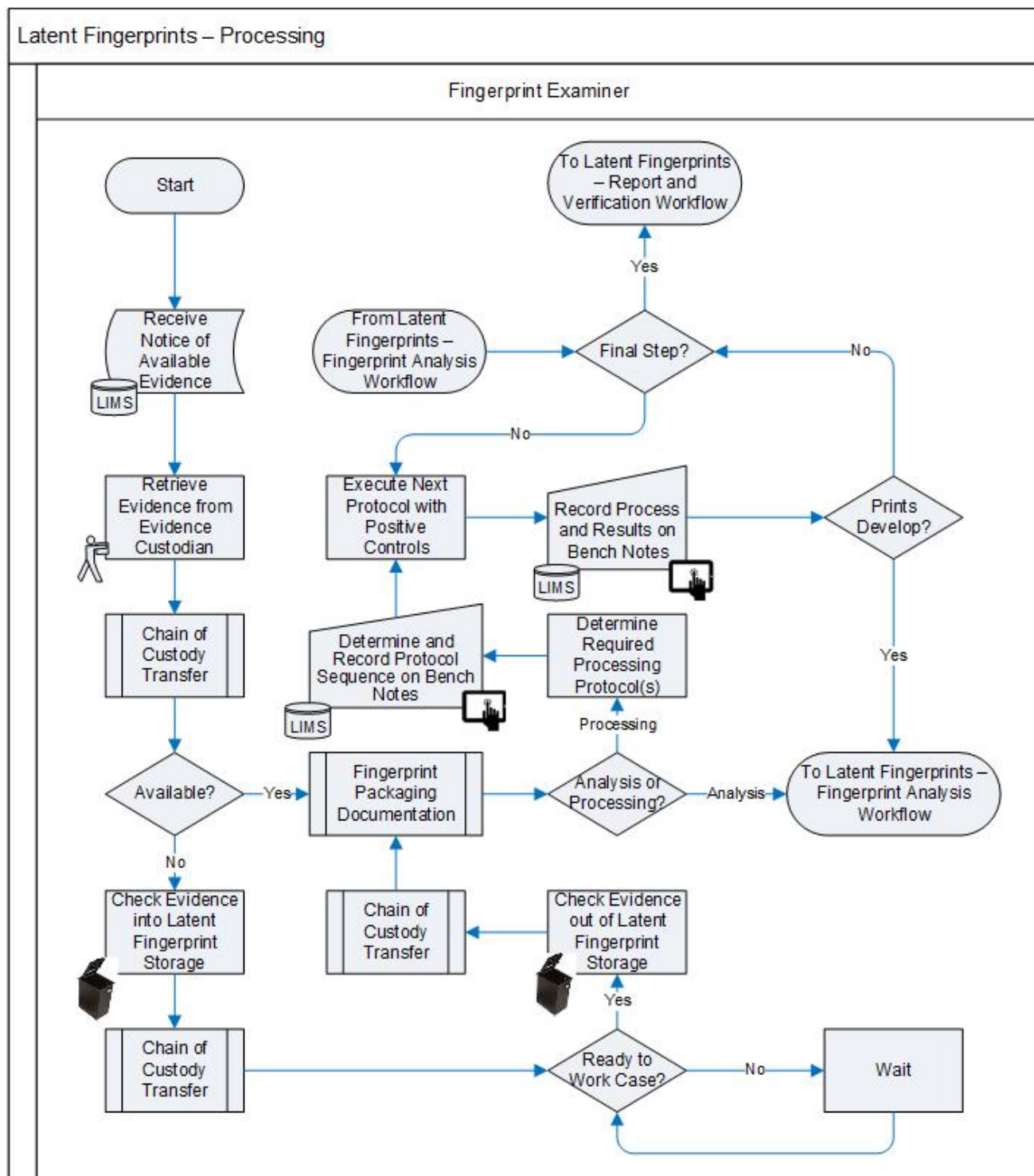


Figure 51 Latent Fingerprints – Processing

3. Fingerprint Analysis

Fingerprints obtained through evidence processing must have sufficient quality and quantity of impressions to be of use in analysis. An individual fingerprint may be determined to be of value for direct comparison, but the same fingerprint, due to the above characteristics, may be unsuitable for use in producing a match through an AFIS search.

Prints without known comparisons that are of sufficient value are submitted for an AFIS search. AFIS provides tentative identification that must be confirmed by a direct comparison between the fingerprint to be evaluated and known examples from records provided by the AFIS search.

Fingerprint comparison is a continuous process whereby unknown prints are compared with known examples obtained via submission from an outside agency, AFIS search, or a records search conducted using a tentative ID.

The following figure illustrates a conceptualized future state fingerprint analysis process:

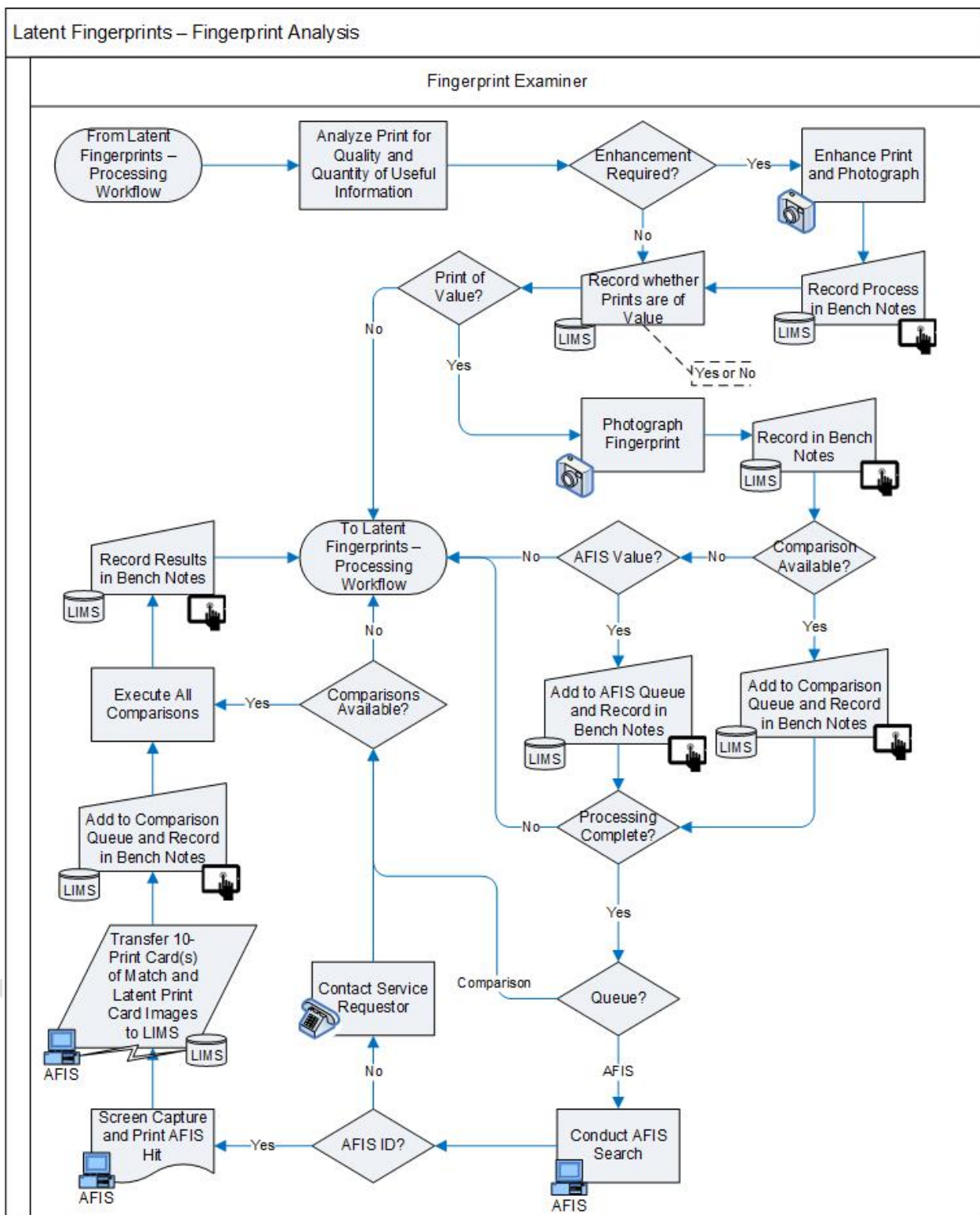


Figure 52 Latent Fingerprints - Fingerprint Analysis

4. Reporting and Verification

After all comparisons are complete, the Fingerprint Examiner produces a report. All fingerprint comparisons must be verified by a second qualified examiner. Due to the fact that the TCME only has a single Fingerprint Examiner, TCME uses the Fort Worth Police Department Fingerprint Examiner to verify all comparisons and for technical review. The proposed workflow assumes this person will have limited access to the LIMS to perform the verification function.

A third qualified examiner would be consulted if the primary examiner and the reviewer cannot come to a consensus.

The following figure illustrates a conceptualized future state report and verification process:

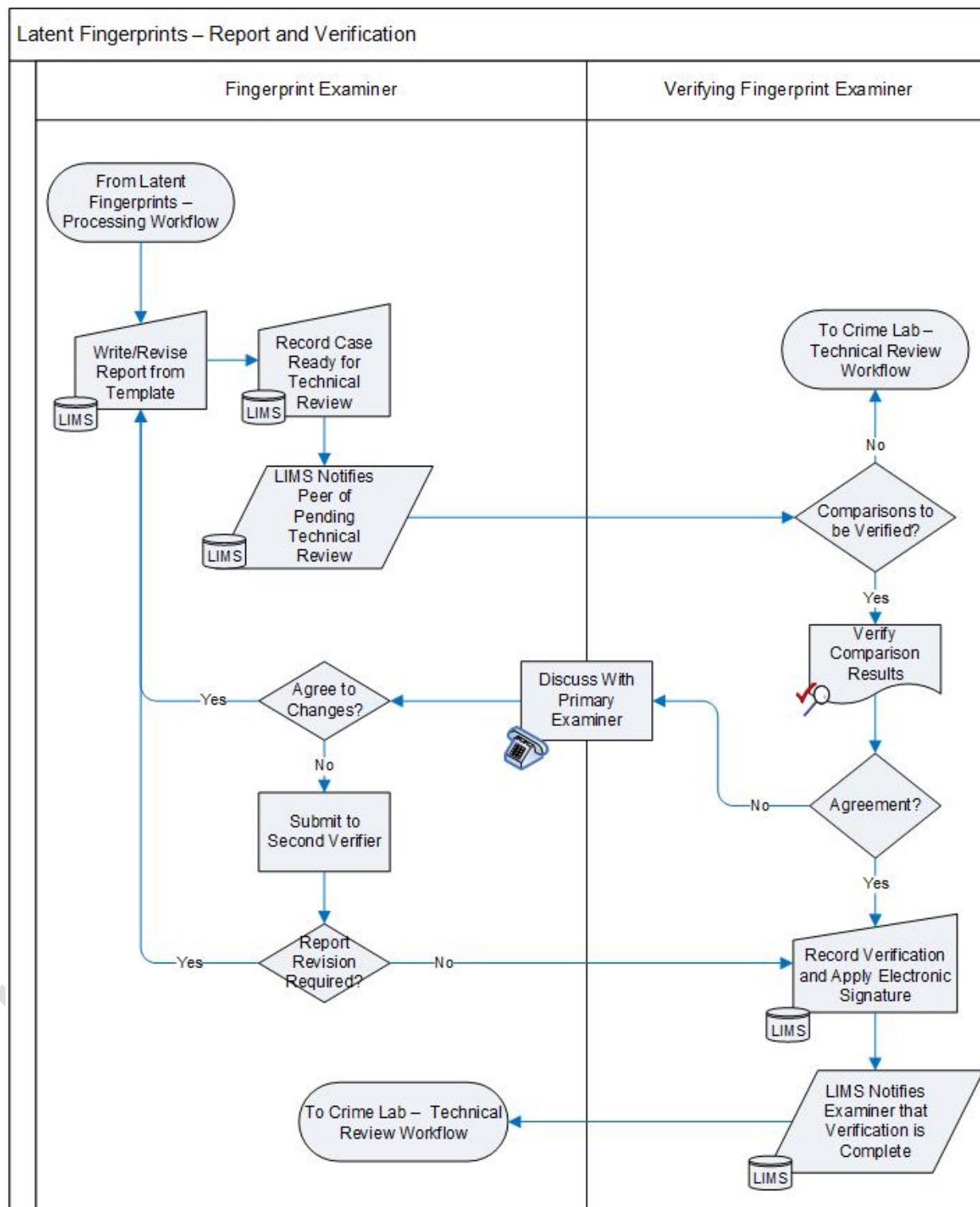


Figure 53 Latent Fingerprints - Report and Verification

10.1.4. Firearms and Tool Marks

The FATM Section provides examination and analyses of firearms, projectiles, fired cartridge cases and/or shot shells; and restores obliterated information such as serial numbers and markings imparted by any form of tool. Firearms submitted are examined for inherent characteristics, unique identifiers and safety related factors. The firearms can be test-fired to obtain reference material that can then be compared to submitted evidence. Range of fire determinations (distance determination examinations) are performed on a 40-foot indoor range.

The FATM also maintains reference collections and libraries.

The introduction of a new LIMS would introduce the following changes to the firearms and tool marks workflows:

- The LIMS would provide the Firearms Examiner with worklists
- The Firearms Examiner would enter information directly into the LIMS via electronic worksheets on a tablet PC rather than use 32 fillable PDF forms
- Items would be entered into the LIMS as evidence rather than CRYPT
- The LIMS would generate barcode labels for newly created evidence items
- Photographs would be directly imported into the SDMS component of the LIMS for use in reports
- The LIMS would provide warnings when QC results are out of specification
- Electronic signature would eliminate the need to print a report solely for the purpose of applying a signature
- The LIMS would notify the second examiner when comparisons require verification
- Reports would be written in the LIMS rather than using a Word template

10.1.4.1. Case Assignments

The majority of cases for the FATM Section are generated through Service Requests for agencies submitting evidence to the Evidence Custodian. The requesting agency details the testing desired and submits evidence for the Examiners to review. Service Requests are also generated by the FDIs when evidence is recovered in the course of their work. MEs generate Service

Requests related to items recovered during an autopsy. If an item of evidence requires the services of multiple laboratory sections, the FATM Section receives the item for processing after all other sections have completed their processing.

10.1.4.2. Firearms Safety

When receiving evidence, the Evidence Custodian will ask if the evidence contains a firearm and if it is in a loaded condition. If so, a FATM Examiner is called to render the firearm safe and recover any ammunition from the gun and add it to the evidence already collected. "Found guns" can be received in a fouled, inoperable and/or loaded (or uncertain) condition. A FATM Examiner will also be called to ensure that these firearms are rendered "safe". If there is any doubt as to the safe condition of a firearm during evidence processing in any of the other laboratory sections, the FATM Section is called to ensure the firearm is rendered "safe".

10.1.4.3. Firearms and Tool Mark Examination

The FATM Section performs a wide variety of testing and also produces evidence items for comparison. Pictures are very important to the FATM Section, which uses the photographs to document everything from the packaging in which the evidence arrives, all tool mark comparisons, chemical changes, and restored information, etc. Photographs are initially stored on Secure Digital (SD) cards and transferred to the Forensic Photography Section.

1. Packaging

When items of evidence are initially received for processing, the FATM Section extensively documents the packaging, inventories the contents, updates the CoC if required, and documents findings on the relevant worksheet.

The following figure illustrates the conceptualized future state packaging documentation workflow:

LIMS REP Updated

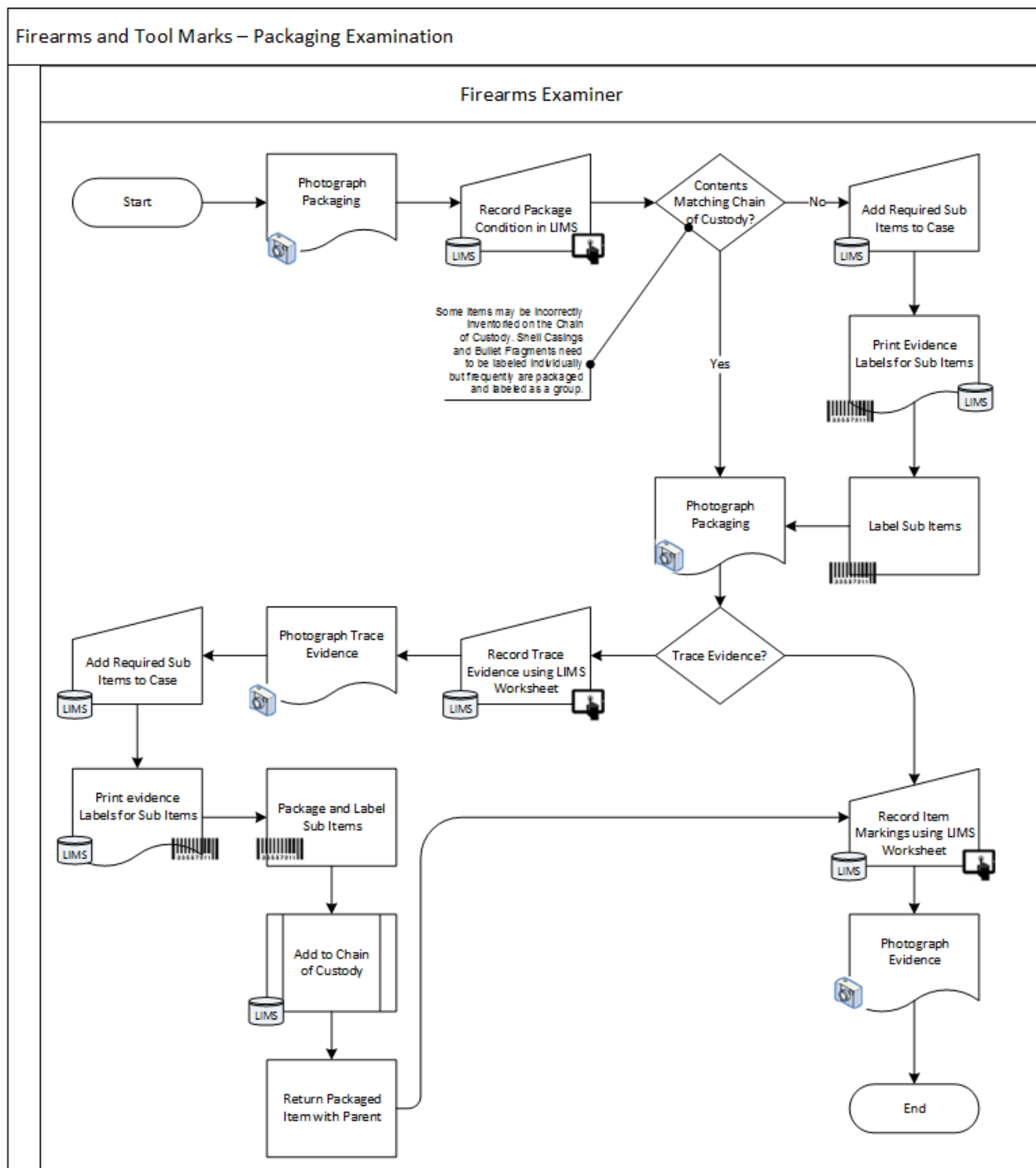


Figure 54 Firearms and Tool Marks – Packaging Examination

2. Examination

The FATM Section uses multiple procedures and testing protocols.

The examination process does not vary widely from protocol to protocol and the conceptualized future state workflow is represented in the following figure:

LIMS REP Updated

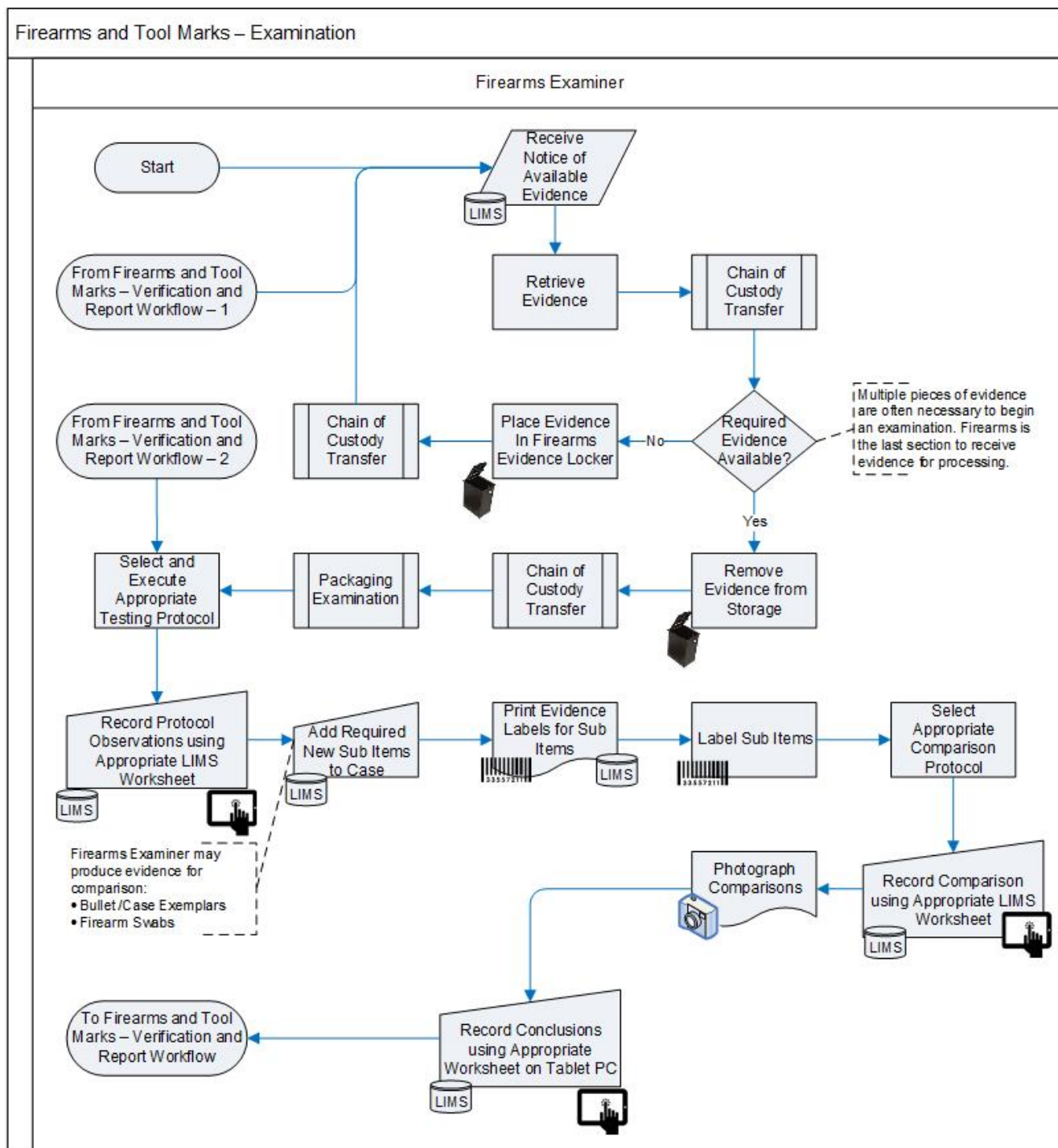


Figure 55 Firearms and Tool Marks – Examination

10.1.4.4. Verification and Reporting

Following examination, a second Examiner must independently verify conclusions and certain results. This verification is separate and independent of a technical review.

The following figure illustrates a conceptualized future state verification and reporting workflow:

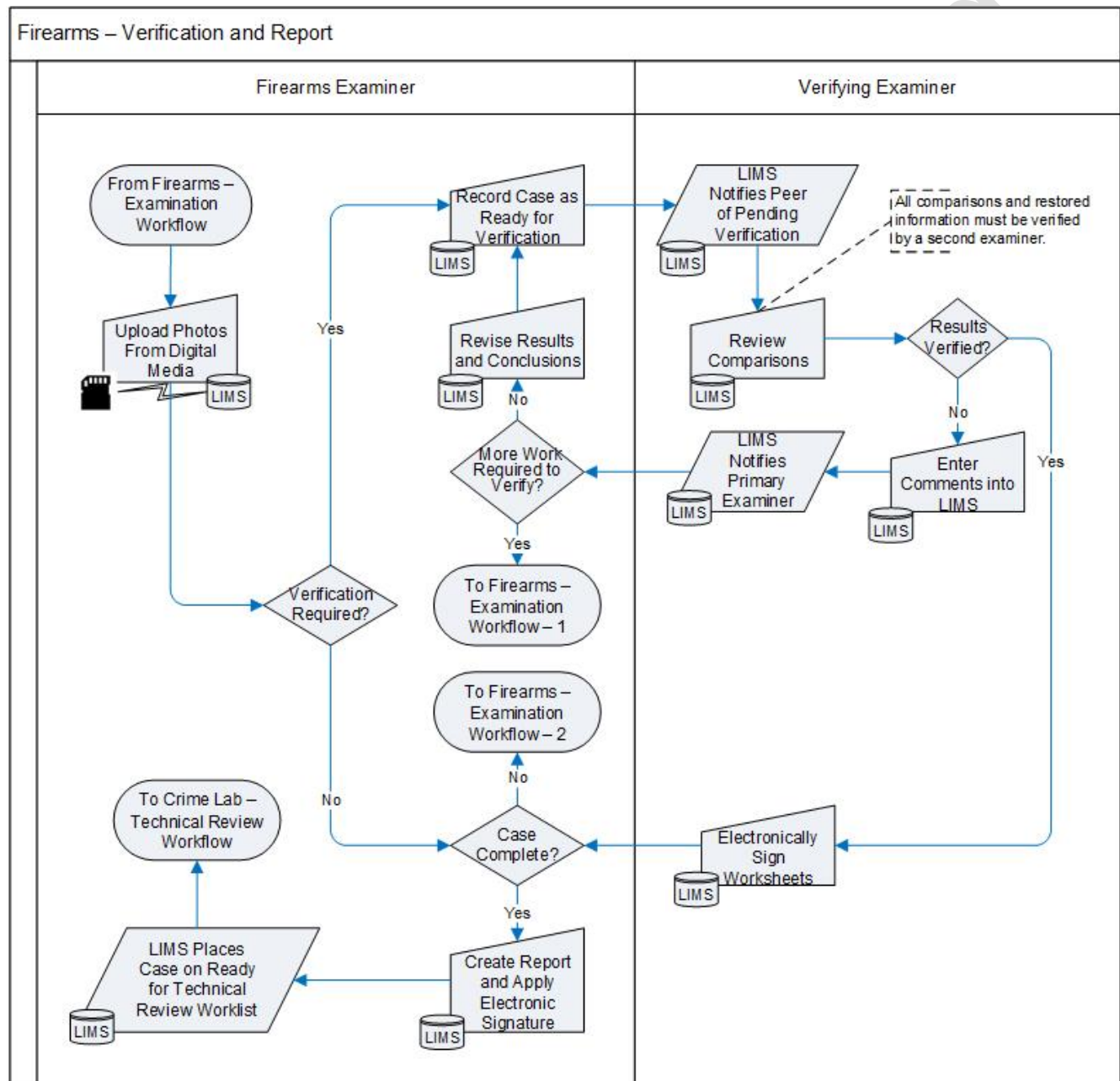


Figure 56 Firearms and Tool Marks - Verification and Report

10-1-4-5. Reference Collections and Libraries

The introduction of a new LIMS would introduce the following changes for maintaining reference collections firearms reference library:

- The LIMS would replace the Filemaker Pro database and Excel spreadsheet for recording firearms and their descriptions in the firearms reference library
- Photographs would be stored in the SDMS component of the LIMS
- Loans to outside agencies would be tracked in the LIMS instead of on paper forms collected in a binder
- The LIMS would replace the Excel spreadsheets used to track example rounds and test-fired exemplar rounds

1. Firearms Reference Library

The FATM Section maintains a relatively large selection of firearms for use in the course of their work. Each firearm in the library is labeled with a barcode that is unique to that firearm and is not reused if that firearm is permanently removed from the collection. Firearms may be loaned to outside agencies.

2. Ammunition Reference Collection

The FATM Section maintains an inventoried collection of example cartridges. These may be whole cartridges, cartridges disassembled into their components, or both within one container. Rounds are disassembled into their base components of a primed case/shot shell, gunpowder sample, shot shell wads and projectile(s). Shot shell and rifle cartridges may not include a gunpowder sample.

3. Test Fired Exemplar References

The FATM Section maintains a large collection of test-fired exemplars from a variety of firearms encountered over the years. These exemplars may be used for a variety of reasons. Each container has a unique number associated to the sample box.

4. Reference Book Library

The FATM Section maintains a large collection of reference books for training, education, research and documentation. These would continue to be tracked via an Excel spreadsheet.

5. Magazine Reference Library

The FATM Section maintains a relatively large selection of magazines for use in the course of their work. Each magazine in the library is labeled with a unique number that is associated to that magazine, and is not reused if that magazine. Magazines may be loaned to outside agencies.

10.1.5. Forensic Photography

The TCME Forensic Photography Laboratory is a fully equipped digital photography facility. Ultraviolet and infrared techniques may be employed in addition to standard photography methodologies. Image enhancement can also be performed. Photographs, enlargements and other services are provided to the ME, to the courts and to requesting agencies.

The introduction of a new LIMS would introduce the following changes to the forensic photography workflows:

- Photographs would be stored in the SDMS component of the LIMS instead of the DIMS
- The Forensic Photographer would import photographs provided by the morgue and FDIs to the SDMS rather than the photography desktop computer
- The Forensic Photographer would maintain the image library in the SDMS component of the LIMS rather than in the photography desktop
- Photographs would be available to LIMS users for inclusion in reports by integrating the SDMS into the LIMS

10.1.5.1. Case Assignment

Forensic Photography is involved in virtually every case handled by the TCME. Digital photographs are produced by FDIs, morgue staff and laboratory personnel.

Individual sections also make special requests for photography services. The Forensic Photographer receives these requests through face-to-face communications, E-mail, and telephone calls.

10.1.5.2. Photograph Retrieval

The Forensic Photographer receives digital photographs from two primary sources: the FDIs and the morgue. Individual lab sections also produce digital images, which must be processed, stored and archived.

1. Forensic Death Investigation Photograph Retrieval

FDIs will typically use a single SD card to record images from a single case. The case number is written on an envelope and the SD card is placed inside to await pick up by the Forensic

Photographer. Rarely, FDIs include multiple cases on a single SD card. In such instances, The FDIs write the case numbers for all images present on the SD card on the envelope.

The following figure illustrates a conceptualized future state Forensic Death Investigator photograph retrieval workflow:

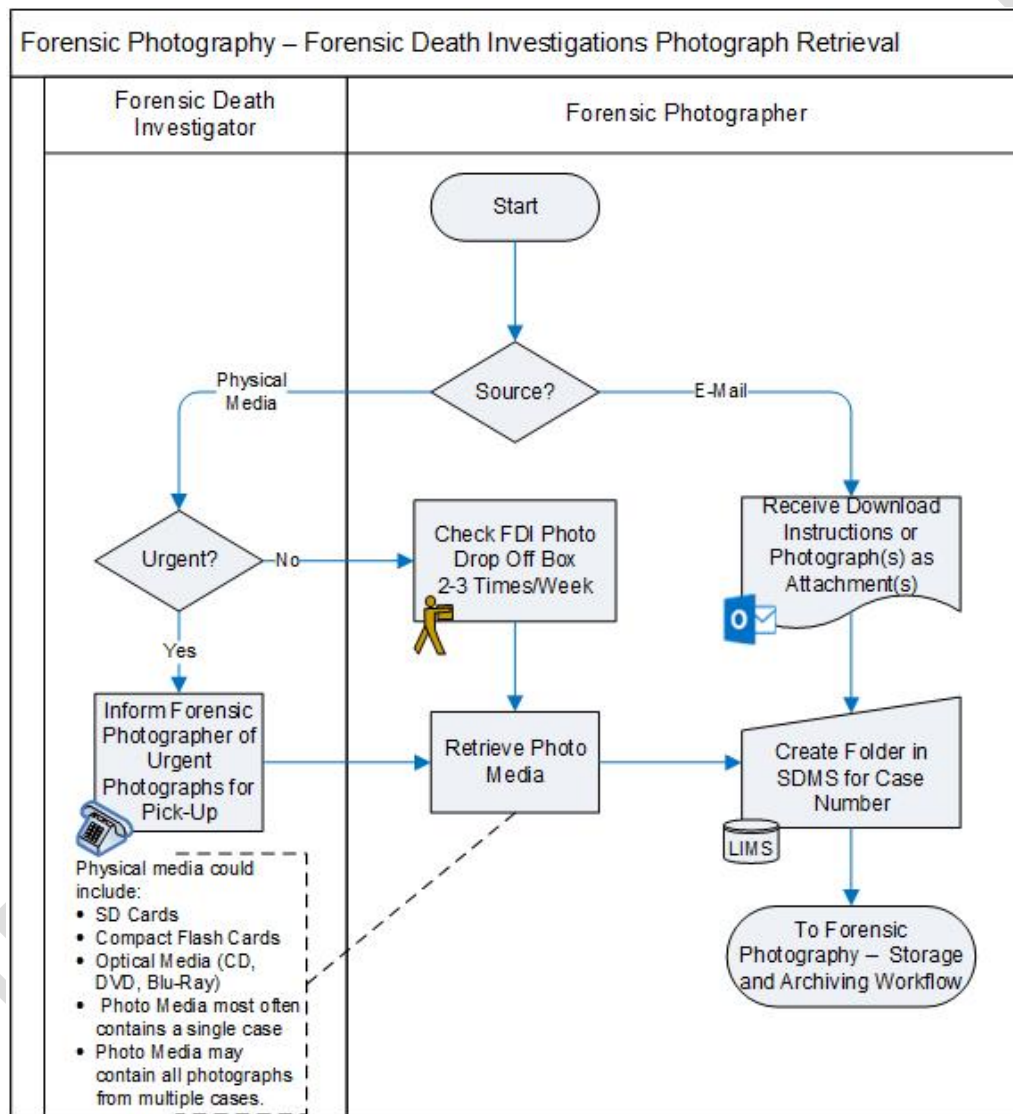


Figure 57 Forensic Photography – Forensic Death Investigation Photograph Retrieval

2. Morgue Photograph Retrieval

The morgue utilizes multiple cameras and uses each camera on multiple cases without changing the SD card, which results in several cases on a single SD card. This requires the Forensic Photographer to collate all of the images by case number from multiple cards.

The following figure illustrates a conceptualized future state morgue photograph retrieval workflow:

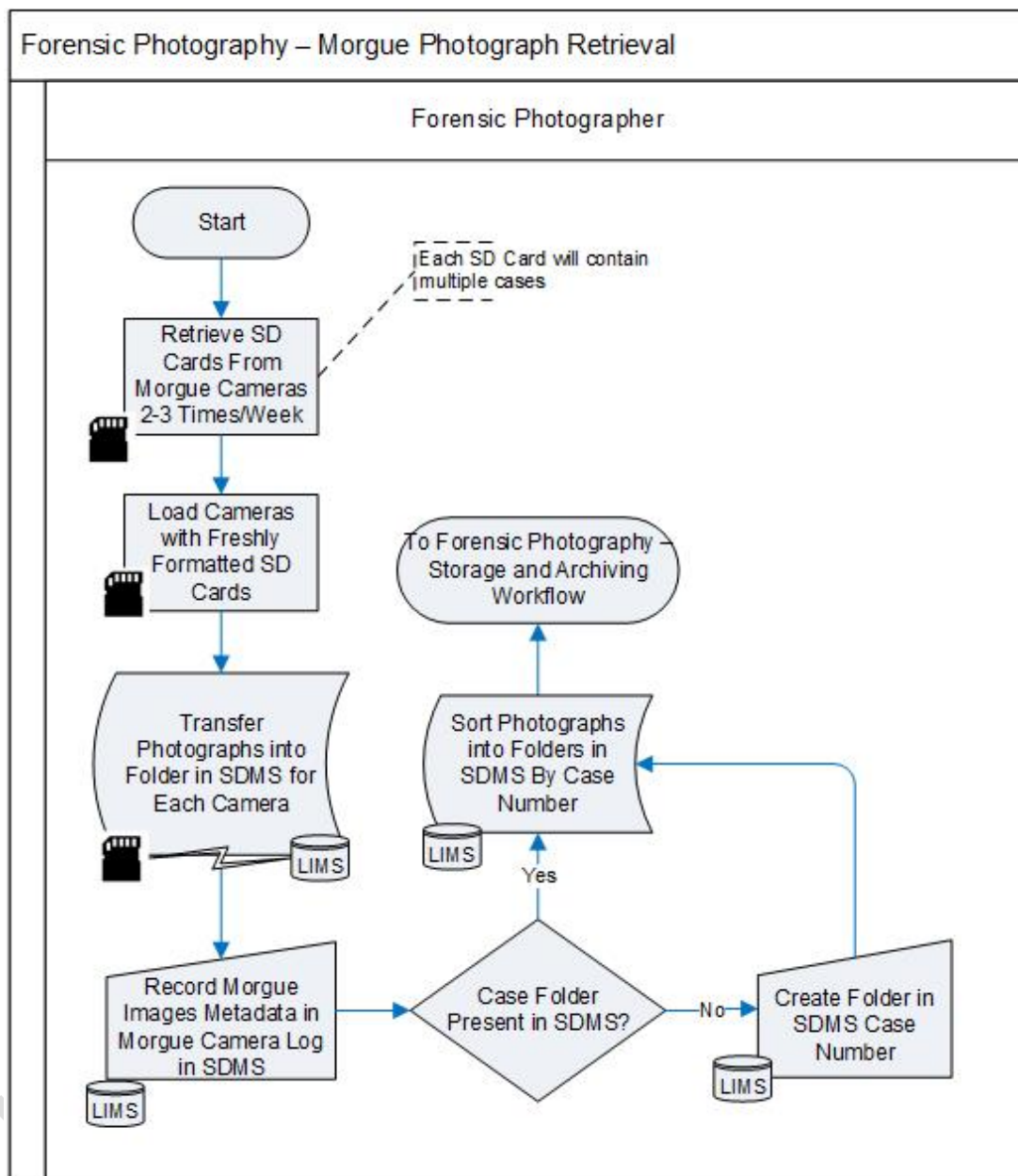


Figure 58 Forensic Photography – Morgue Photograph Retrieval

3. Laboratory Section Support and Specialized Photography Services

The various sections of the Crime Lab each produce digital images over the course of their work. The Forensic Photographer provides support for each section by producing prints, enhancing images, producing contact sheets (multiple images on a single page), and providing

copies of image files on optical storage media. Lab Sections may request the Forensic Photographer to conduct on-location photography or specialized photography such as infra-red and ultraviolet photography. Requests for support and specialized services would be received via face to face requests, E-mail, phone calls or Service Requests.

LIMS REP Updated

10.1.5.3. Photographic Storage

The following figure illustrates the photograph storage and archiving workflow:

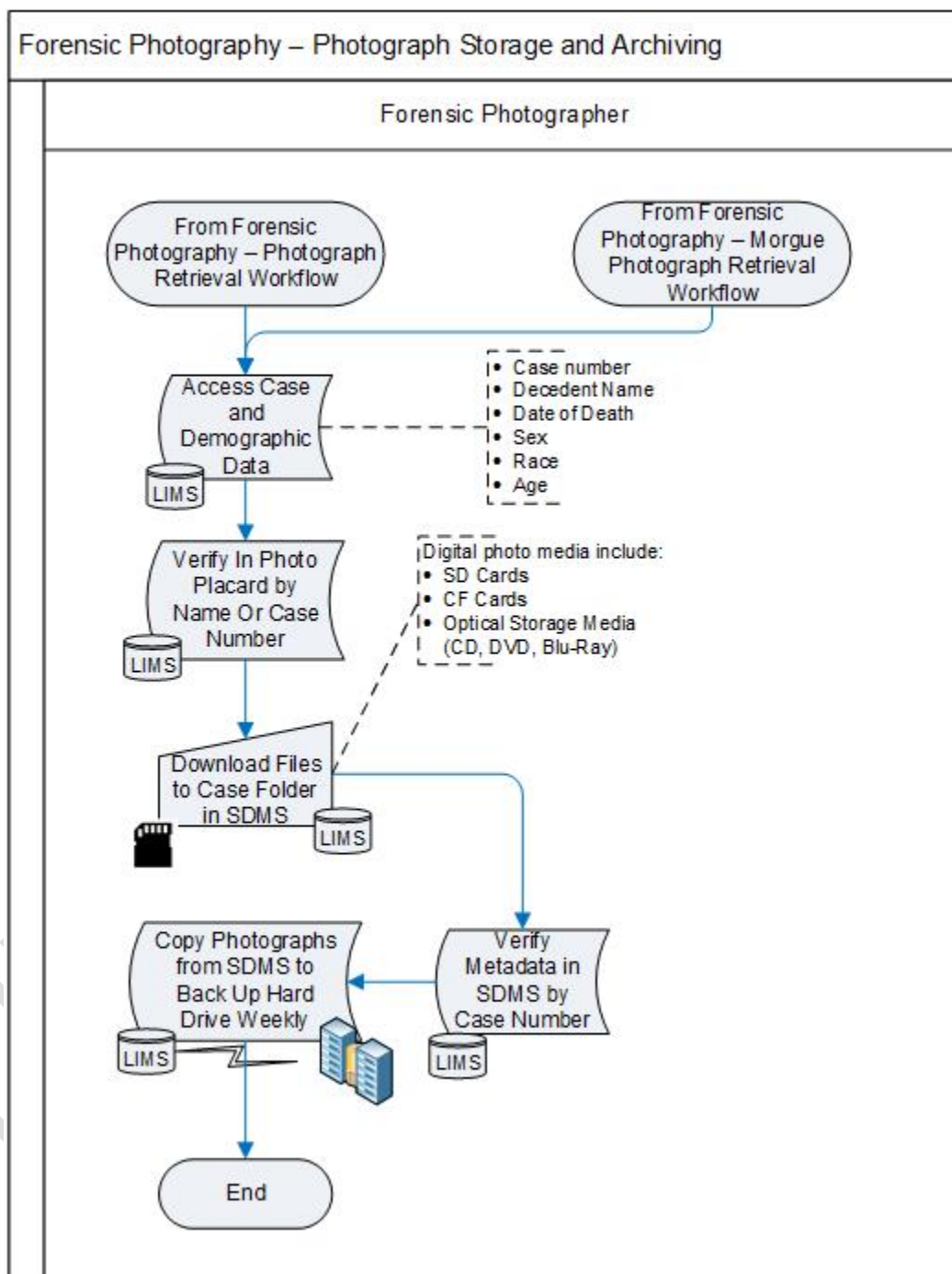


Figure 59 Forensic Photography - Photograph Archiving and Storage

10.1.6.Crime Lab Reviews, and Report Distribution

The processes for technical reviews, administrative reviews, and report distribution are the same for all Crime Lab sections.

The introduction of a new LIMS would introduce the following changes to the workflows for technical reviews, administrative reviews, report distribution and billing for the Crime Lab:

- Notifications of pending reviews and report distribution would be via the LIMS
- Review notes would be recorded in the LIMS instead of on paper Review sheets
- Records of completed cases in the LIMS would eliminate the need for the Shared Completion spreadsheet
- The availability of electronic reports in the LIMS would eliminate the need to create multiple paper copies of reports
- Assignment of billing codes and service descriptions to Service Request definitions in the LIMS would eliminate the need to:
 - o Enter billing codes and service descriptions after completion of a case
 - o Verify agreement between the billing codes and service descriptions
 - o Create and mail monthly billing spreadsheets to the business office

10.1.6.1. Technical and Administrative Reviews

The following figure illustrates a conceptualized future state process for technical reviews for completed cases:

LIMS REP Updated

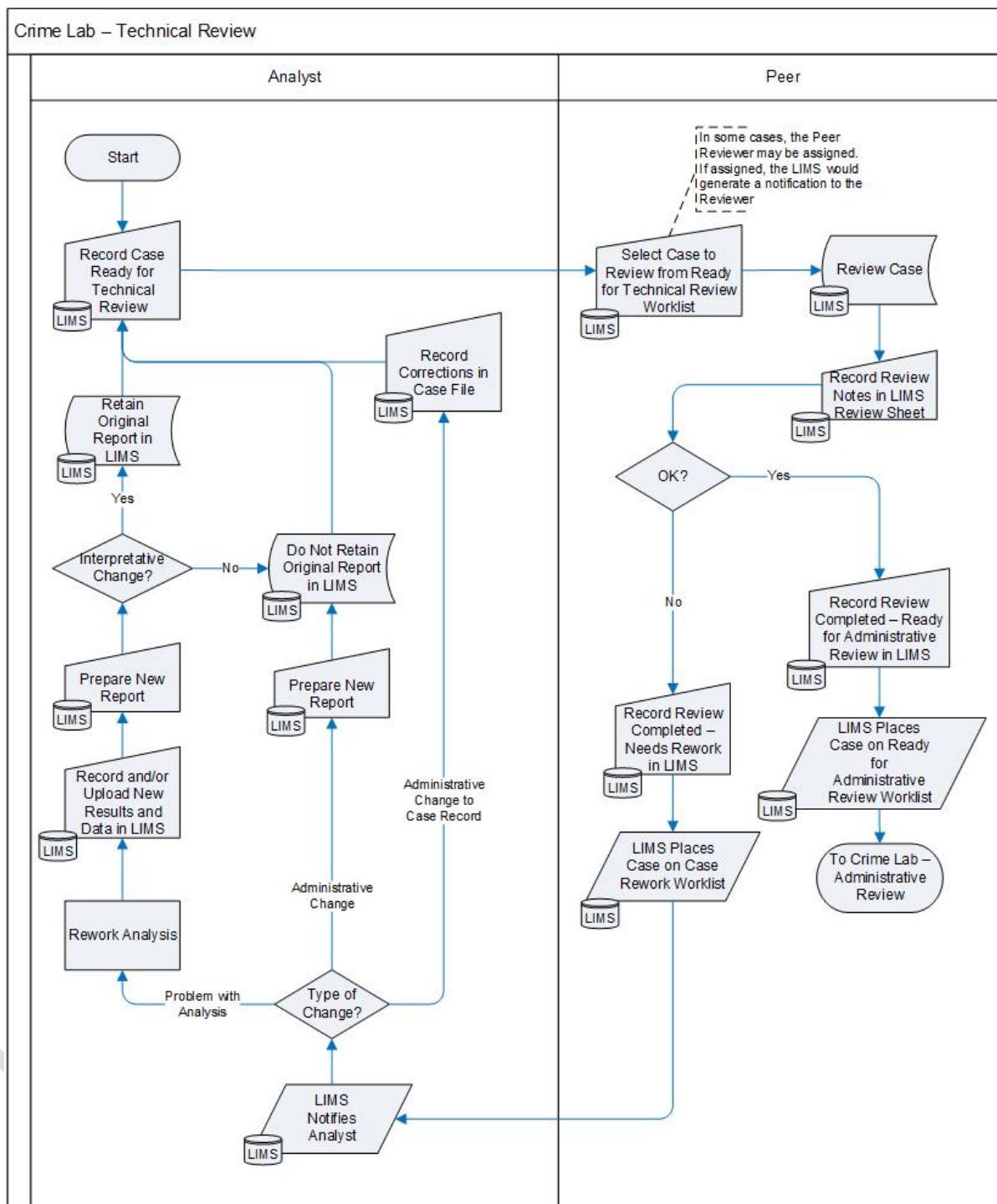


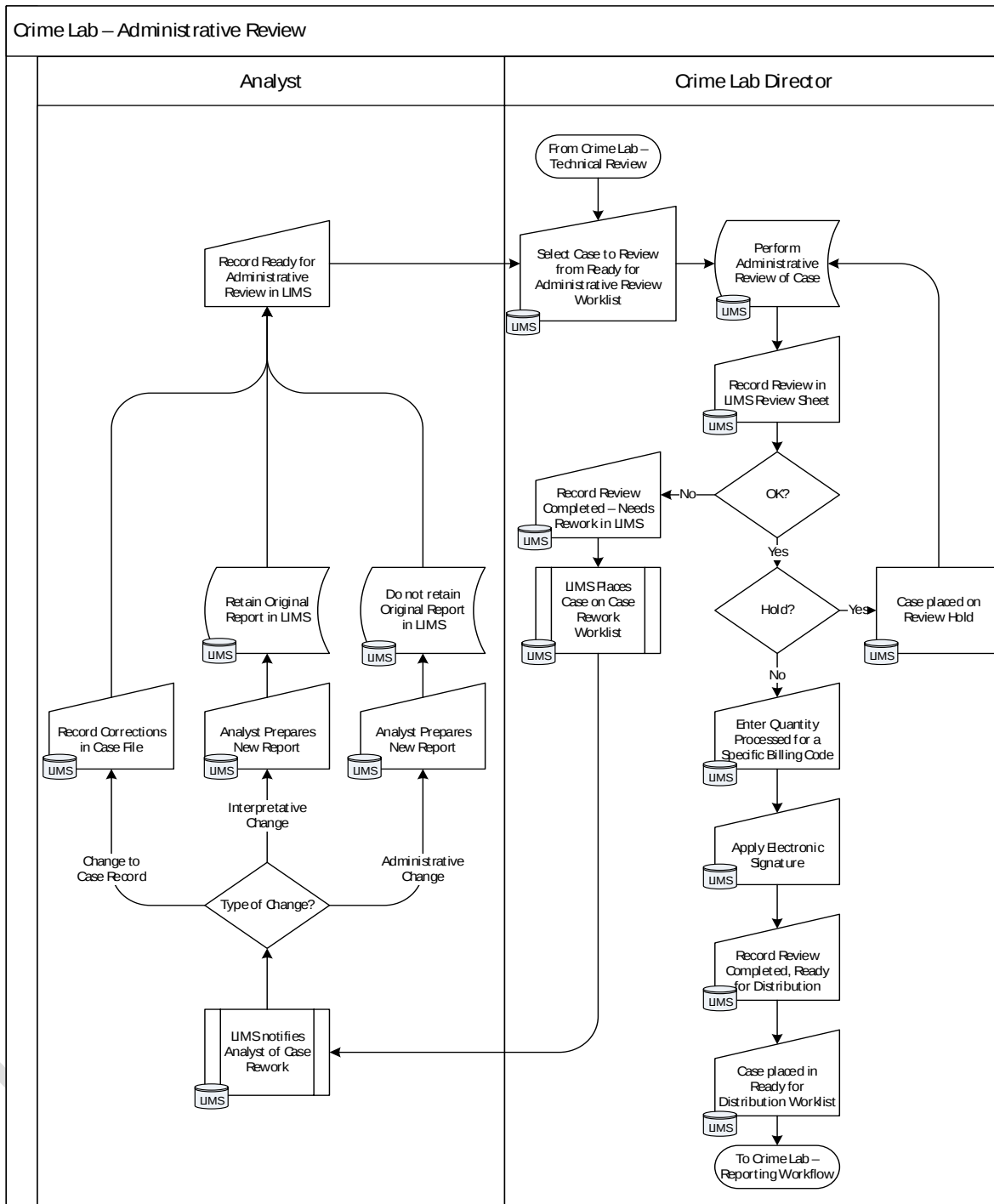
Figure 60 Crime Laboratory - Technical Review

The figure above shows that there are up to three types of changes that may be necessary following a technical review: administrative changes to the case record, administrative changes to the report, and problems with the analysis. Depending on the required changes, the workflow follows one or more of the appropriate paths.

LIMS REP Updated

The following figure illustrates a conceptualized future state process for administrative reviews for completed cases:

LIMS REP Updated



The figure above shows that two types of changes may be necessary: administrative changes to the case record and administrative changes to the report. Depending on the required changes, the workflow follows the appropriate path or both path.

10.1.6.2. Reporting

The following figure illustrates a conceptualized future state process for reporting completed cases:

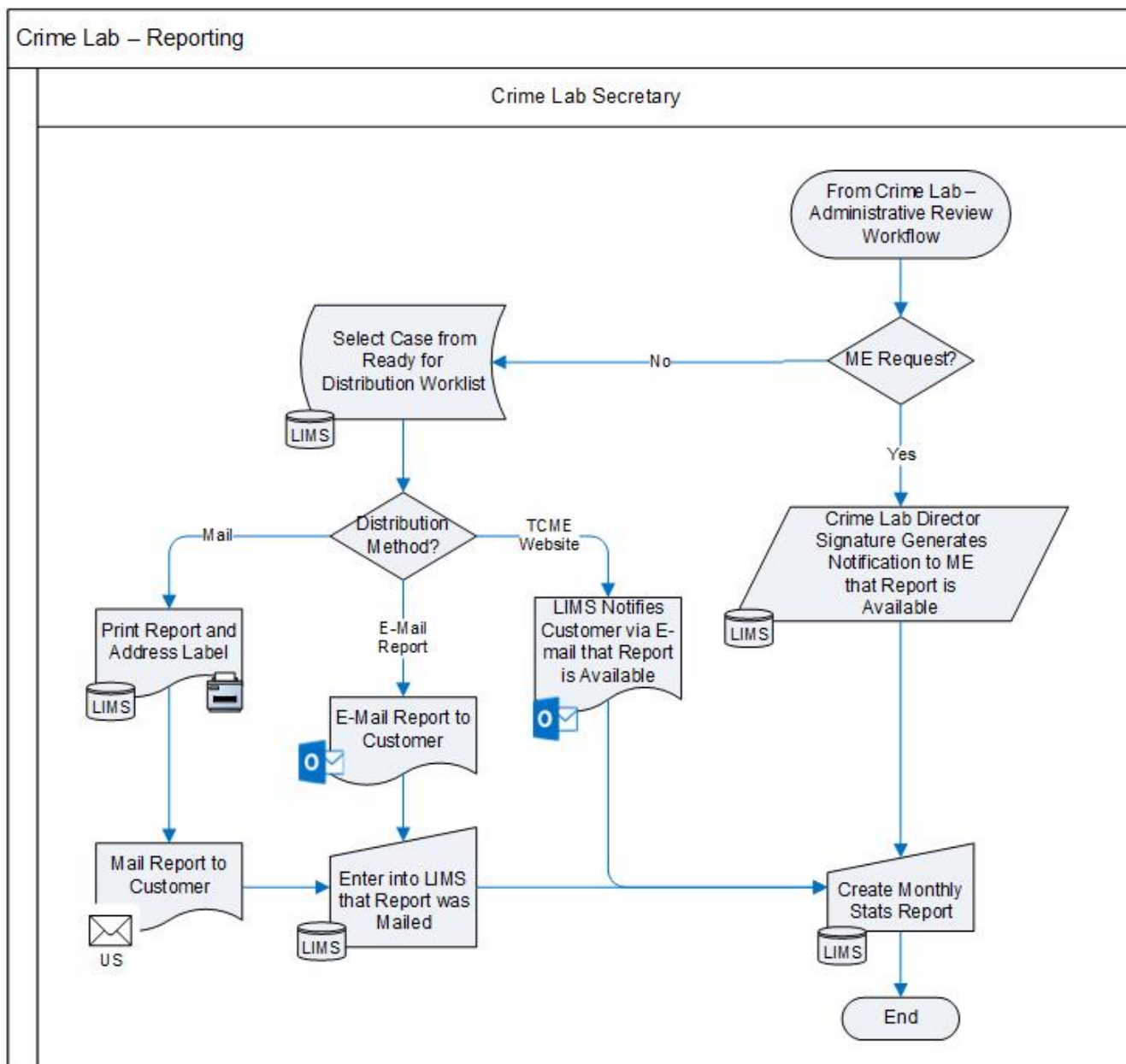


Figure 62 Crime Laboratory - Reporting

10.1.6.3. Release of Information Prior to Report

Conclusions may be released without the case being finalized. The following figure illustrates a conceptualized future state process for release of information prior to a report being issued:

LIMS REP Updated

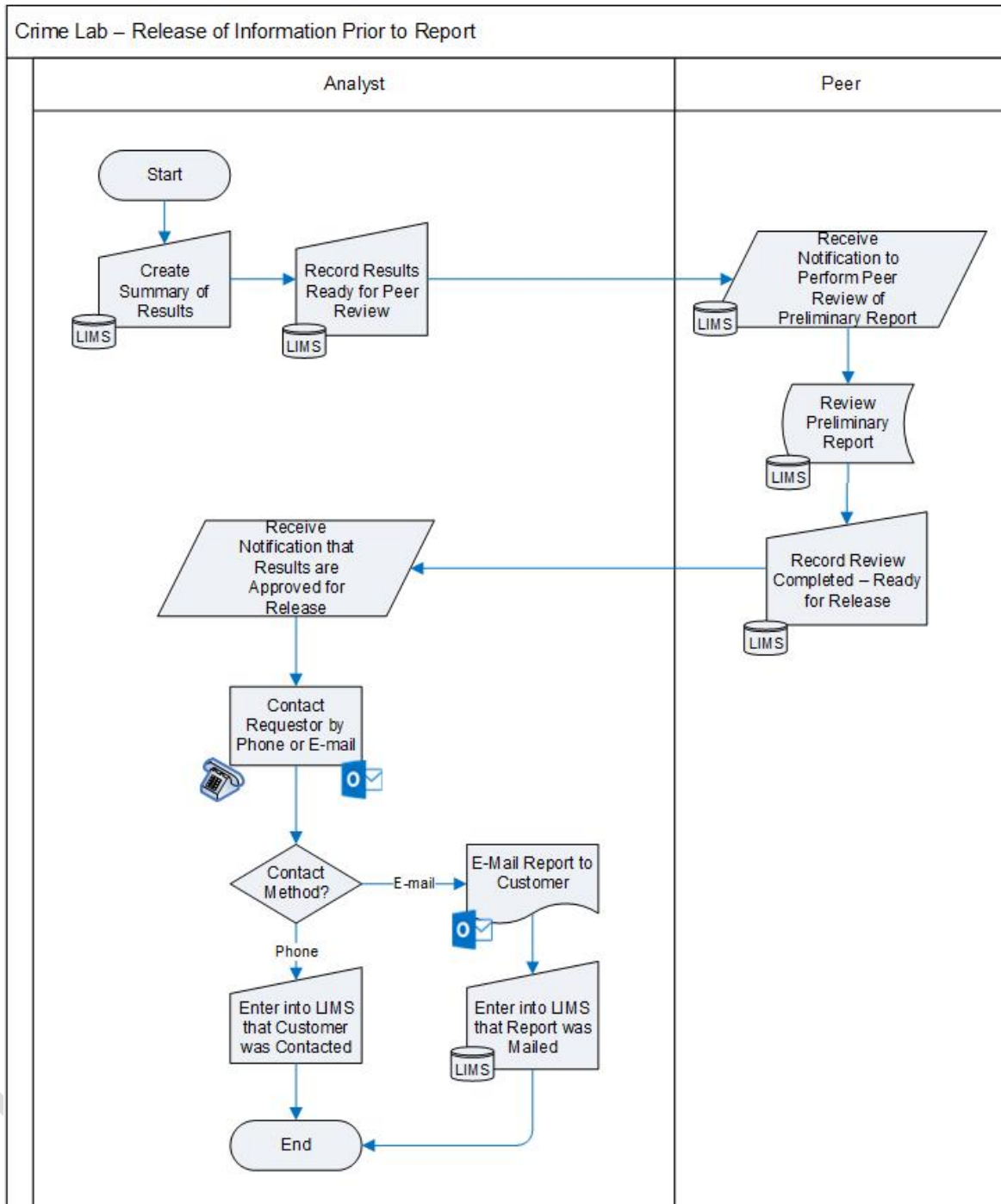


Figure 63 Crime Laboratory – Release of Information Prior to Report

10.2. DRUG CHEMISTRY AND TOXICOLOGY LABORATORY

10.2.1-Drug Chemistry

The Drug Chemistry Section analyzes drugs submitted by other agencies. Drug types received commonly range from clandestine chemical substances to therapeutic or prescribed medications. Cocaine, heroin, marijuana and amphetamines, and all drugs of abuse represent the most common products received for chemical assay. The Drug Chemistry Section receives drugs in many forms including: plant material, pills, tablets, capsules, powders, liquids, films, paper, canned air, fungi, syringes, and oils. The Drug Chemistry Section also analyzes substances recovered from bodies.

Qualitative tests used to determine the presence of drugs include: color, logo matching for pharmaceuticals, macroscopic and microscopic examination of plant materials, Fourier Transform infrared spectroscopy (FT-IR), and gas chromatography with mass spectroscopic detection (GC/MSD). Prior to performing any of these tests, the Drug Chemistry Section weighs the specimens. The weight of a detected drug determines penalty ranges based on type of substance.

The introduction of a new LIMS would introduce the following changes to the drug chemistry workflows:

- Sampling plans would be selected in the LIMS creating an appropriate worklist
- Notifications of evidence ready for pick-up would be via the LIMS
- The use of paper case folders would be minimized if not eliminated
- CoC information and entry of results in the LIMS would eliminate the use of Lab Works (a Tarrant County produced database not to be confused with the commercial LIMS)
- Sub items, and their condition, would be logged into the LIMS instead of recorded on a paper CoC form
- Barcode labels for sub items would be printed from the LIMS
- Balances would be selected in the LIMS eliminating the need to record this information on paper worksheets
- Weight results, FT-IR results and GC/MSD results would be transferred directly from the instruments to the LIMS via electronic interfaces eliminating the need to record this information on paper worksheets

- *Calculations for net weight, approximate net weight and measurement uncertainty would be performed by the LIMS eliminating the need to perform these calculations manually and then record the result*
- *Sample preparation and test results would be recorded in the LIMS instead of on paper worksheets*
- *Items not tested would be indicated by not having recorded results*
- *The LIMS would provide warnings when QC results are out of specification*
- *Electronic records would eliminate paper worksheets and internal date/time stamps would eliminate the need to date worksheets*
- *Reports would be written in the LIMS rather than using a Word template*
- *Notifications of pending reviews and report distribution would be via the LIMS*
- *Electronic signatures would eliminate the need to print reports solely for the purpose of applying a signature*
- *Electronic signatures would cause reports to be placed on review worklists and notification of pending reviews to be generated*

The following figure provides a conceptualized future state overview of the Drug Chemistry Section workflow:

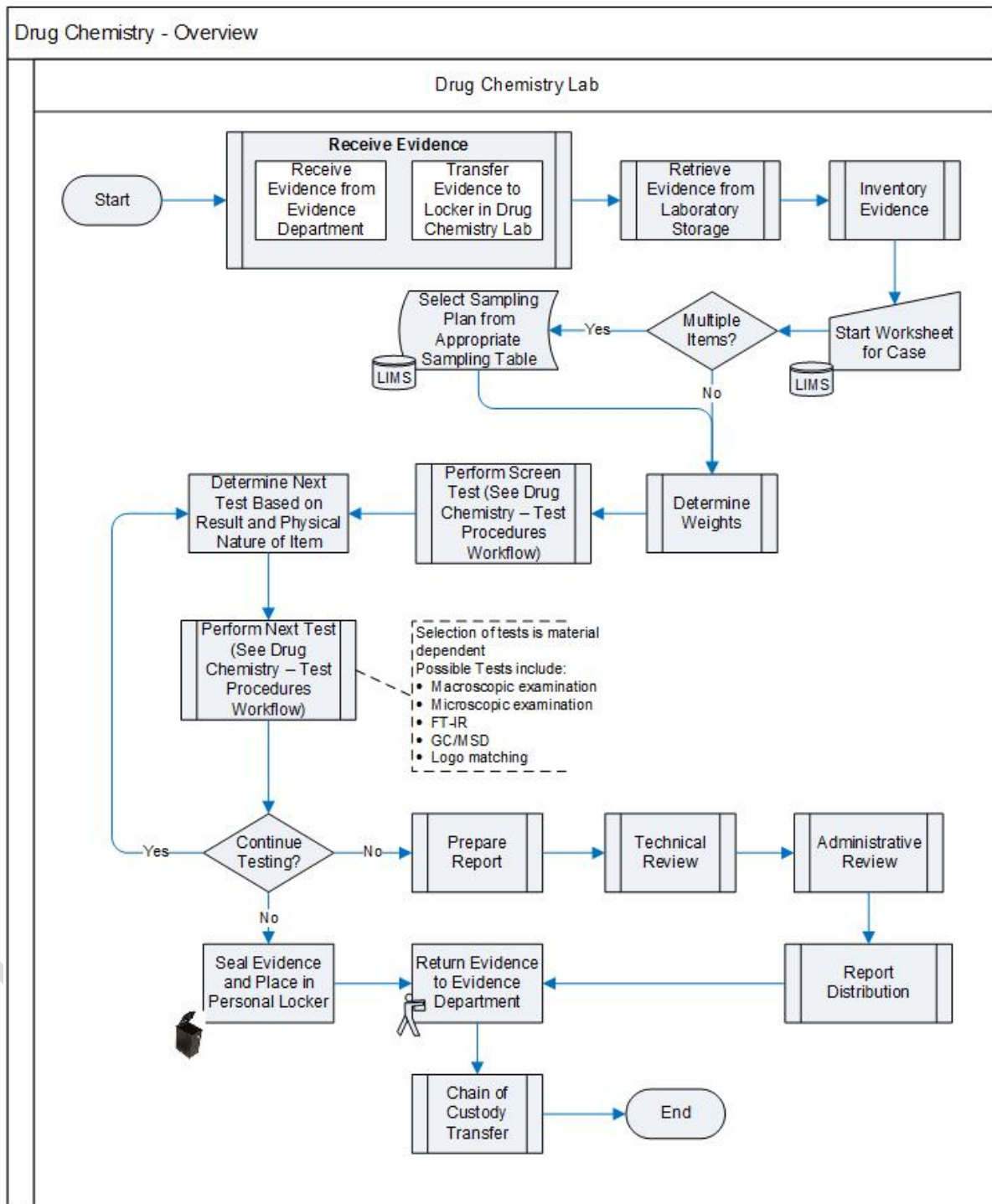


Figure 64 Drug Chemistry - Overview

10.2.1.1. Evidence Transfers

The following figure illustrates a conceptualized future state process by which evidence is transferred from the Evidence Department to the Drug Chemistry Section and then stored in the Drug Chemistry locker:

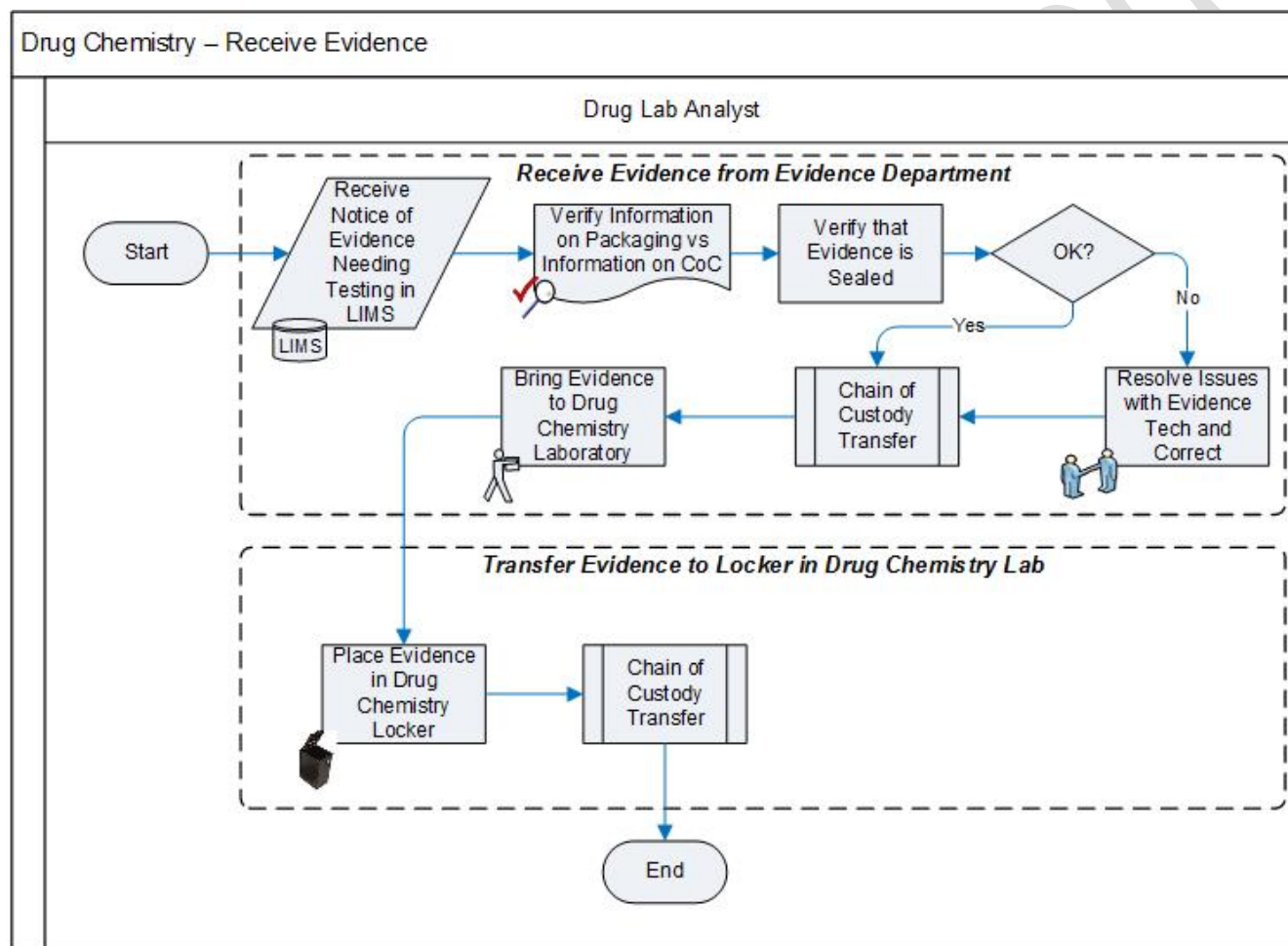


Figure 65 Drug Chemistry - Receive Evidence

Prior to testing, the Drug Chemistry Analyst retrieves the items from the Drug Chemistry locker. When not actively working the case, the Analyst stores the items in a personal locker.

The following figure illustrates a conceptualized future state process for retrieving evidence from the Drug Chemistry locker:

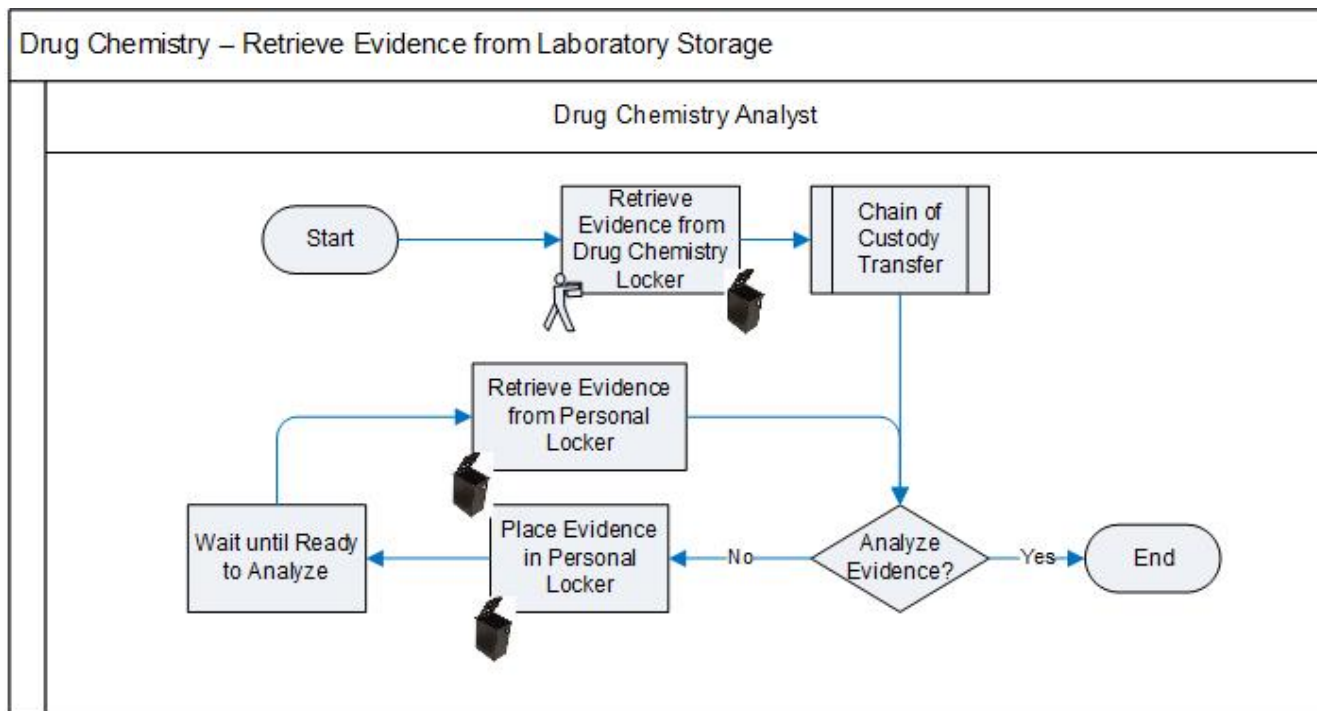


Figure 66 Drug Chemistry – Retrieve Evidence from Laboratory Storage

10.2.1.2. Testing

Prior to analyzing the items, the Analyst first opens the packaging to inventory the evidence. A package may contain one or more sub-packages and each sub-package, in turn, may contain one or more sub-packages. The Analyst examines the seals on each package to insure they are intact and the CoC to verify the contents of the packages. When all levels of packages have been opened, the Analyst begins analyzing the items, places the items in their personal locker, or places the items in one of the large drug lockers.

The following figure illustrates a conceptualized future state inventory process:

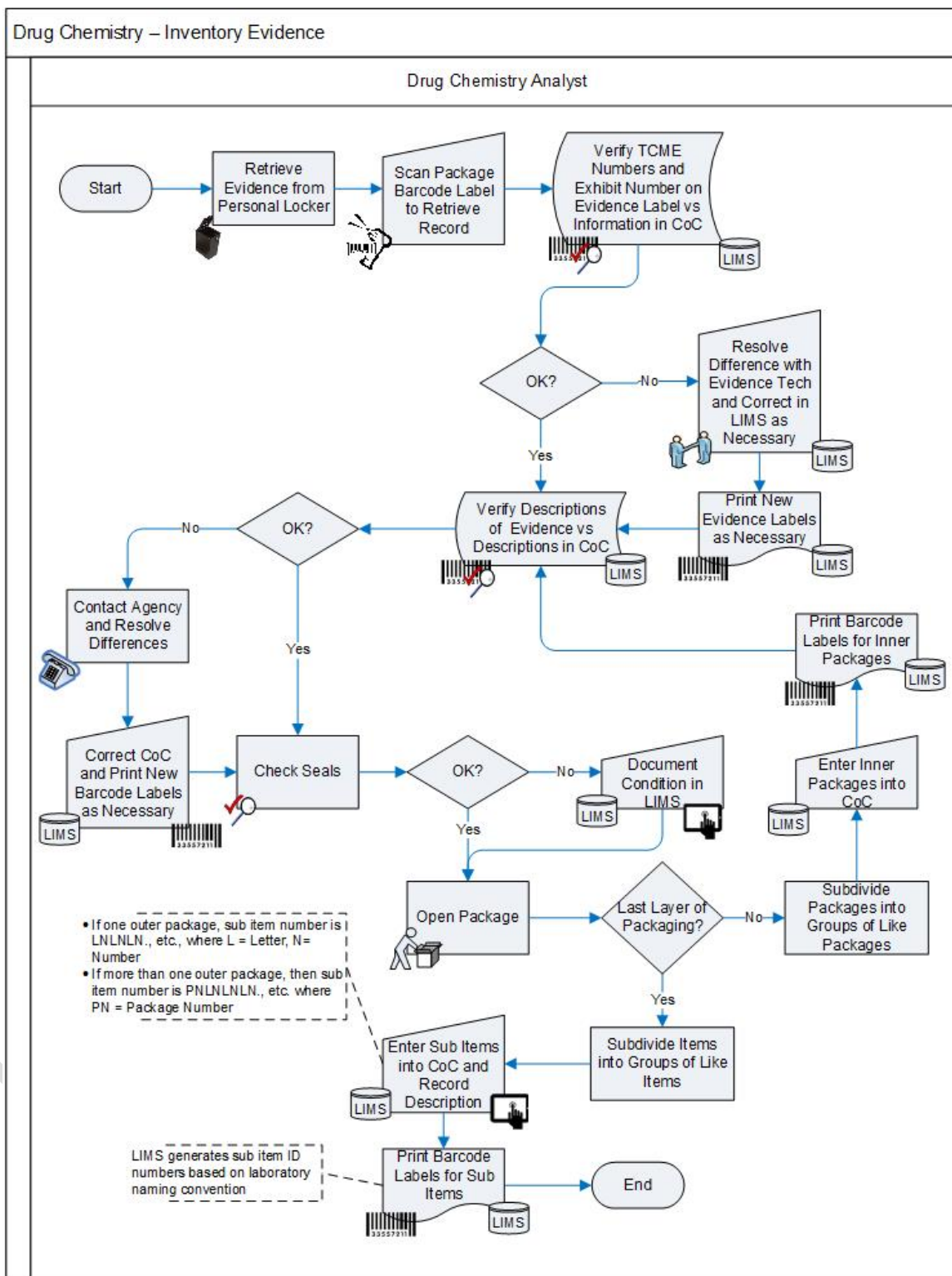


Figure 67 Drug Chemistry - Inventory Evidence

The first step in the assay involves obtaining the weight of the item. The Drug Chemistry Section uses a penalty group / weight threshold table that defines the weight thresholds for different penalty groups.

For multiple items, if possible, the Analyst weighs all the items together to obtain the total weight. If this is not possible, the Analyst has two choices: either determine an approximate net weight or an actual net weight. In addition to recording the weight, the LIMS would calculate measurement uncertainty (except for approximate weights) by multiplying the previously determined measurement uncertainty of the balance, which is available in a table, times the number of weighing events and a constant (3).

Depending on the nature of the items and the quantity of items, the Drug Chemistry Analyst may not be able to assay every single item. The Drug Chemistry Analyst can use hypergeometric distribution (HGD) sampling tables or sample enough items to satisfy a weight threshold based on penalty group. Sometimes, sampling one item is sufficient.

The following figure illustrates a conceptualized future state process for weighing samples:

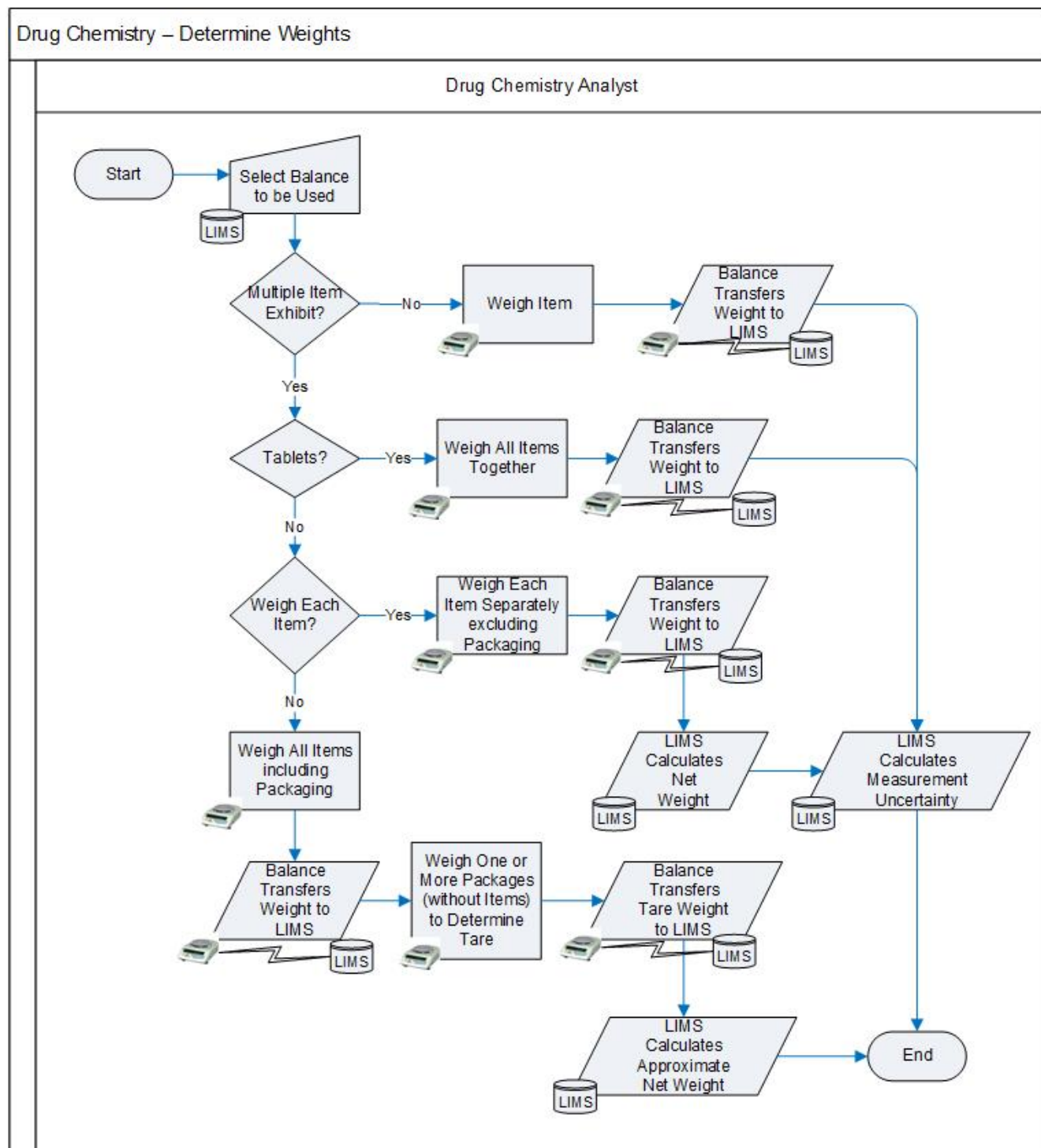


Figure 68 Drug Chemistry - Determine Weights

After weight is determined, the Analyst determines the identity of the substance. Color tests are used to screen the material. Then, the Analyst follows specific schema depending on the physical nature of the items, e.g., plant material or tablet.

The following figure illustrates a conceptualized future state overview of the test procedures:

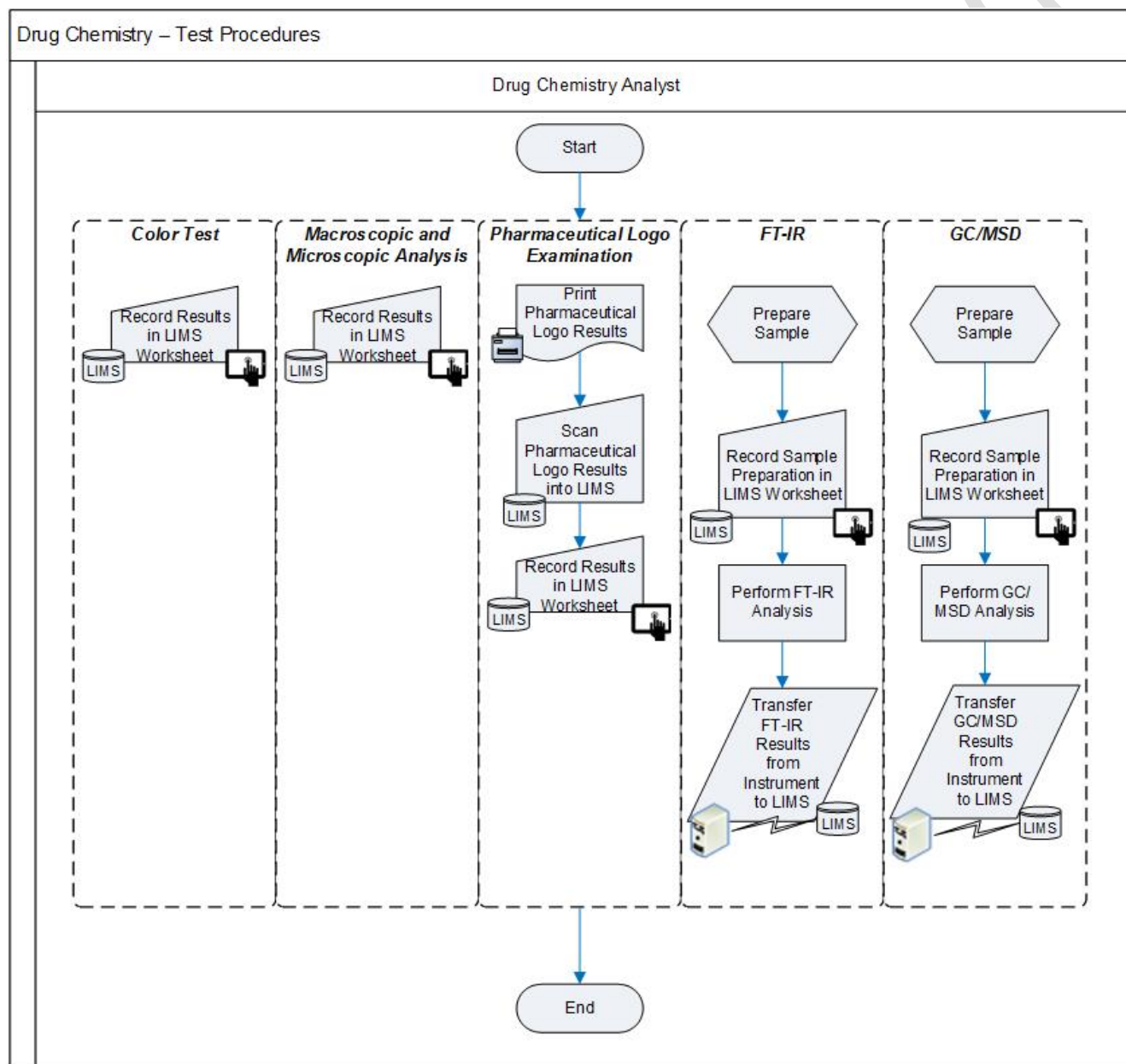


Figure 69 Drug Chemistry - Test Procedures

When all testing has been completed, the Analyst records his/her conclusions and then prepares a report.

The following figure illustrates a conceptualized future state process for preparing reports:

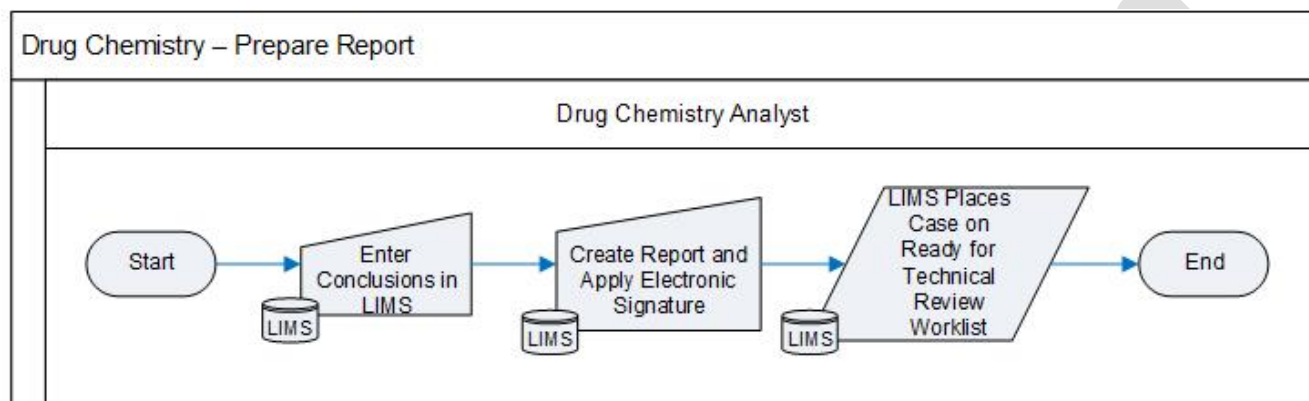


Figure 70 Drug Chemistry - Prepare Report

10.2.1.3. Technical and Administrative Reviews

Completed cases require both a technical review by a peer analyst and an administrative review by the Chief Toxicologist. The following two figures illustrate conceptualized future state processes for technical and administrative reviews for completed cases, respectively:

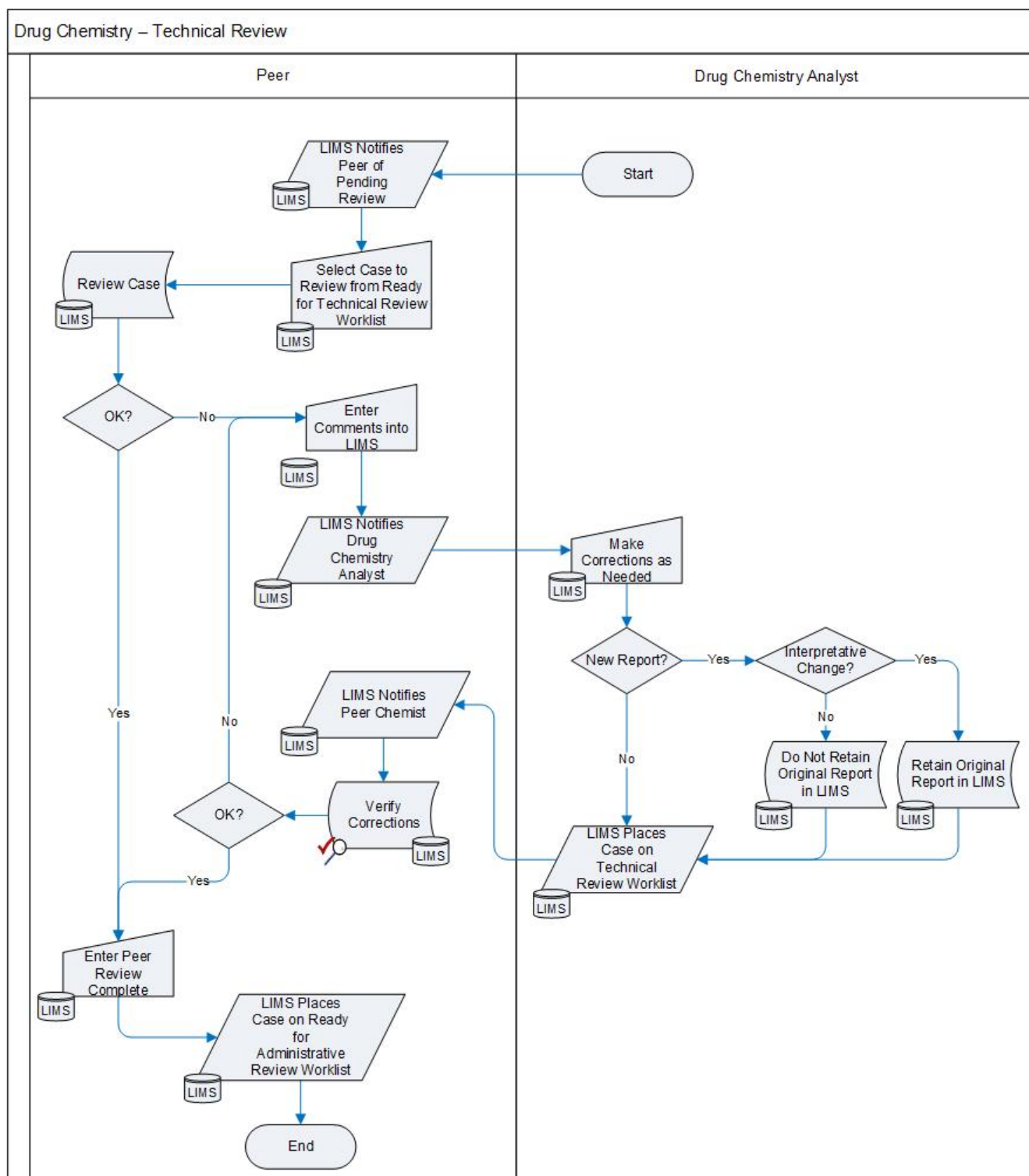


Figure 71 Drug Chemistry - Technical Reviews

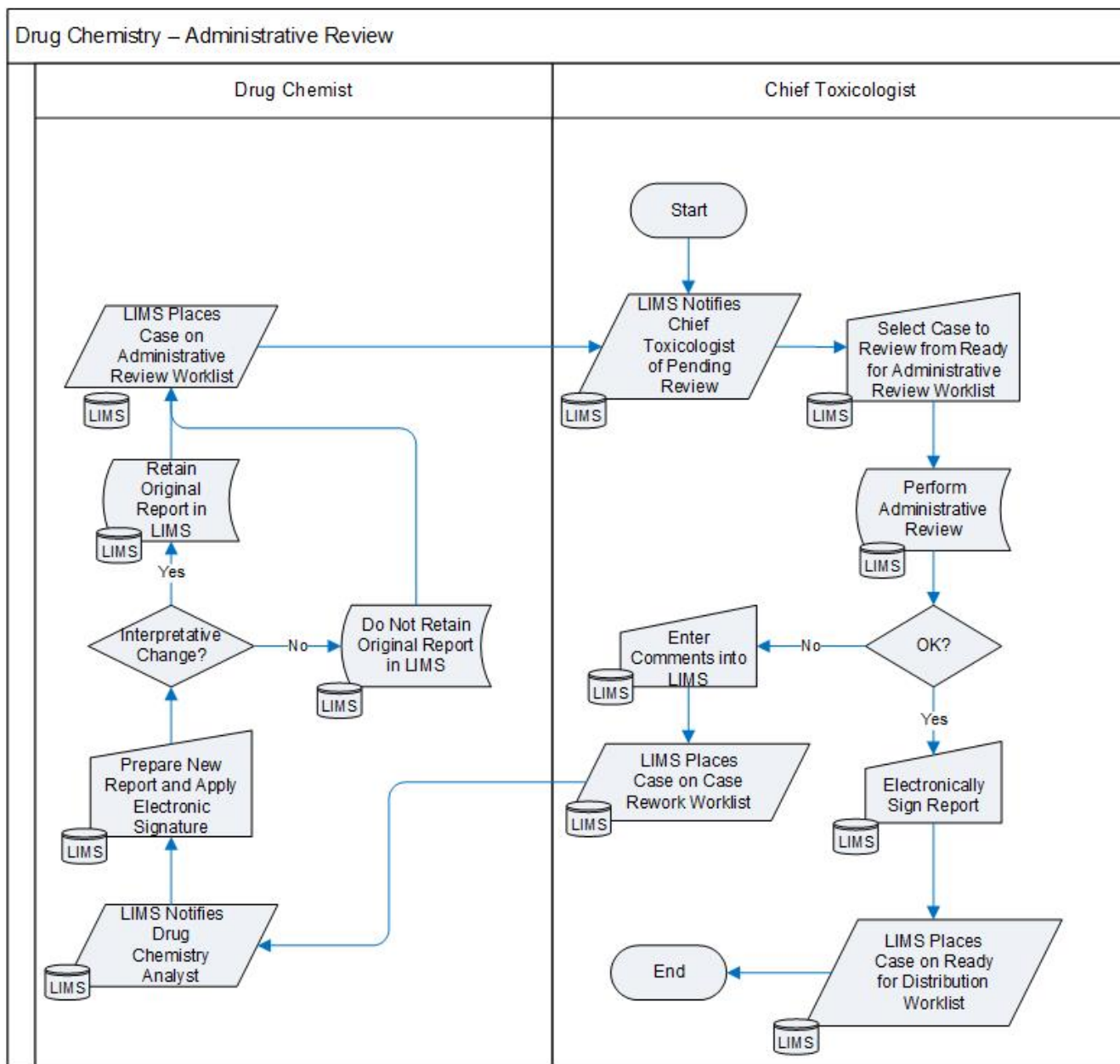


Figure 72 Drug Chemistry - Administrative Reviews

10.2.1.4. Report Distribution

The following figure illustrates a conceptualized future state process for distributing reports:

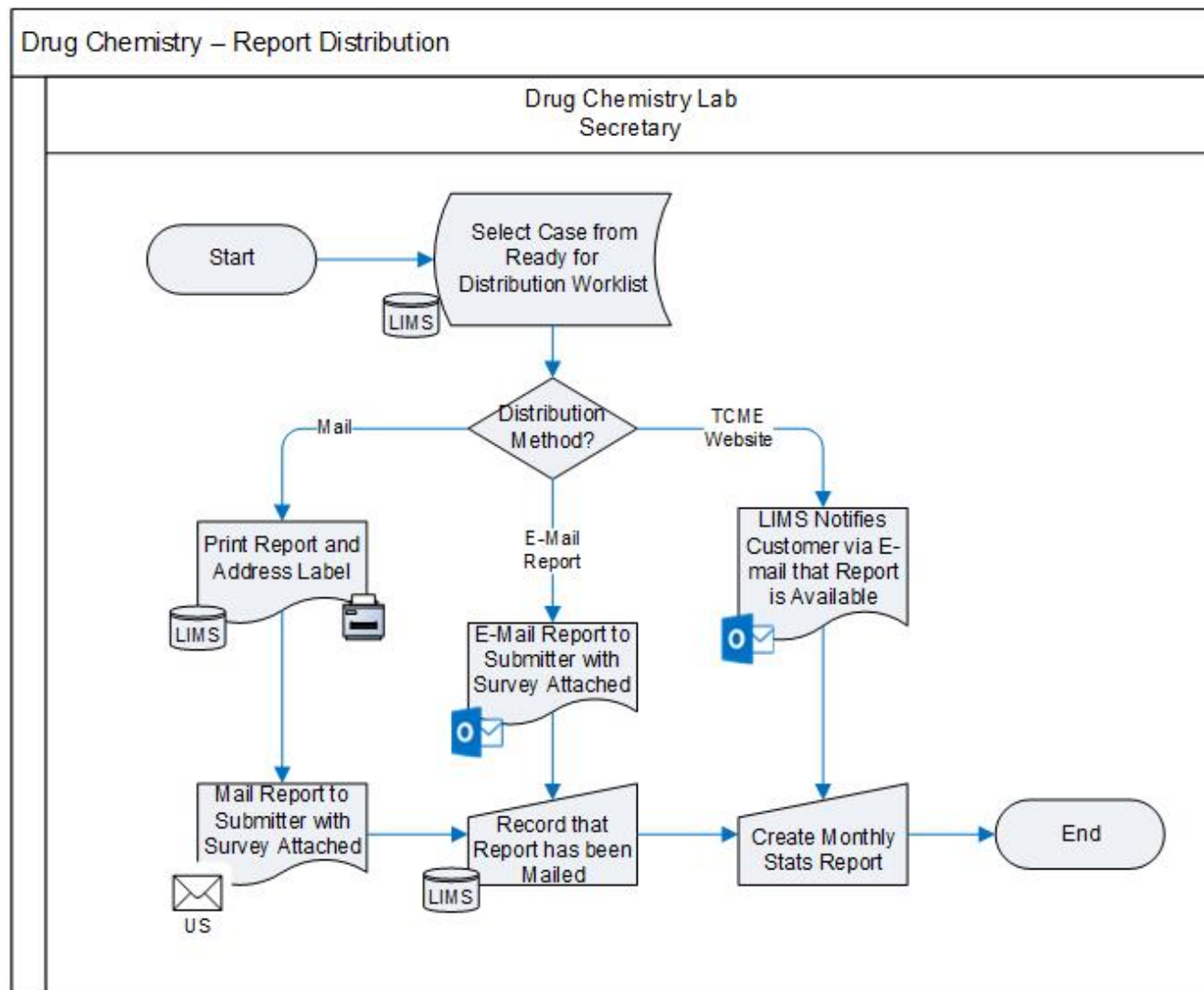


Figure 73 Drug Chemistry – Report Distribution

Information may also be release prior to a report as described in Section 10.1.6.3.

10.2.2. Toxicology

The Toxicology Section provides drug testing to assist the MEs and others in determining the CoD and MoD by isolating, identifying and determining the level of chemicals in collected

specimens. The Toxicology Section also analyzes specimens collected from persons suspected of driving while intoxicated (DWI).

The Toxicology Section routinely tests specimens for alcohol, and performs drug screens using enzyme-linked immunosorbent assays (ELISA) and gas chromatography with mass spectrometric detection (GC/MSD). If drugs are detected, the laboratory quantitates using liquid chromatography with mass spectrometric detection (LC/MS) or liquid chromatography with ultraviolet detection (LC/UV). The Toxicology Section also performs non-routine tests for carbon monoxide, ethylene glycol, difluoroethane, and other specific drugs, as appropriate.

The introduction of a new LIMS would introduce the following changes to the toxicology workflows:

- The LIMS CoC capability would replace the internal CoC form
- Discrepancies would be recorded in the LIMS
- Barcode labels would replace handwritten labels
- Requests for initial work and for additional work would be via electronic worklists rather than by clipboard
- Samples to be tested first would be selected from and notated in worklists in the LIMS
- Electronic case files would eliminate the need for the Toxicology Secretary to create paper case files and to record information in a Toxicology sign out spreadsheet
- Send out information would be recorded in the LIMS
- Run batches would be created in the LIMS and downloaded directly to instruments via an electronic interface eliminating the need to type run sequences into instruments
- Lot numbers for controls, internal standards and reagents would be recorded in the LIMS and associated to run batches
- Sample and QC results would be uploaded directly from instruments via an electronic interface eliminating the need to manually enter results
- The LIMS would provide warnings when QC results are out of specification
- The LIMS would perform calculations, truncation and rounding, as applicable
- The LIMS would select DWI values to be reported based on configured rules
- Reports and affidavits would be written in the LIMS rather than using a Word template

- *Notifications of pending reviews and report distribution would be via the LIMS*
- *Review notes and comments would be recorded in the LIMS instead of on paper and Post-It notes*
- *Electronic transfer of data would eliminate the need for batch administrative reviews*
- *Electronic signatures would eliminate the need to print reports for the sole purpose of applying a signature*
- *Electronic records would eliminate the various spreadsheets used to provide the Business Office with billing information since records for completed tests would be available to the Business Office*
- *Non-jurisdictional reports for cases lacking a CoD would not have to be given to the Bookkeeper since these reports would be available electronically when the CoD becomes available*

10.2.2.1. Receiving Evidence

The Toxicology Section receives evidence for both ME and non-ME cases.

The following two figures illustrate conceptualized future state workflows for receiving ME and non-ME cases, respectively:

Toxicology – Evidence Retrieval – ME Cases

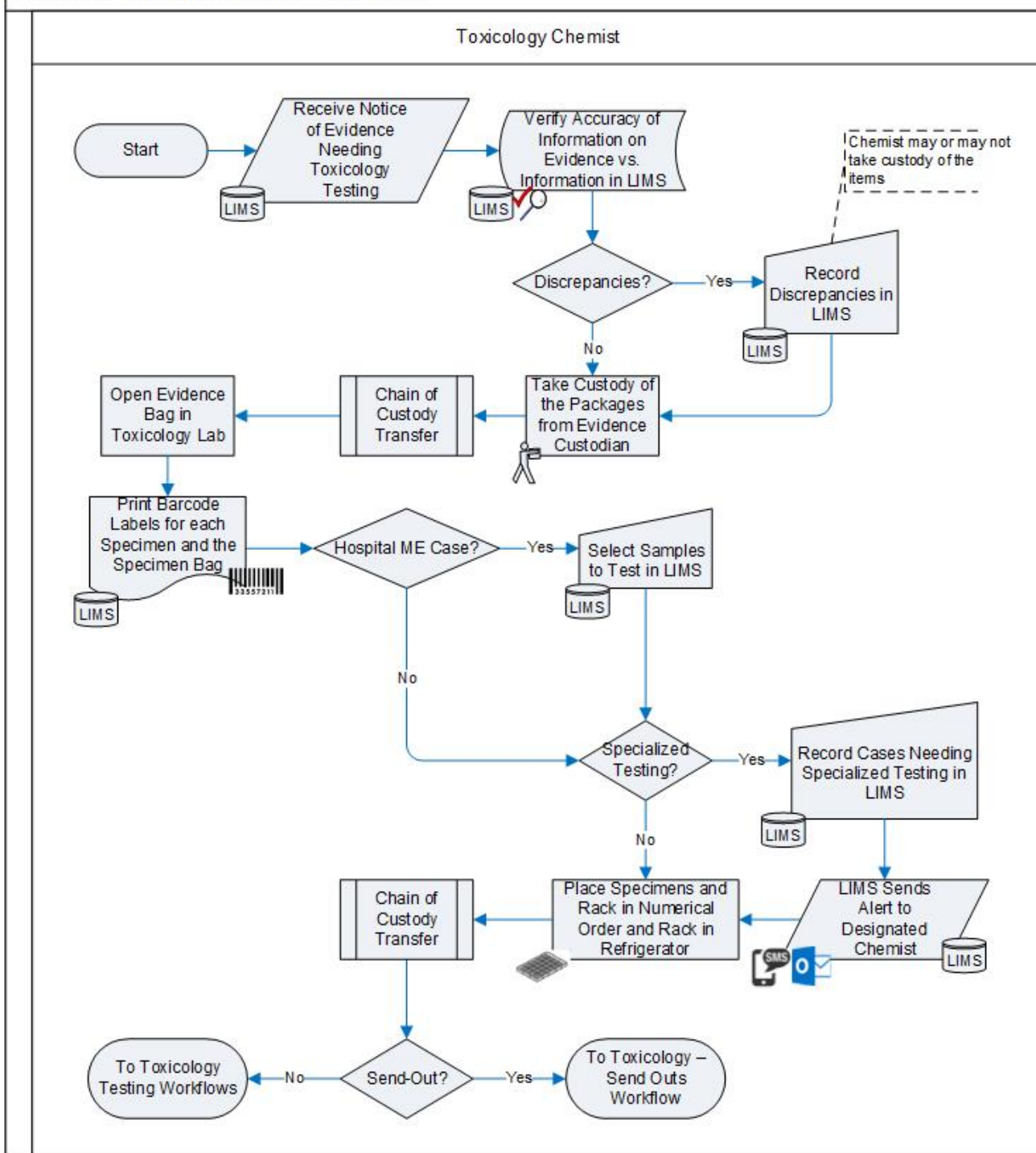


Figure 74 Toxicology - Evidence Retrieval - ME Cases

LIMS REP Updated

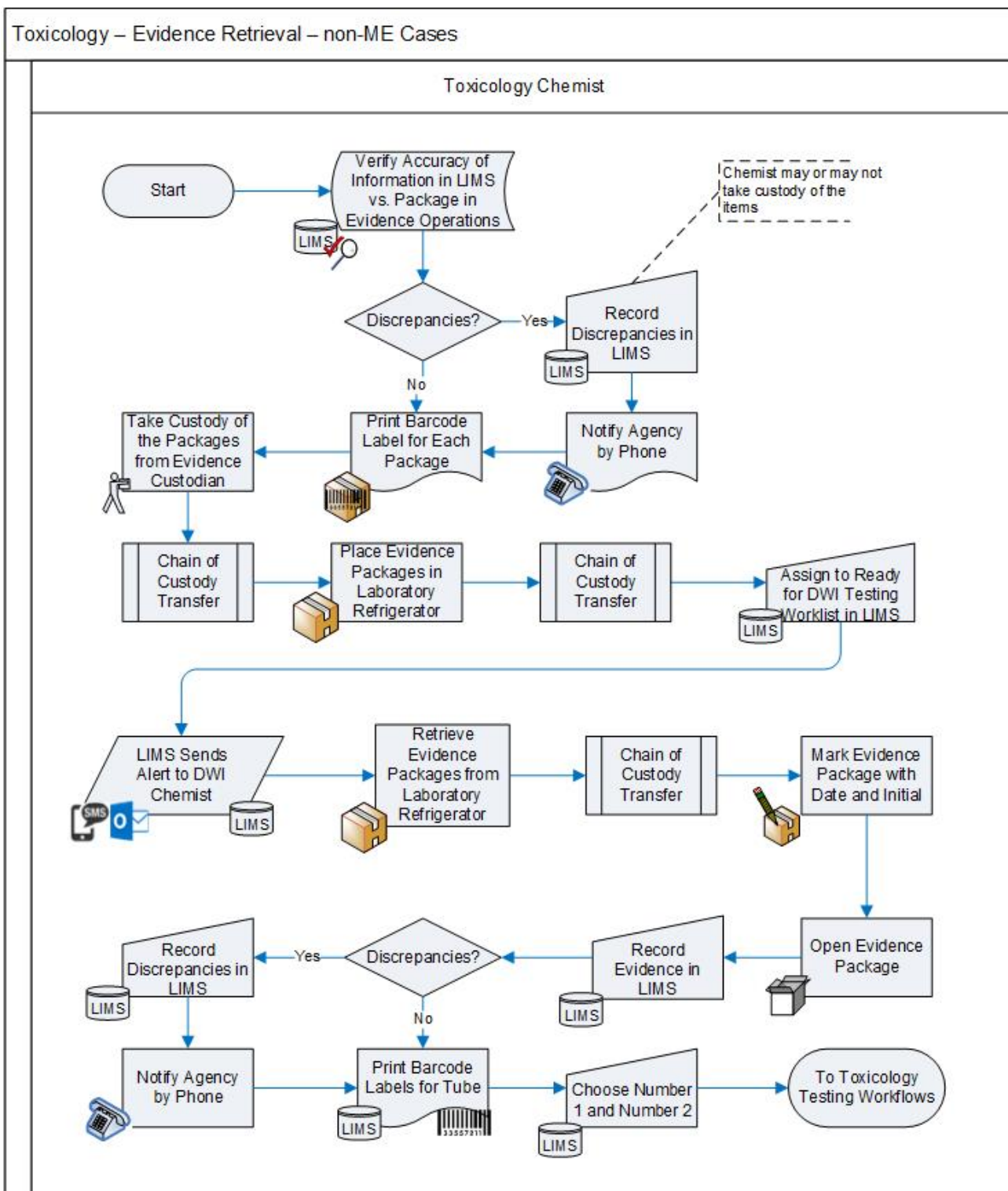


Figure 75 Toxicology - Evidence Retrieval - non-ME Cases

The Toxicology Section sends specimens to reference laboratories when a request is received for a non-validated test. The following figure illustrates a conceptualized future state send-out process:

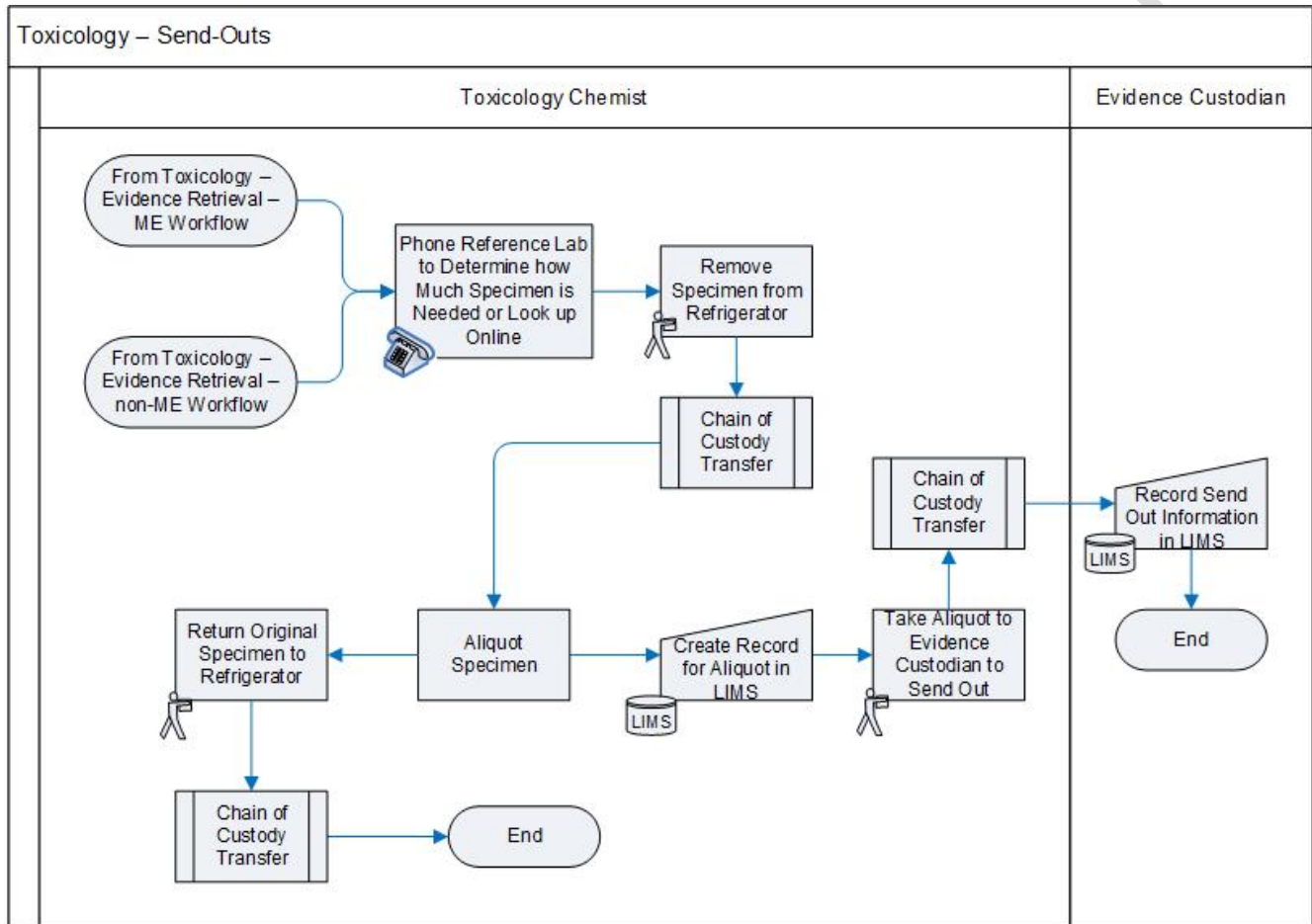


Figure 76 Toxicology - Send-Outs

Reports from reference laboratories go directly to the MEs without Toxicology Section involvement.

10.2.2.2. Testing

The Toxicology Section uses automated instrumentation for almost all of its testing. The following workflow, which is referenced from the workflows for specific tests, illustrates a conceptualized future state general specimen testing workflow for the laboratory:

Toxicology – Specimen Analysis

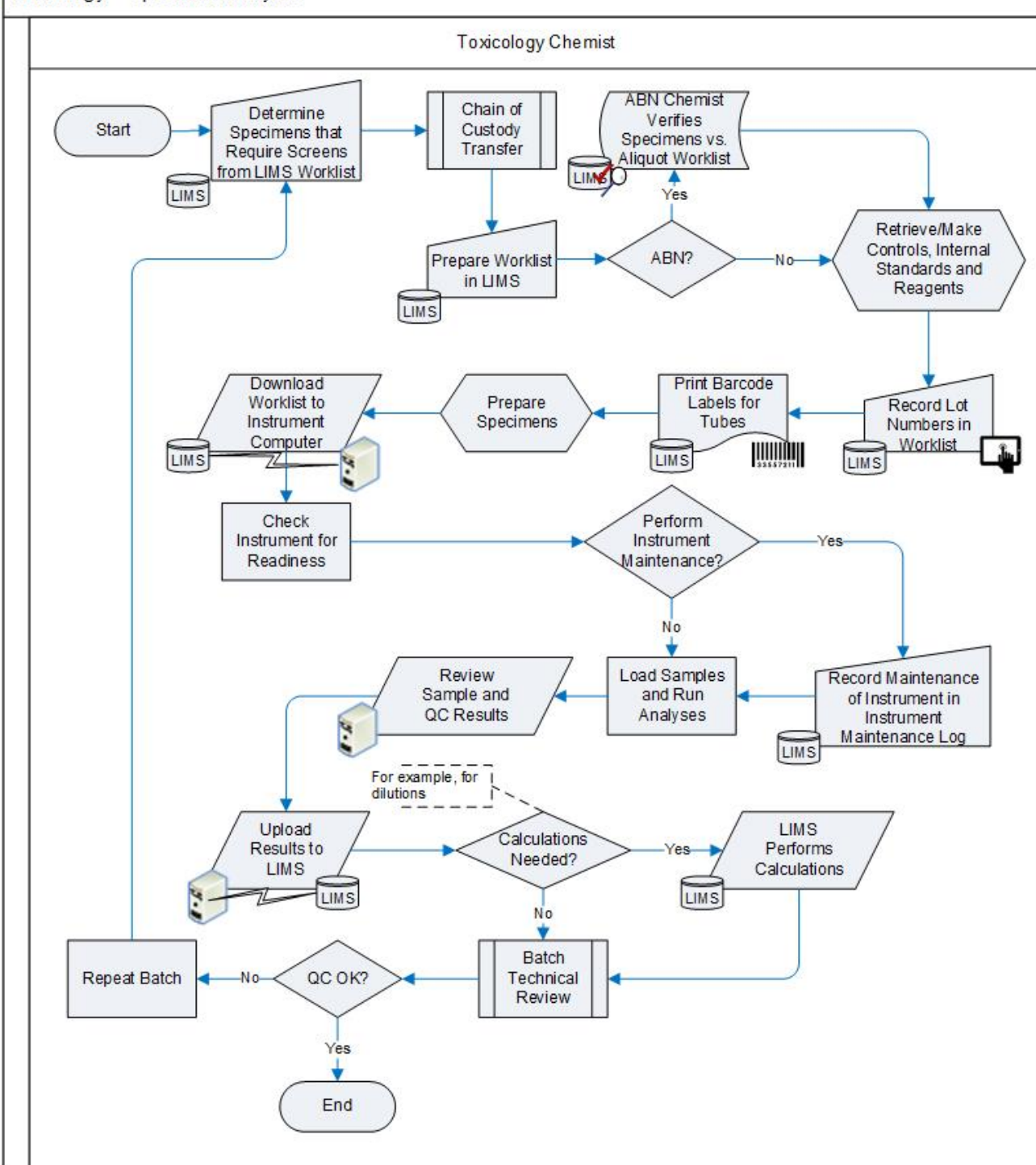


Figure 77 Toxicology - Specimen Analysis

The preceding workflow references a Batch Technical Review process. The following figure illustrates a conceptualized future state workflow for this review:

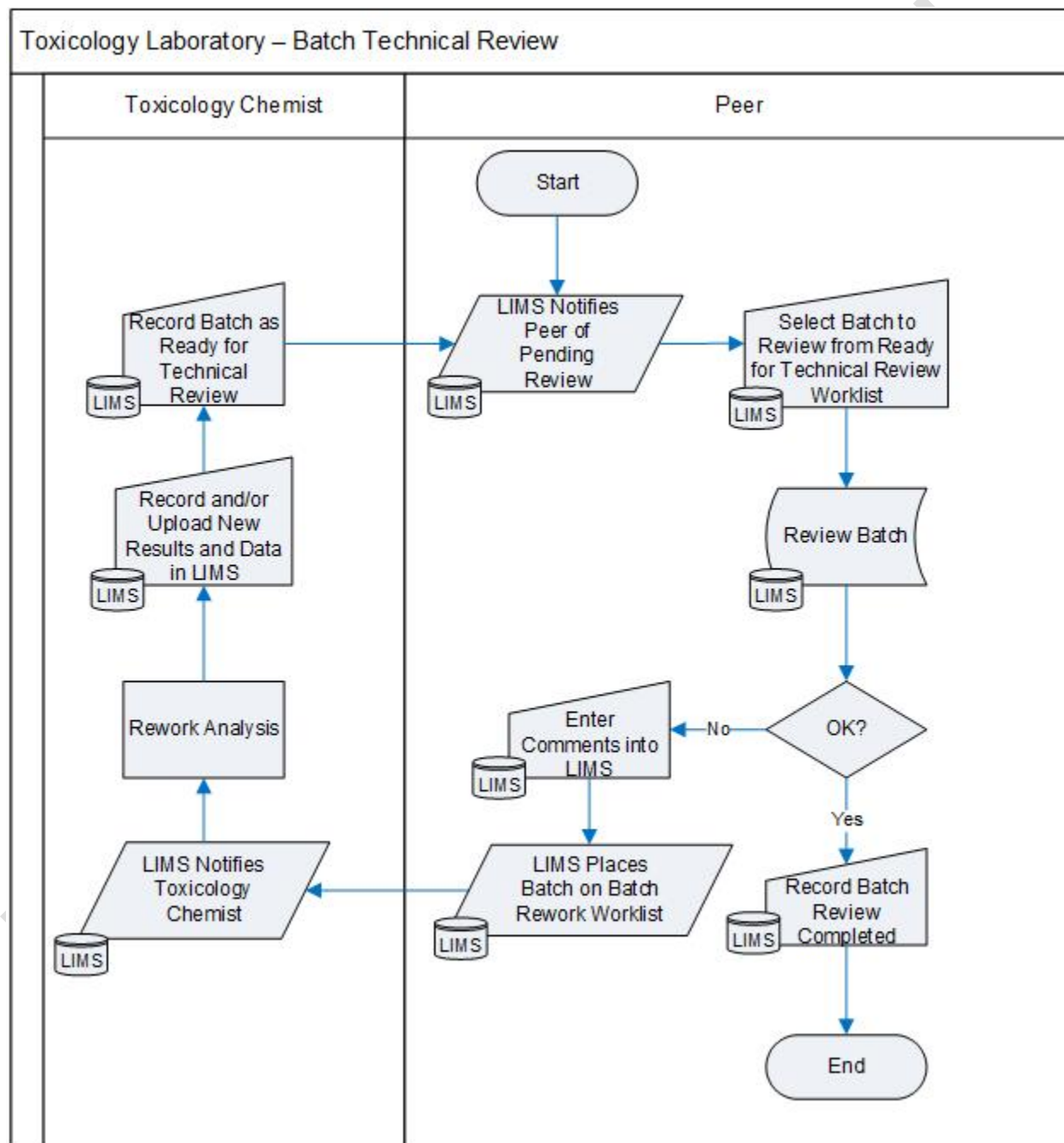


Figure 78 Toxicology - Batch Technical Review**1. Drug Testing**

Drug screening begins with ELISA and GC/MSD screens. However, in some cases, the Toxicology Section screens by ELISA only. Positive results are confirmed by quantitating the detected

drugs using LC/MS or LC/UV. The following two figures illustrate a conceptualized future state workflow for drug testing:

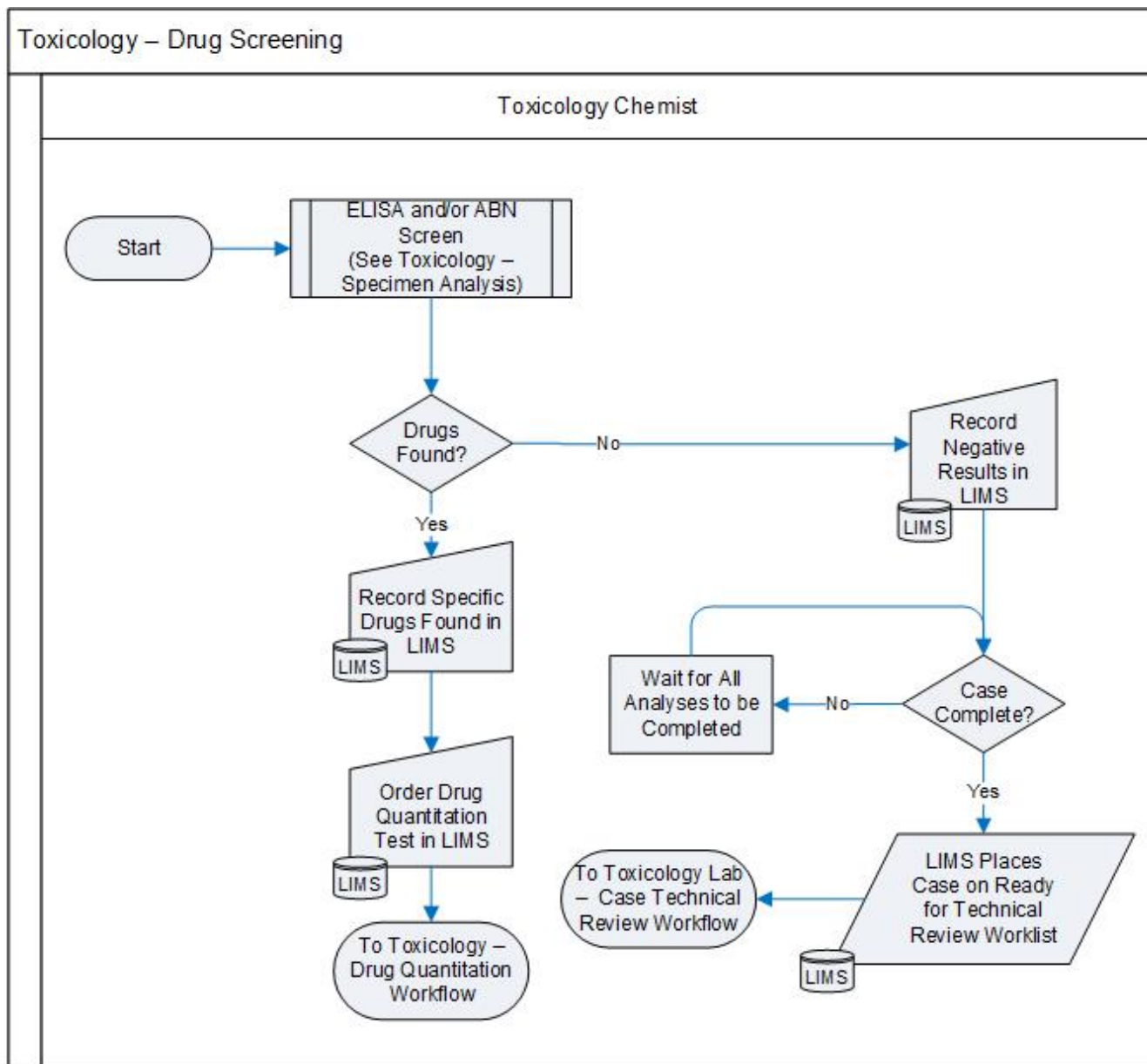


Figure 79 Toxicology – Drug Screening

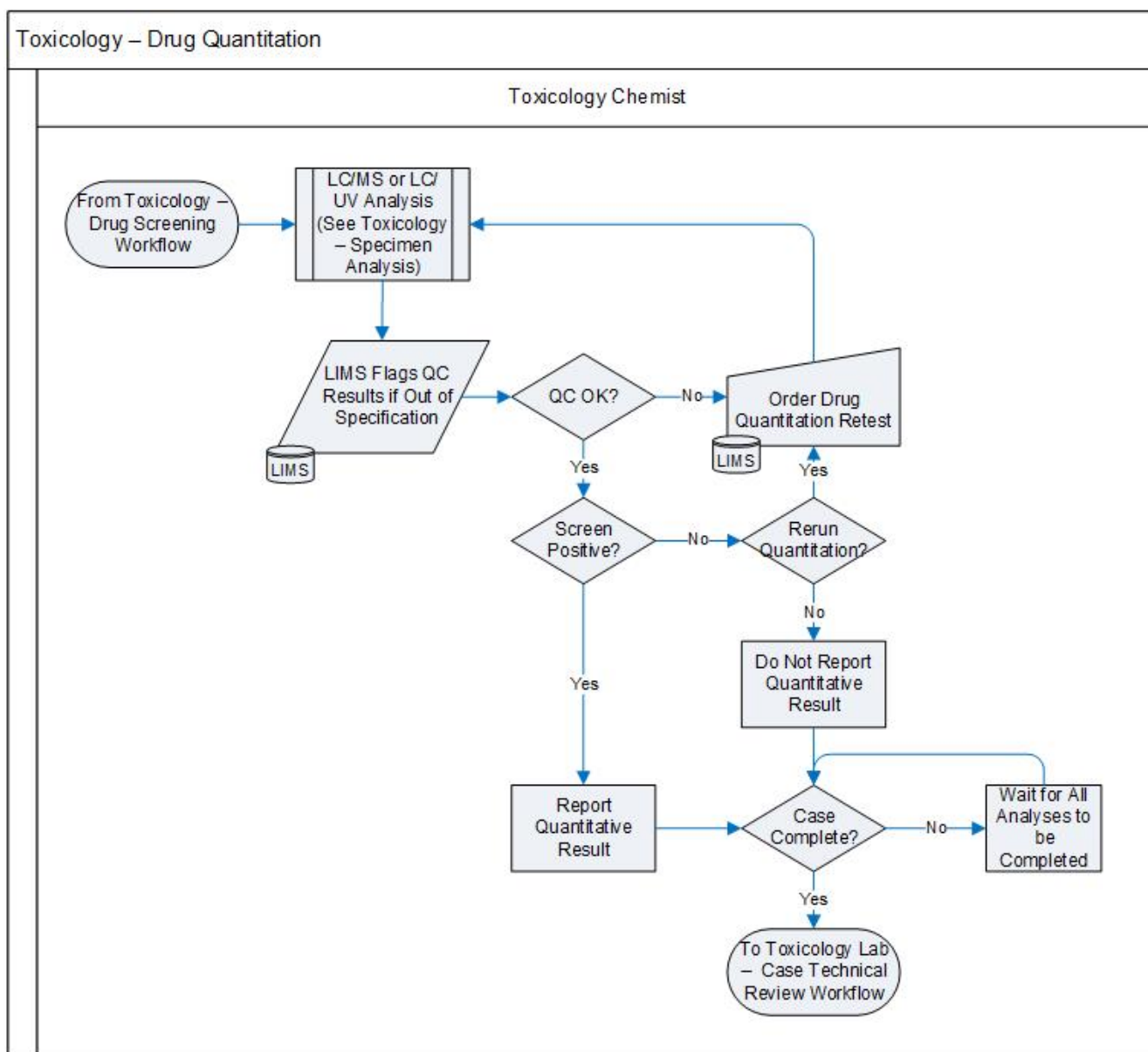


Figure 80 Toxicology – Drug Quantitation

2. DWI Testing

The TCME provides DWI testing as a service. Unless otherwise requested, testing starts with a screen for blood alcohol. A blood alcohol content of >0.08% is considered to be evidence of intoxication and requires preparation of a notarized affidavit. If the blood alcohol content is <0.1%, the Toxicology Section will screen for drugs (as per above).

The testing protocol is designed to give suspects the benefit of the doubt: Results are truncated down and confidence intervals are rounded up.

The following figure illustrates a conceptualized future state workflow for testing for DWI:

LIMS REP Updated

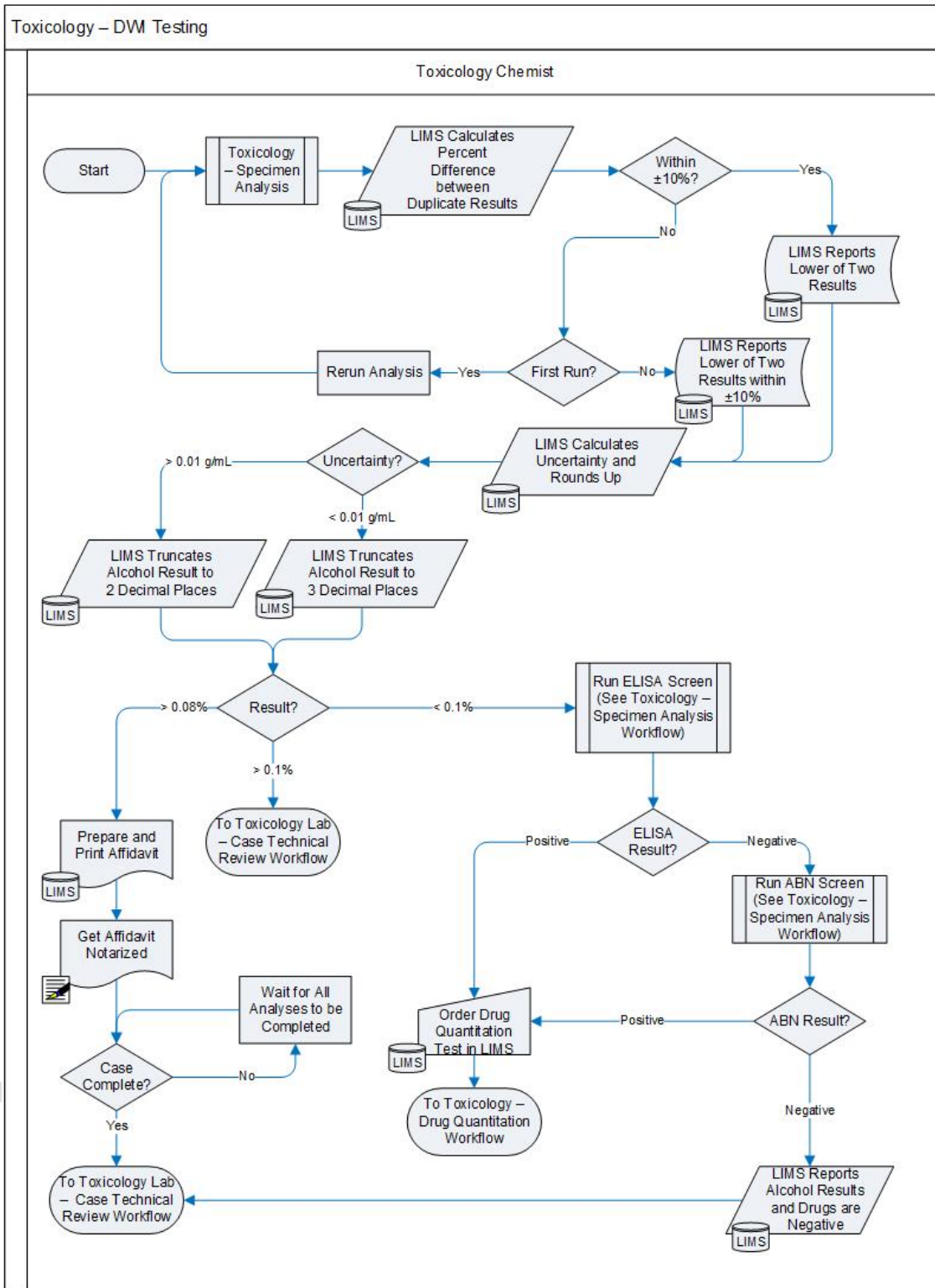


Figure 81 Toxicology - DWI Testing**3. Alcohol Testing for ME Cases**

The Toxicology Section also tests for alcohol in body fluids collected during ME examinations at the TCME. The following figure illustrates a conceptualized future state workflow when testing for alcohol for ME Cases:

LIMS REP Updated

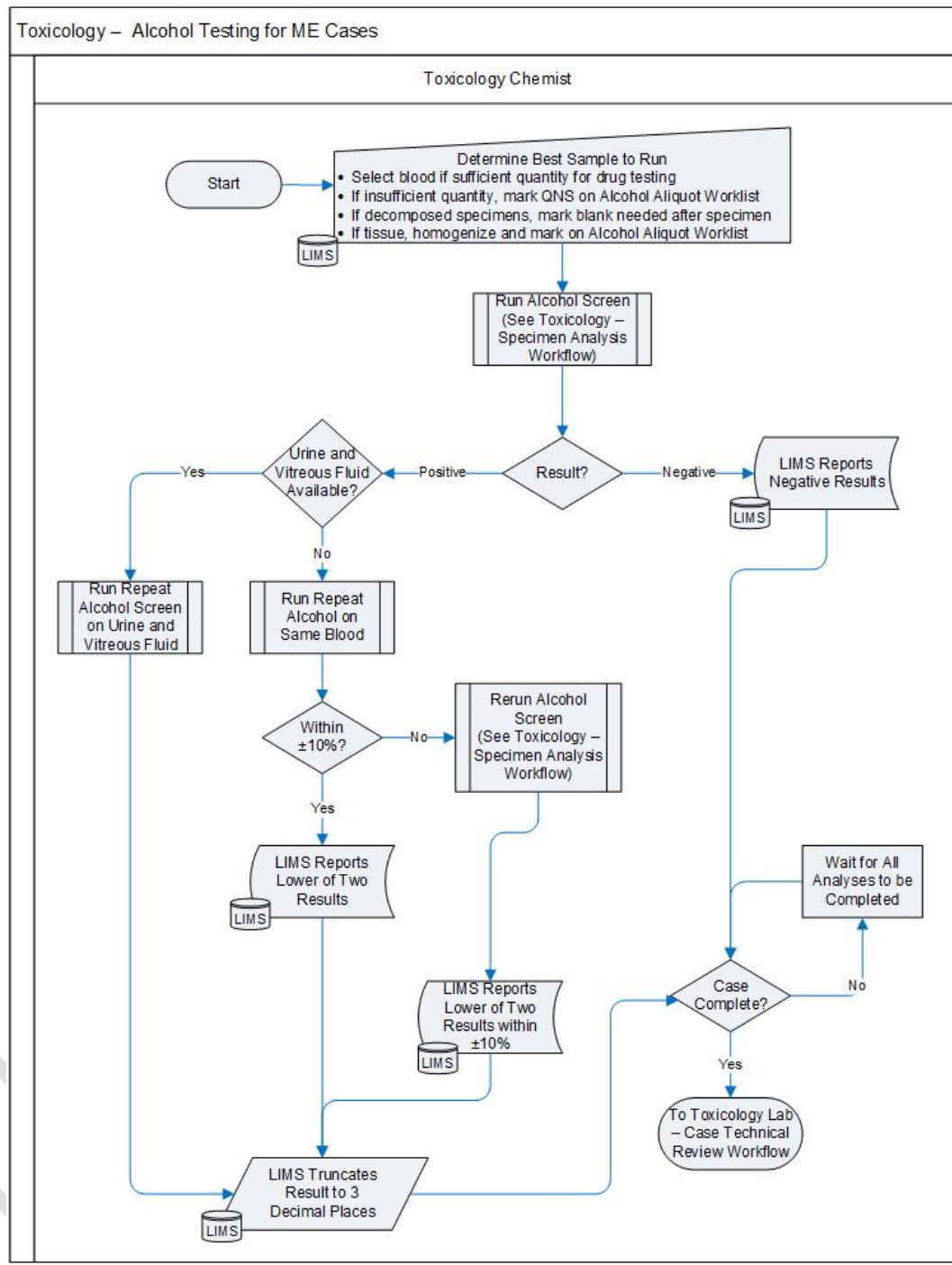


Figure 82 Toxicology – Alcohol Testing for ME Cases

10.2.2.3. Technical and Administrative Reviews

The following two figures illustrate conceptualized future state processes for technical and administrative reviews for completed cases, respectively:

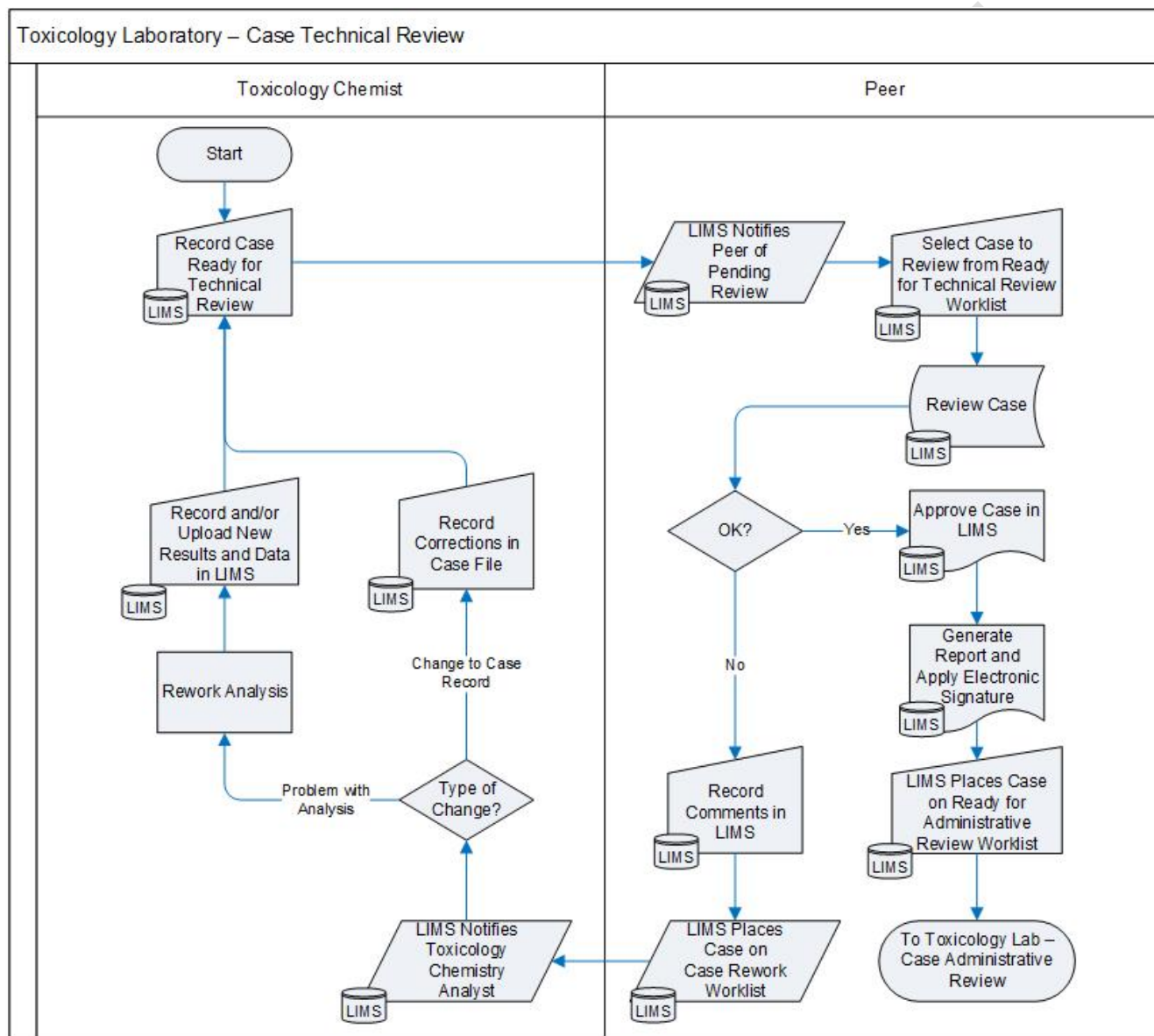


Figure 83 Toxicology – Case Technical Reviews

If a new report is needed at any time for interpretative changes, the original report will be retained in LIMS. Original reports are not retained if the change is non-interpretative.

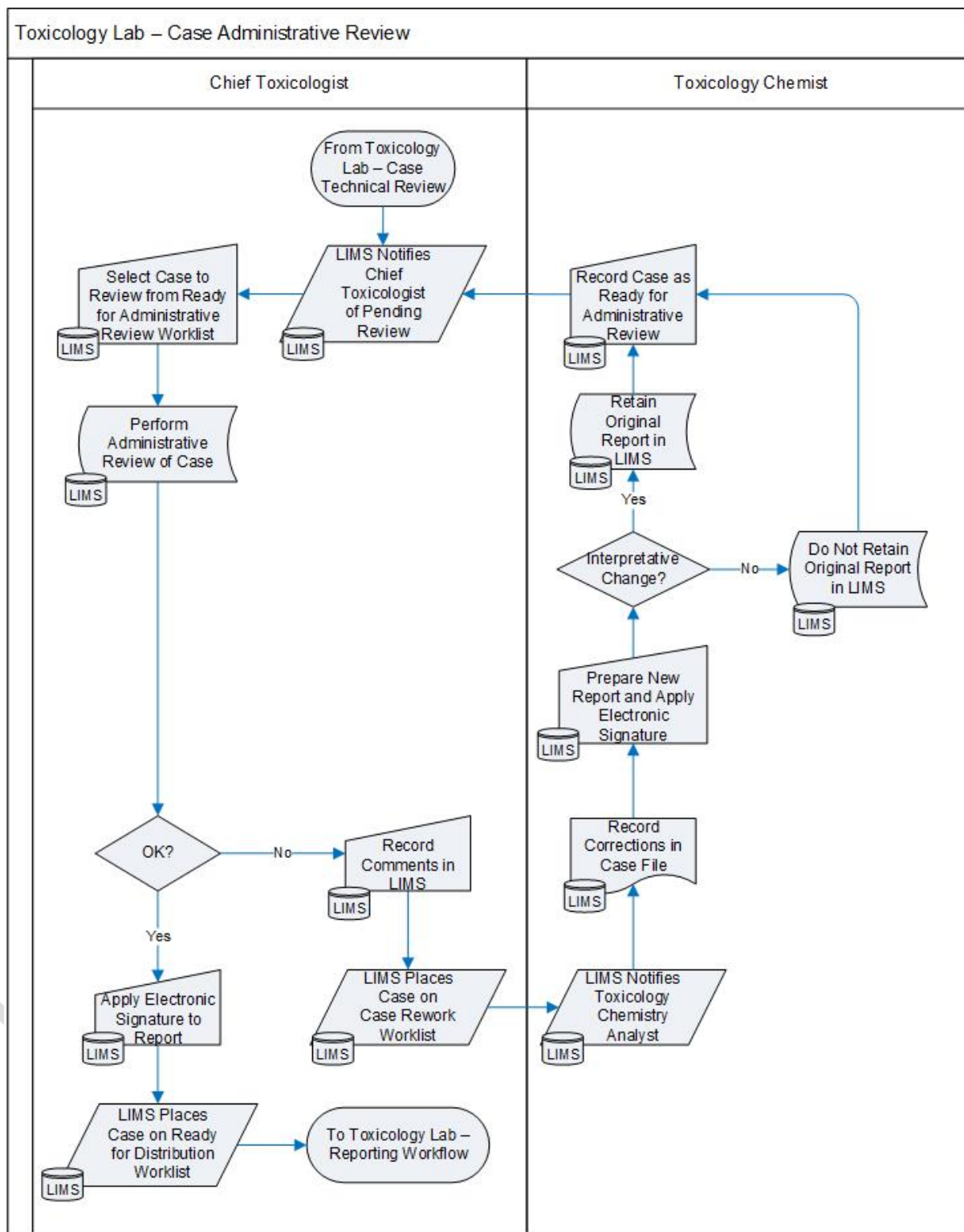


Figure 84 Toxicology - Case Administrative Reviews

LIMS REP Updated

10.2.2.4. Reporting

The following figure illustrates a conceptualized future state process for reporting completed cases:

LIMS REP Updated

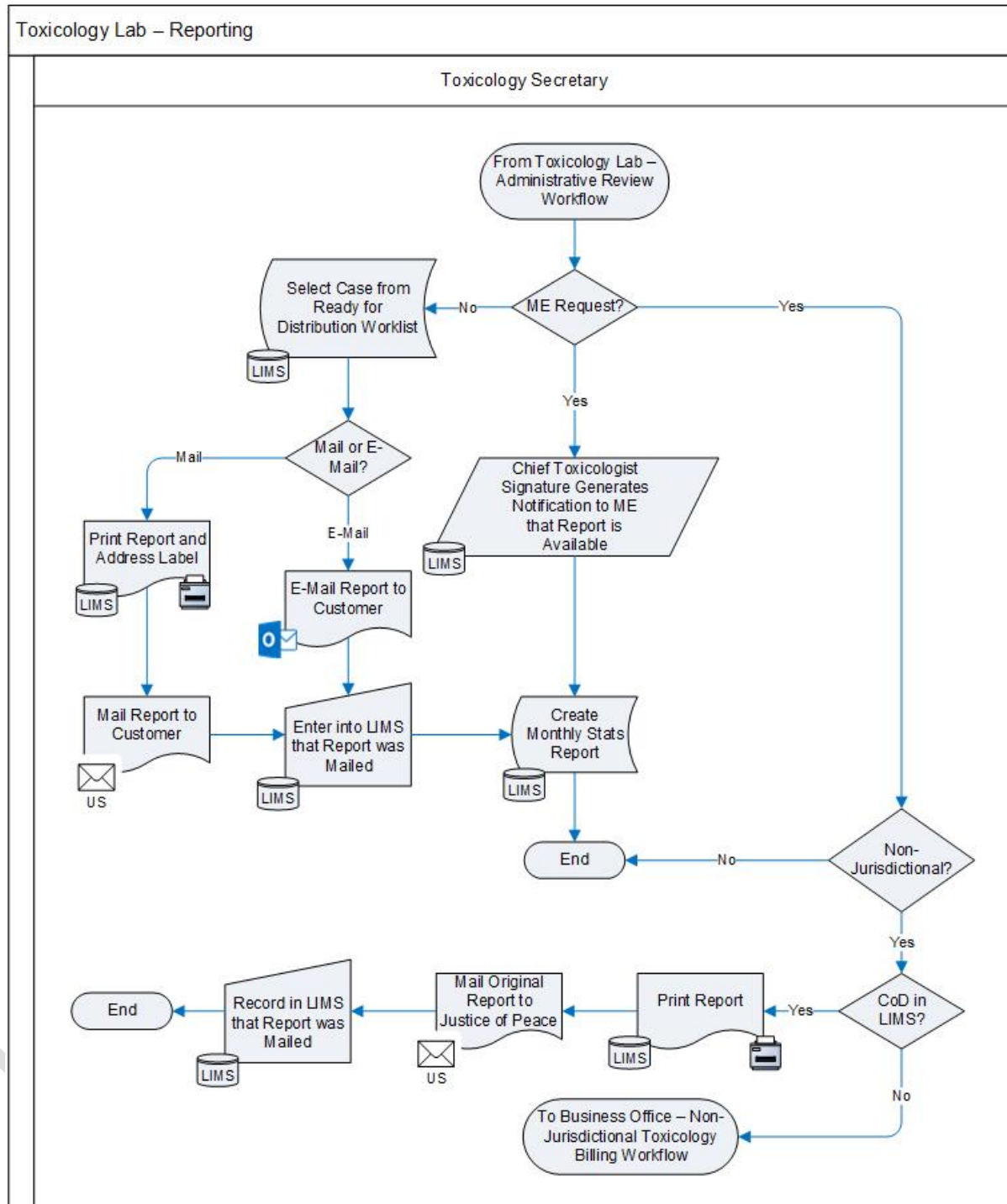


Figure 85 Toxicology – Reporting

Information may also be release prior to a report as described in Section 10-1-6-3.

10-2-2-5- Returning Evidence to the Evidence Custodian

Following completion of a case, the Toxicology Section returns the evidence to the Evidence Custodian as shown in a conceptualized future state workflow in the next figure:

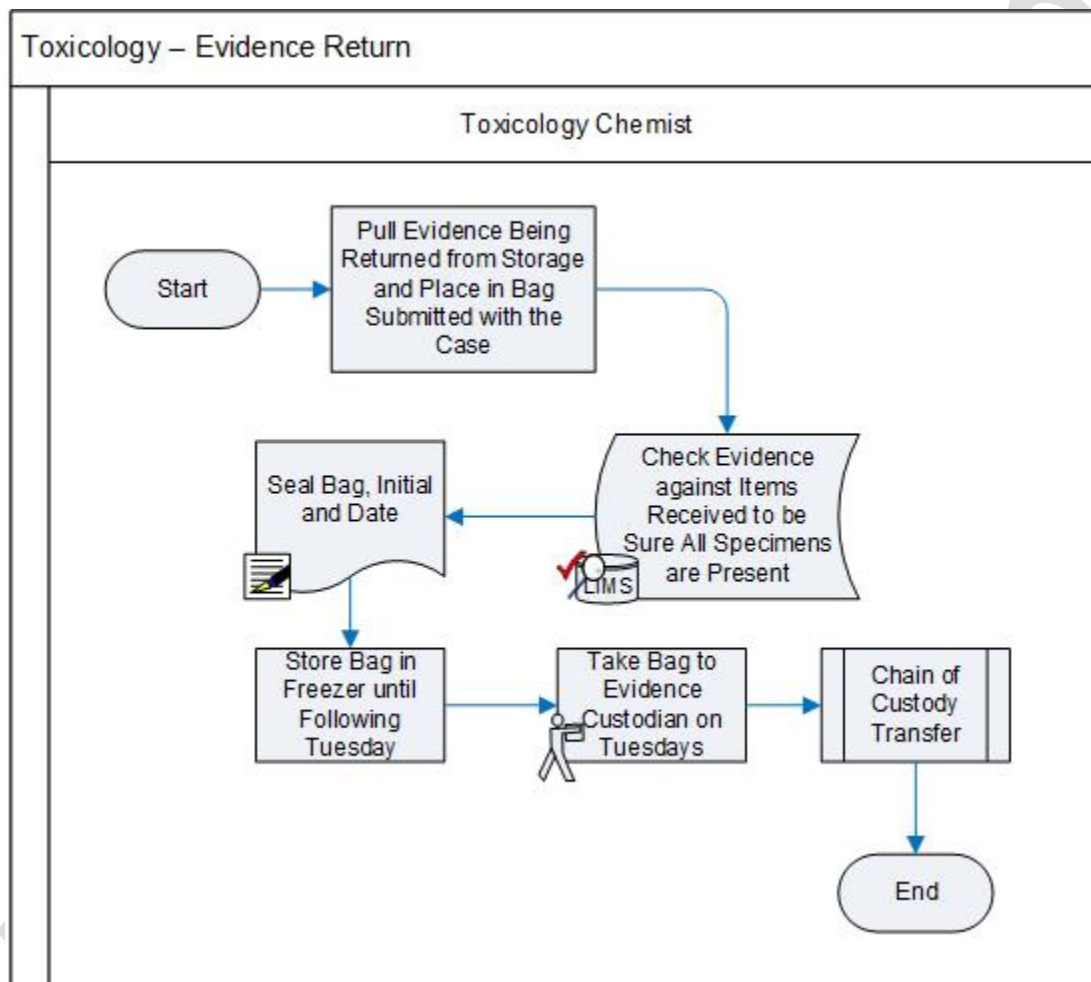


Figure 86 Toxicology - Evidence Return

10-3- QUALITY ASSURANCE (QA) AND QUALITY CONTROL (QC)

As an ASCLD/LAB-accredited laboratory, the TCME must adhere to the requirements of ISO/IEC 17025, as well as the supplementary requirements of ASCLD/LAB.

10.3.1.1. Reagents, Controls, Buffers and Calibrators

The laboratory sections would maintain inventory logs in the LIMS for laboratory-purchased and laboratory-prepared, reagents, controls, buffers and standards. The inventories would be incremented and decremented as materials are added to or removed from inventory, respectively. The LIMS would provide an alert if inventories dropped below a specified threshold or if the expiration date were less than a month away.

In order to meet ISO 17025 traceability requirements, the laboratory sections would use the LIMS to record the preparation of reagents, controls, buffers and standards including the identity and lot numbers of the stock materials used to prepared the working materials. The LIMS would allow specific lots or batches of reagents, controls, buffers and standards to be assigned to run batches.

10.3.1.2. Instrument Maintenance and Environmental Controls

The laboratory sections would use LIMS-integrated tablet PCs to record and store: 1) maintenance and calibration histories for each of their instruments, 2) the daily temperature of refrigerators and freezers, and 3) day of use balance checks.

10.3.1.3. Control Charting

The Toxicology Laboratory runs control samples with drug quantitation batches and with alcohol testing batches. Results for the control samples would be recorded in the LIMS. Control charts would be created by using either an integrated statistics package or by exporting the data to Excel spreadsheets for charting using Excel charting capability.

10.3.1.4. Technical Procedure Departure Form

Deviations to an established technical procedure must be justified and authorized prior to the use of the deviation in casework. The requesting analyst documents the date of request, case numbers affected, the specific deviations requested, and technical justification for the deviations in a Technical Procedure Departure Form. The Technical Lead in the section makes comments and signs and dates their approval of the request. The form is then passed on to the Lab Director for approval signature and date. The form would be scanned into the LIMS and attached to the applicable batch and case files.

11. DETERMINE AND REPORT CAUSE AND MANNER OF DEATH

The ME determines the CoD and MoD after completing his/her examination and receiving all pertinent information from the other TCME sections. The ME then prepares the Autopsy Report, which is the formal, written report that results from examination of a body. The term Autopsy Report encompasses all types of examinations conducted by the MEs to include external examinations, full autopsies, and partial autopsies (an internal exam focused on a particular area of interest).

The Administration Section prepares the Death Certificate. Frequently with ME cases, final CoD and MoD may not have been determined at the time that a Death Certificate is initially created.

11.1. PREPARATION OF AUTOPSY REPORT

The TCME maintains a dictation system known as Fusion that allows the MEs to formally record their observations while performing exams. Not all of the MEs make use of this service; some choose to write their own reports using a Word document template. Each transcribed report is submitted to the dictating ME for correction, corrected if required, approved, signed, and uploaded to CRYPT. Except for using a new LIMS instead of CRYPT and maintaining completed autopsy reports in the LIMS, the workflow would be unchanged from current operations.

The following two figures illustrate preparation of the Autopsy Report:

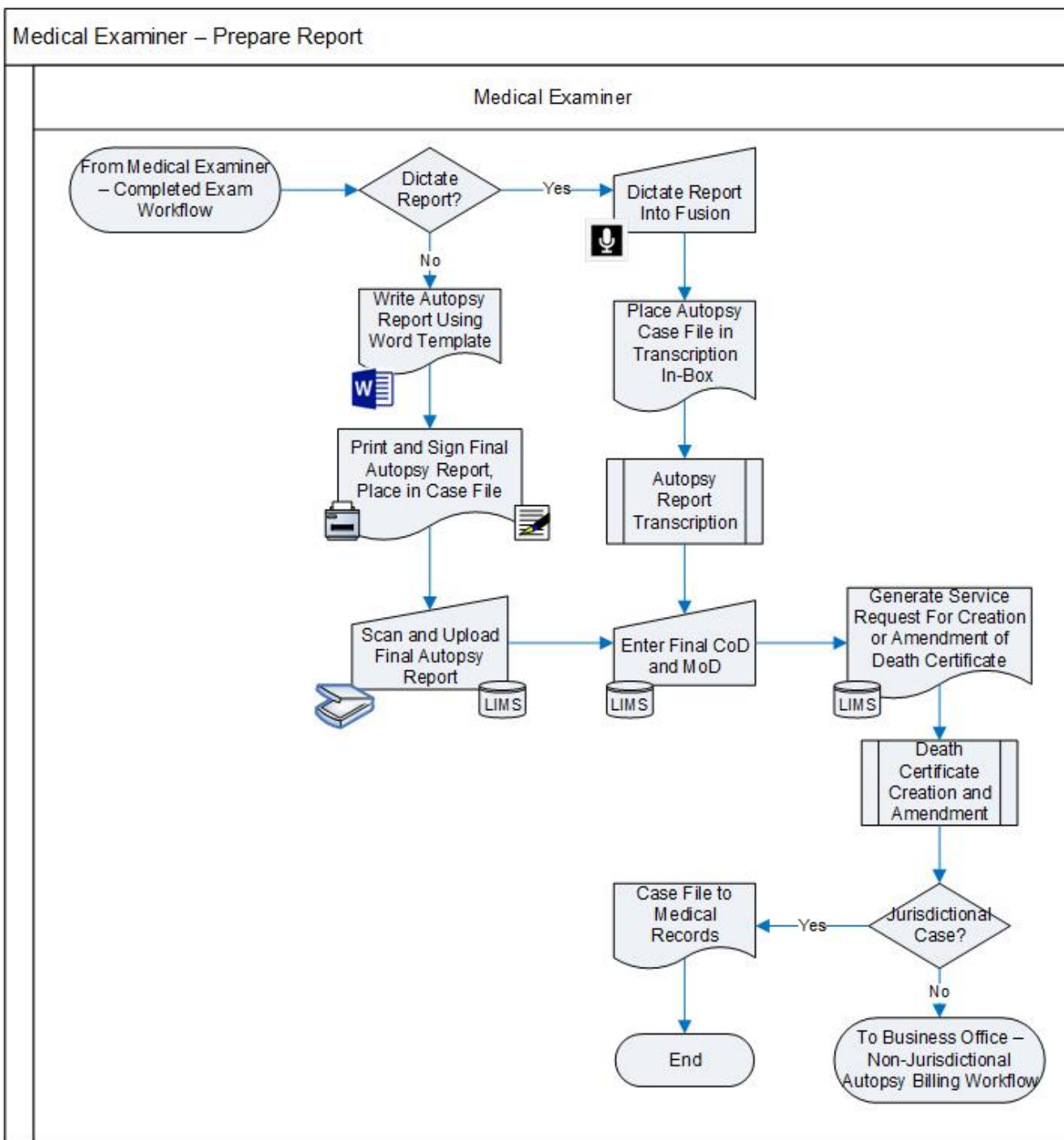


Figure 87 Medical Examiner - Prepare Report

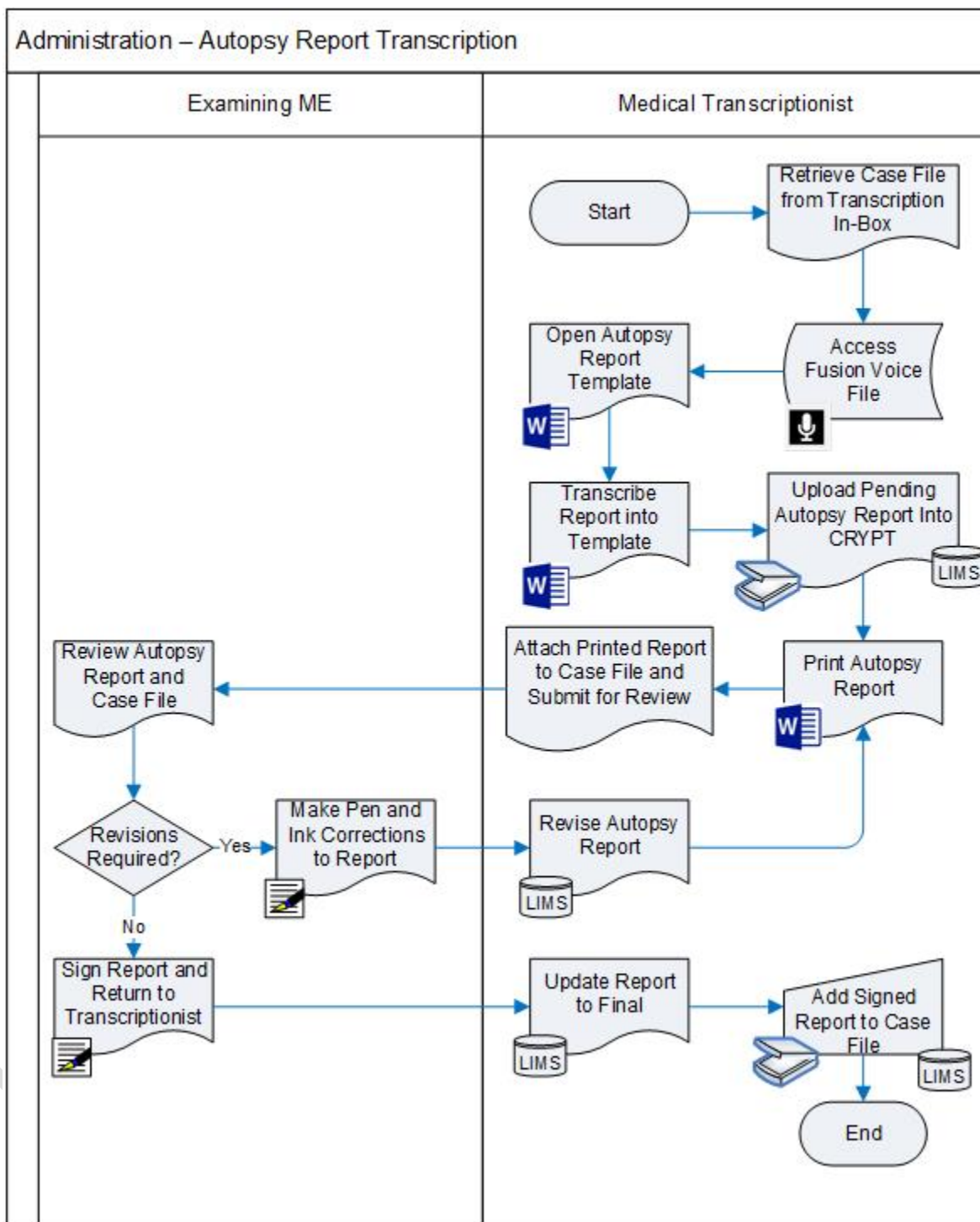


Figure 88 Administration – Autopsy Report Transcription

11.2·DEATH CERTIFICATES

Death Certificates are produced and managed via the Texas Electronic Registrar (TER), a web-based application that provides the ability for authorized users to register deaths and create the certificates. If the COD and/or MOD were not determined at the time the original Death Certificate was created, Medical Secretaries amend the Death Certificates when the information becomes available. Under the direction of the MEs, Medical Secretaries are authorized to access TER and perform these functions on behalf of the licensed MEs.

The introduction of a new LIMS would introduce the following changes in the creation or amendment of death certificates:

- The LIMS would notify the Medical Secretary that there is a pending death certificate Service Request
- The Medical Secretary would access the case file in the LIMS
- A death certificate would be uploaded directly to the LIMS instead of CRYPT

The following figure illustrates a conceptualized future state Death Certificate creation and amendment workflow:

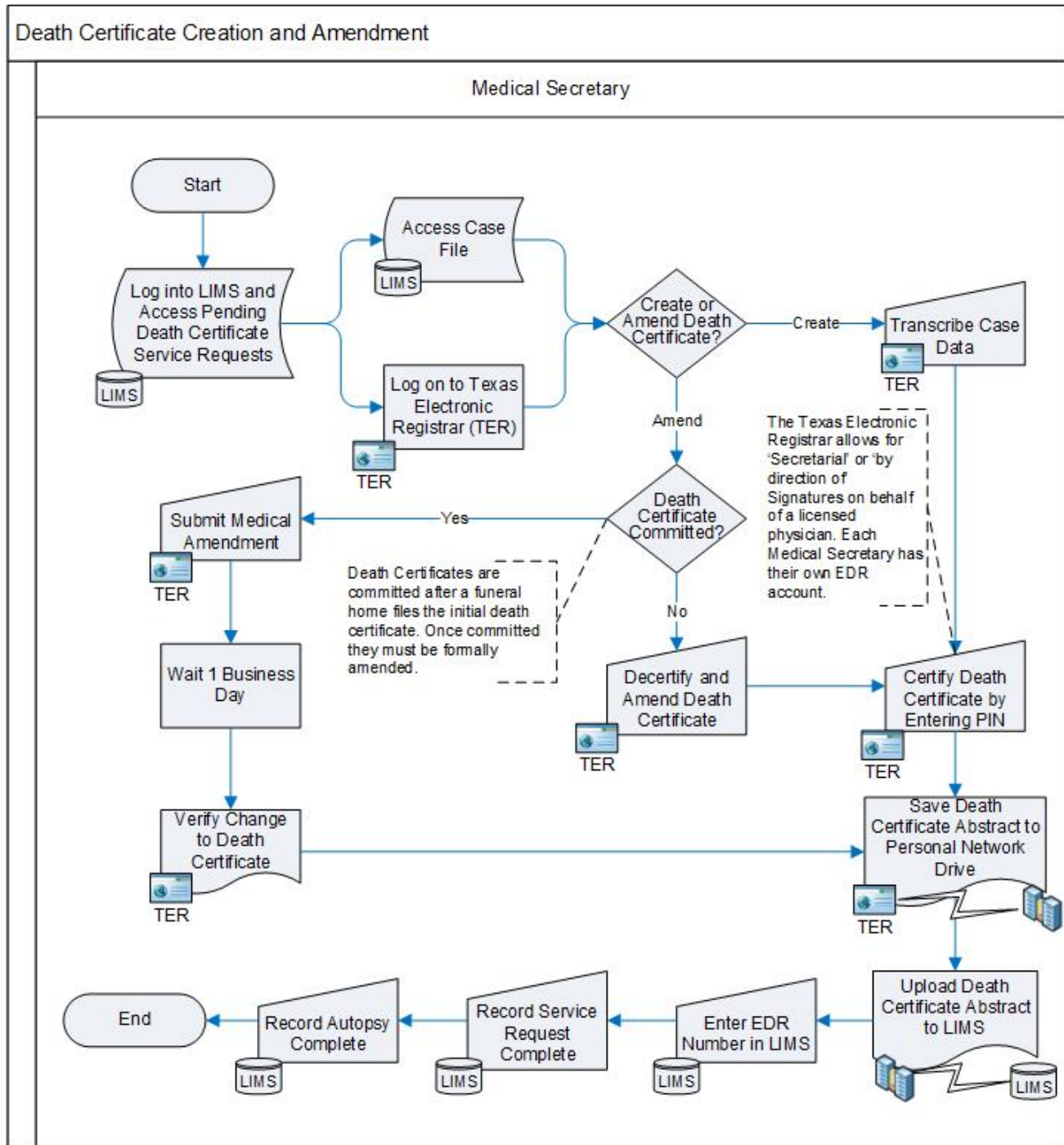


Figure 89 Administration - Death Certificate Creation and Amendment

12. RELEASE BODY

The Morgue staff releases the body, and any property that had been received with the body, when all appropriate examinations have been created and all holds have been removed. (The FDI Section performs these functions when Morgue staff is not available, e.g., during holidays, on weekends and after hours.)

The introduction of a new LIMS would introduce the following changes to the workflow for releasing bodies and associated property:

- Body and property release forms and checklists would be created in the LIMS, printed for the funeral home driver, signed by the funeral home driver, and then scanned into the LIMS
- Address labels for communication with family members would be printed from the LIMS
- Communication activities would be recorded in the LIMS rather than in CRYPT

The following figure illustrates a conceptualized future state body and property release workflow:

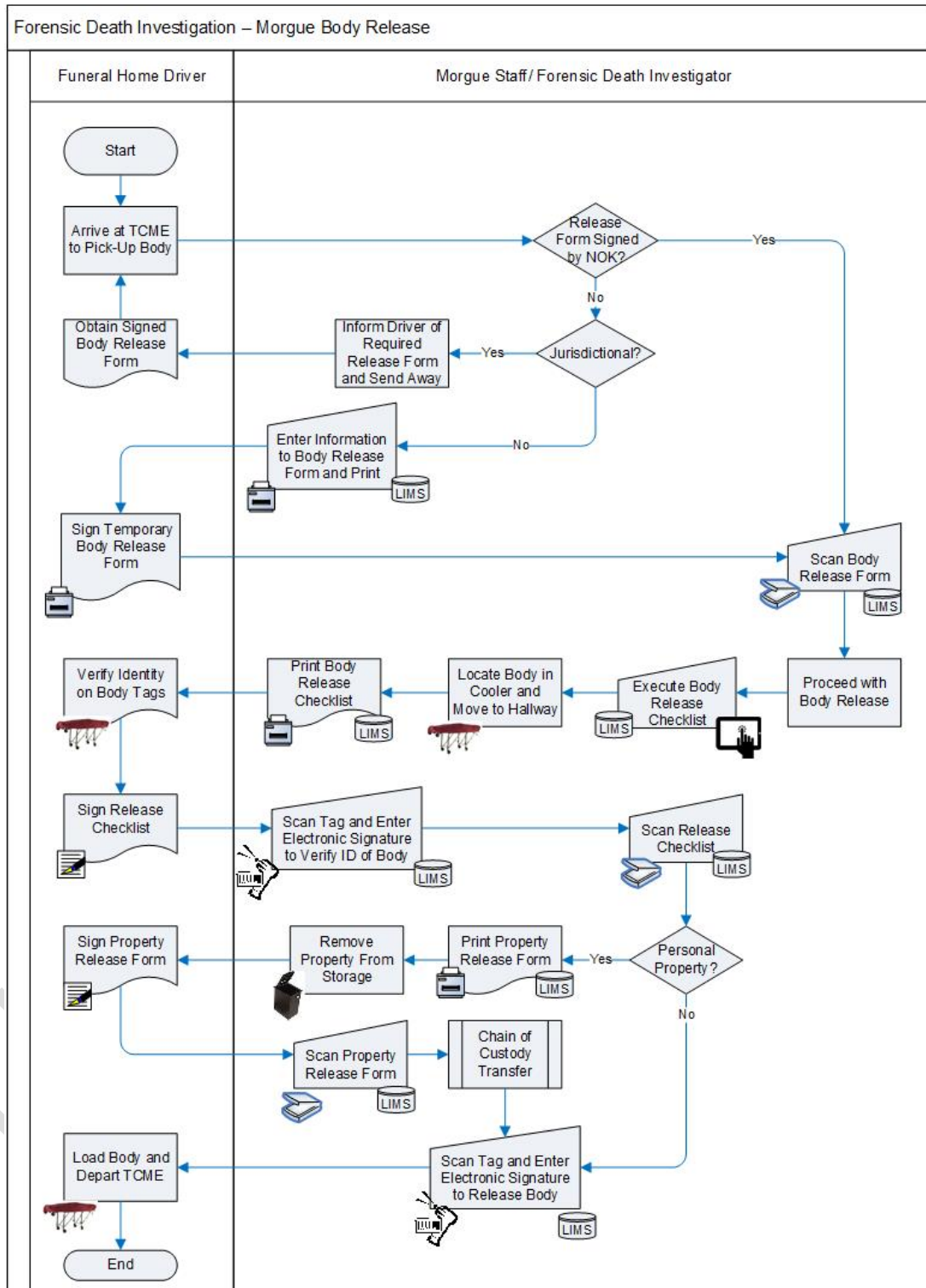


Figure 90 Forensic Death Investigations - Morgue Body Release

The FDIs are responsible for communicating with surviving family members when bodies or property are unclaimed.

The following figure illustrates a conceptualized future state workflow for informing the family:

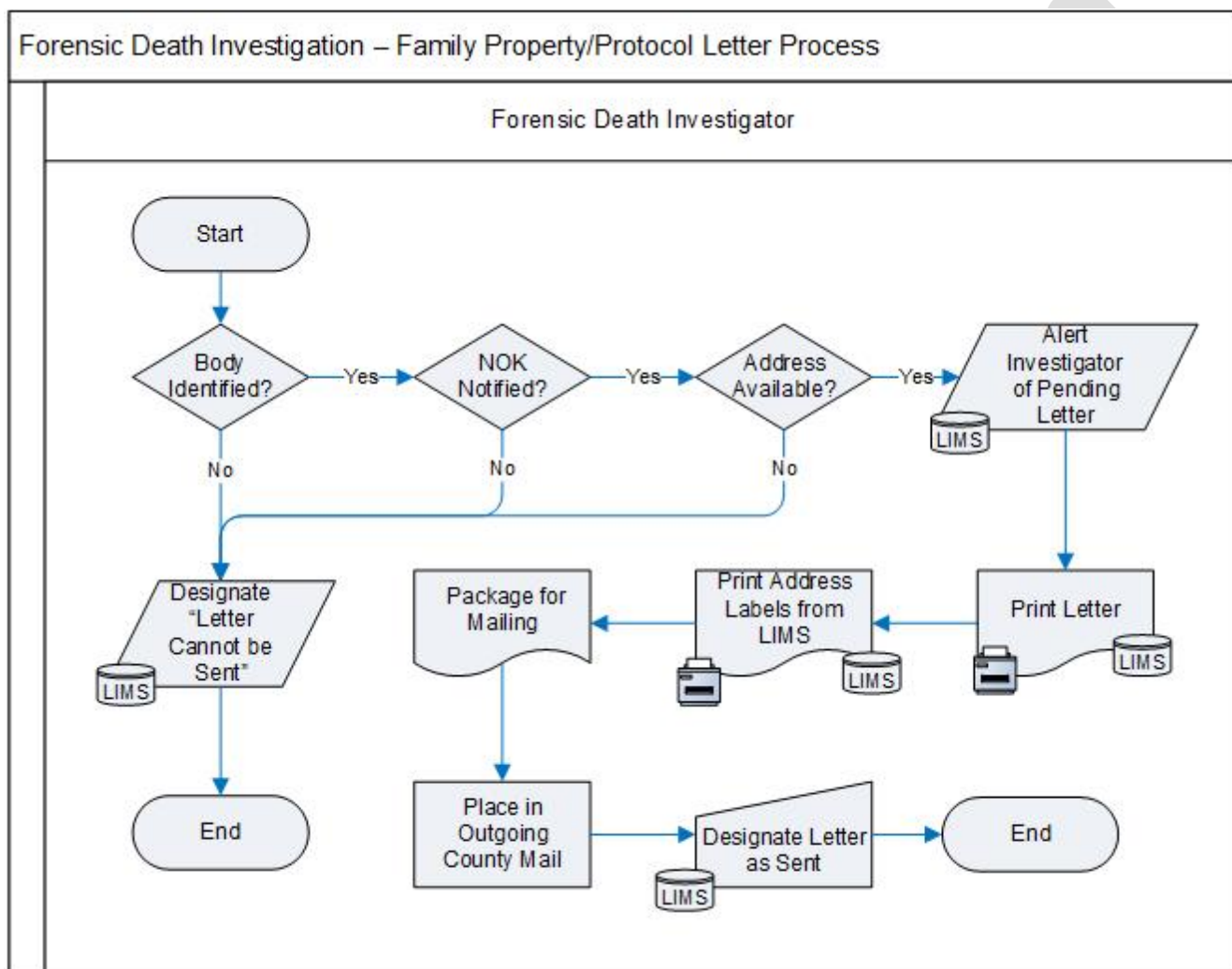


Figure 91 Forensic Death Investigations - Family Property/Protocol Letter Process

13. BILLING CUSTOMERS

The TCME operates as a fee for service organization. Autopsies performed for counties outside of the contract jurisdiction of the TCME are billed to the requesting county Justice of the Peace.

The introduction of a new LIMS would introduce the following changes to the workflows for billing customers:

- Lists of completed and reported agency requests would be available to the Bookkeeper in LIMS eliminating the need for the Laboratory Directors to send monthly billing spreadsheets
- The LIMS would notify the bookkeeper when an autopsy report is complete and ready for billing
- Electronic versions of reports would eliminate the need to store paper copies of non-jurisdictional toxicology reports lacking a CoD since these would be retrieved from the LIMS when the Business Office receives notification that the CoD is available

13.1 AGENCY SERVICE REQUEST BILLING

The following figure illustrates a conceptualized future state agency service request billing process:

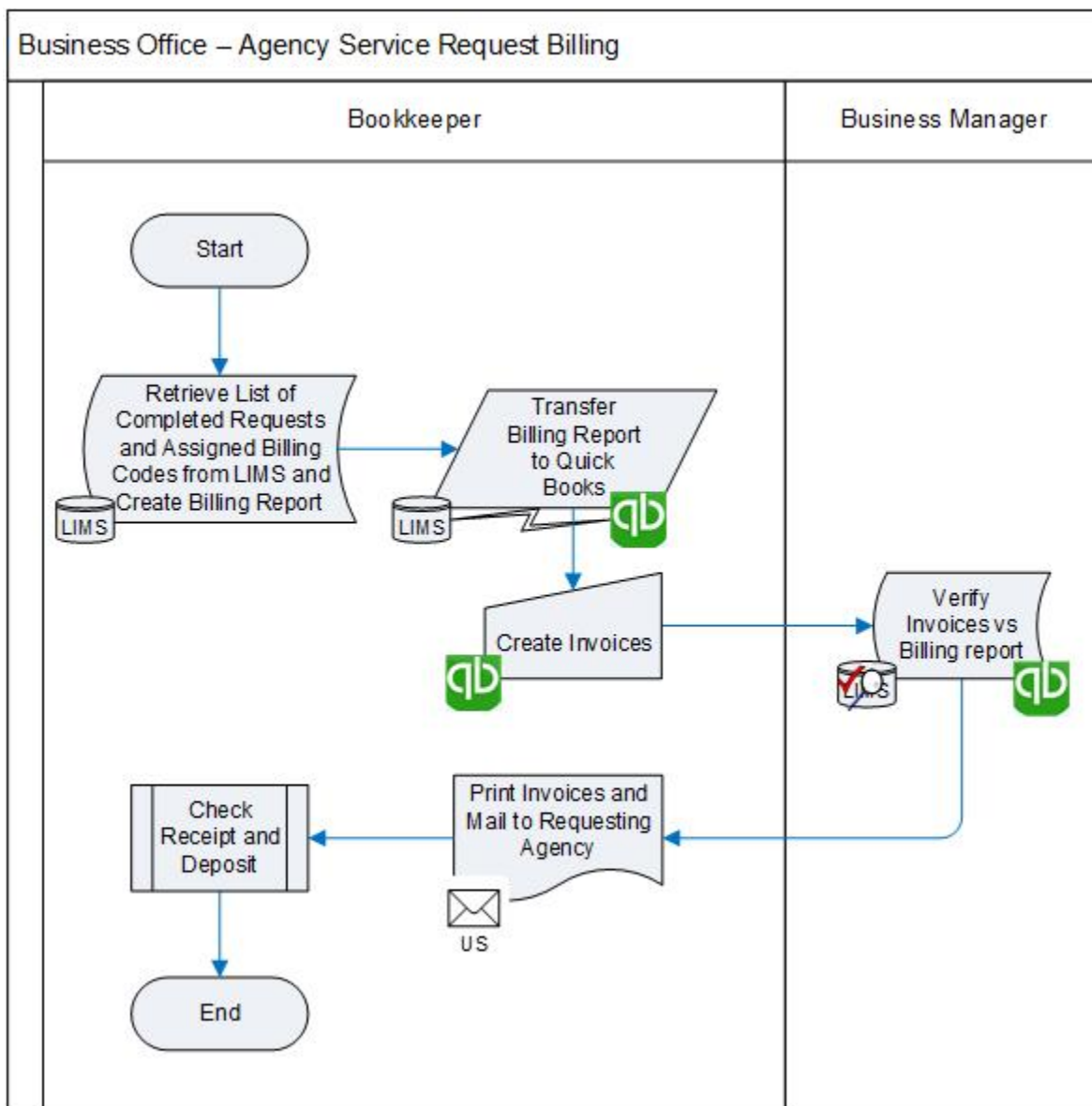


Figure 92 Business Office – Agency Service Request Billing

13.2. NON-JURISDICTIONAL AUTOPSY BILLING

The following figure illustrates a conceptualized future state non-jurisdictional autopsy billing workflow:

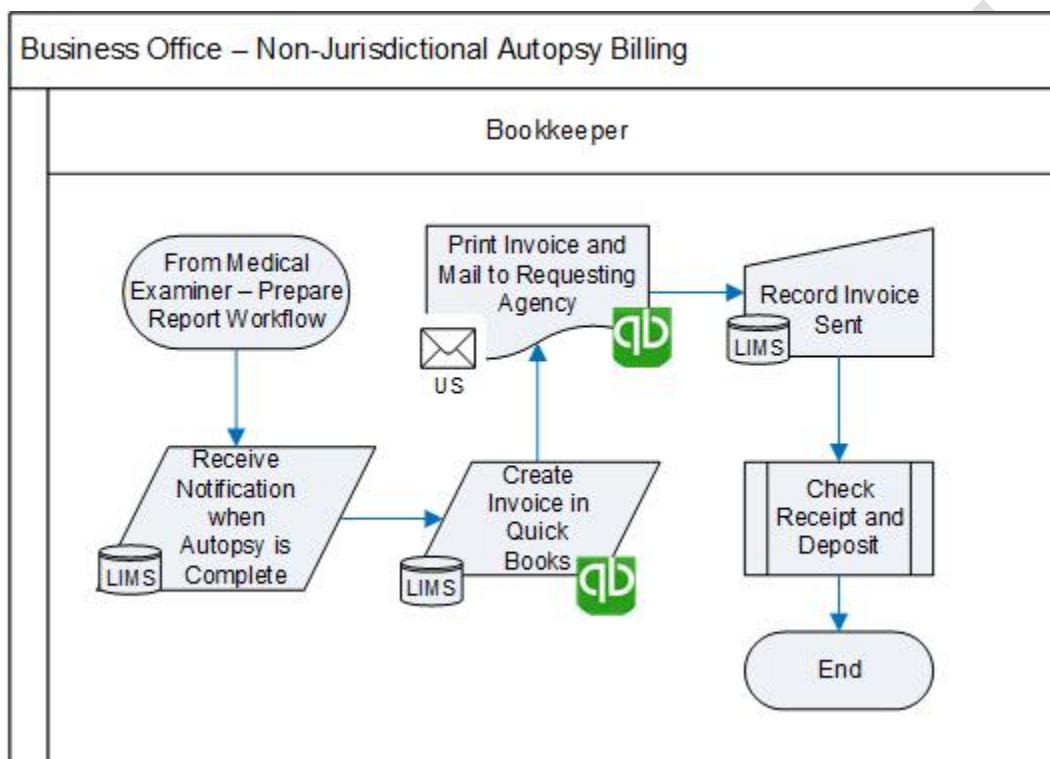


Figure 93 Business Office - Non-Jurisdictional Autopsy Billing

13.3. NON-JURISDICTIONAL TOXICOLOGY BILLING

The following figure illustrates a conceptualized future state non-jurisdictional toxicology billing workflow:

LIMS REP Updated

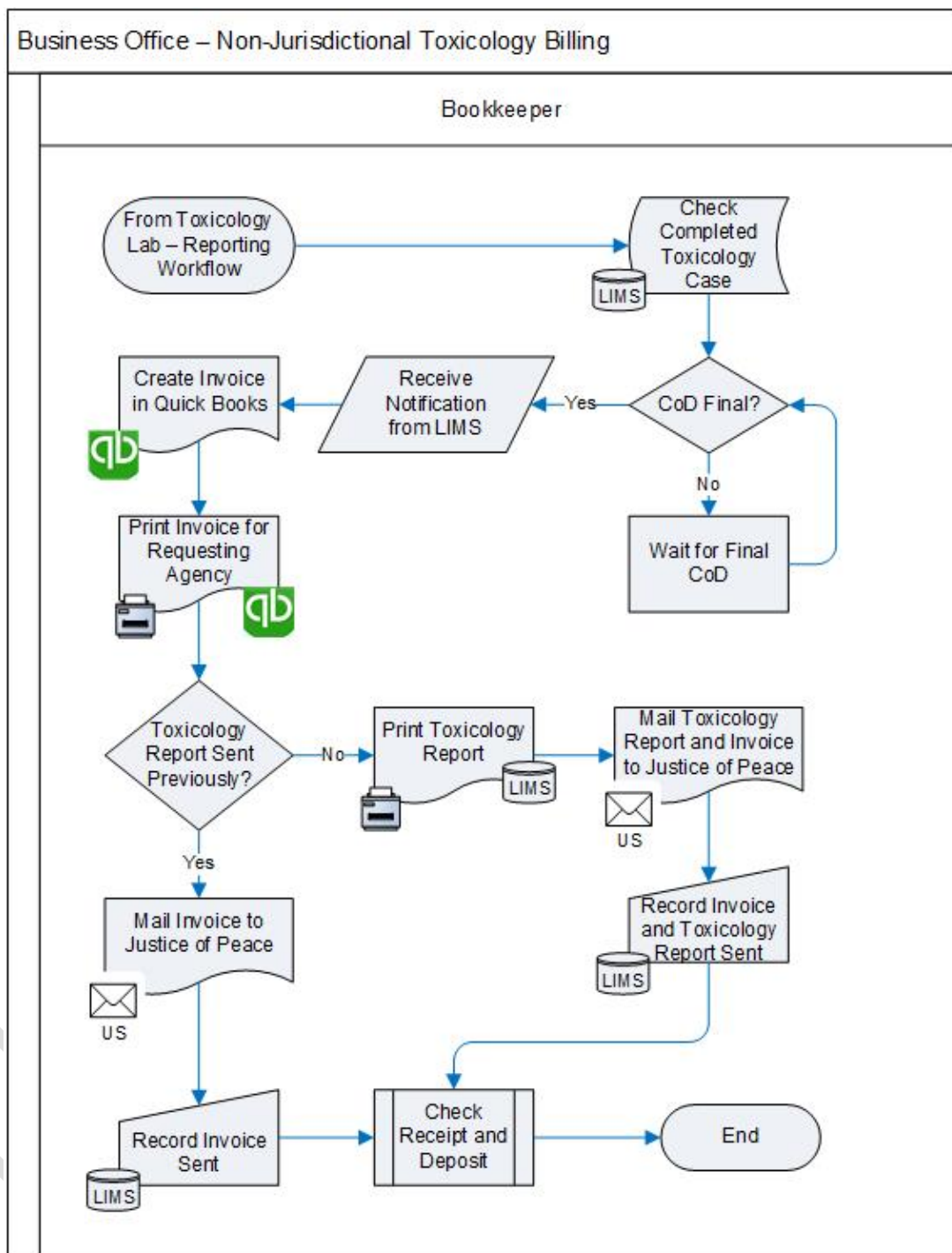


Figure 94 Business Office – Non-Jurisdictional Toxicology Billing

13.4. CHECK RECEIVING AND DEPOSITS

The following figure illustrates the check receipt and deposit workflow, which would not change:

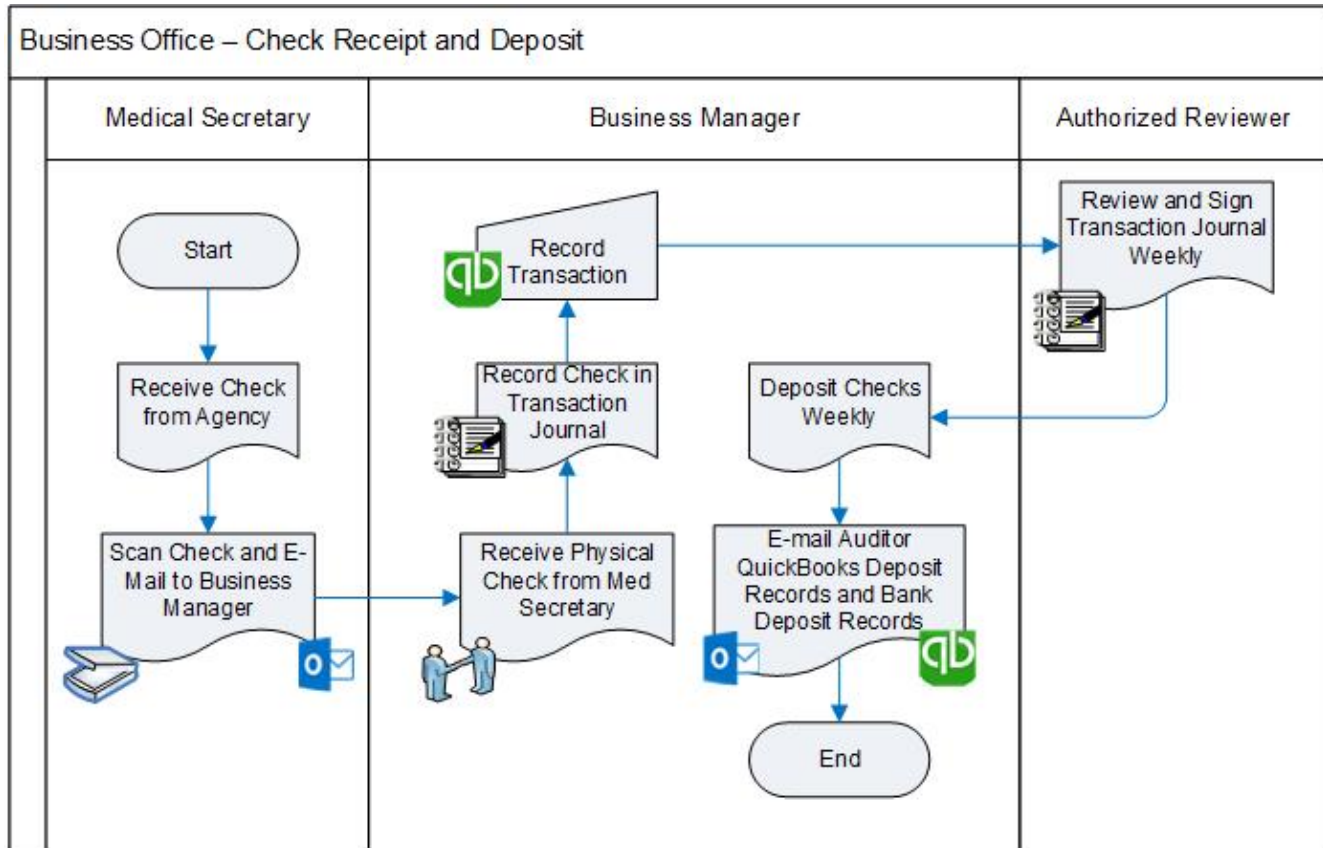


Figure 95 Business Office – Check Receipt and Deposit

14. RETURN EVIDENCE

After evidence has been returned to the Evidence Custodian and no further Service Requests are pending for that evidence, the Evidence Custodian contacts the agency responsible for the case and returns the evidence.

The following figure illustrates a conceptualized future state return of evidence workflow:

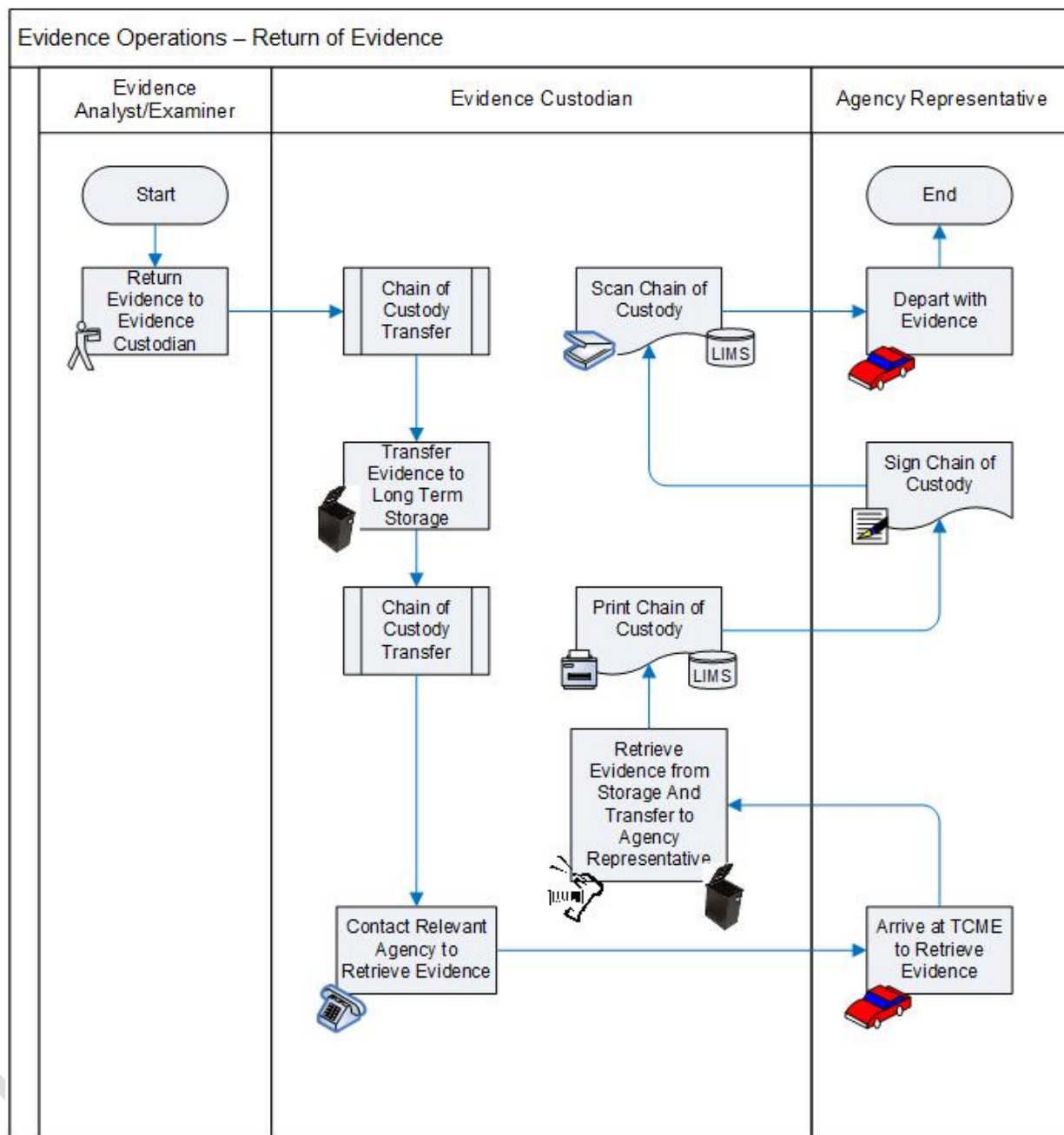


Figure 96 Evidence Operations – Return of Evidence

15. ADMINISTRATION DEPARTMENT

The TCME Administration Department provides supportive and executive functions for the TCME. These functions include generating the TCME's District Annual Report, collating and maintaining medical examination records, providing transcription services, managing the creation, approval and distribution of cremation permits and death certificates, and handling ME records and other information available by public request.

This Department consists of the following sections: Medical Administration and Records Administration.

15.1. MEDICAL ADMINISTRATION

The Medical Administration Section consists of personnel necessary to provide the executive and supportive functions associated with the MEs. The Medical Administration Section is primarily responsible for providing transcription services to the MEs (See Section 0), managing the creation and amendment of death certificates (See Section 11.2), and handling cremation permit requests. In addition, the Medical Administration Section issues the TCME Annual Report and reports reportable diseases or conditions.

15.1.1. Cremation Permits

Under Texas law, cremation cannot be performed within 48 hours following death, unless 1) a Medical Examiner or Justice of the Peace provides a written waiver, or 2) a court issues an order to that effect. In addition, a cremation permit must be provided to the funeral home or crematory. The TCME Medical Administration Section provides these permits to funeral homes and crematories upon request. The LIMS would notify the Medical Secretary if a funeral home has a significant outstanding balance due. The Medical Secretary would then have the option to withhold the certificate until the balance is paid.

The introduction of a new LIMS would introduce the following changes in the issue of cremation certificates:

- The LIMS would notify the Medical Examiner of pending cremation permit requests*
- The Medical Secretary would access the case file in the LIMS*
- The Medical Secretary would verify that on the medical abstract of the death certificate is present in LIMS for the case*
- The medical abstract of the death certificate would be uploaded to the LIMS if required*
- The ME would review cremation permit requests in the LIMS*
- Approved cremation permit requests would be electronically signed by the Medical Examiner*
- The LIMS would generate an approved cremation permit with a facsimile of the signing ME's signature*

The following two figures illustrate a conceptualized cremation permit workflow:

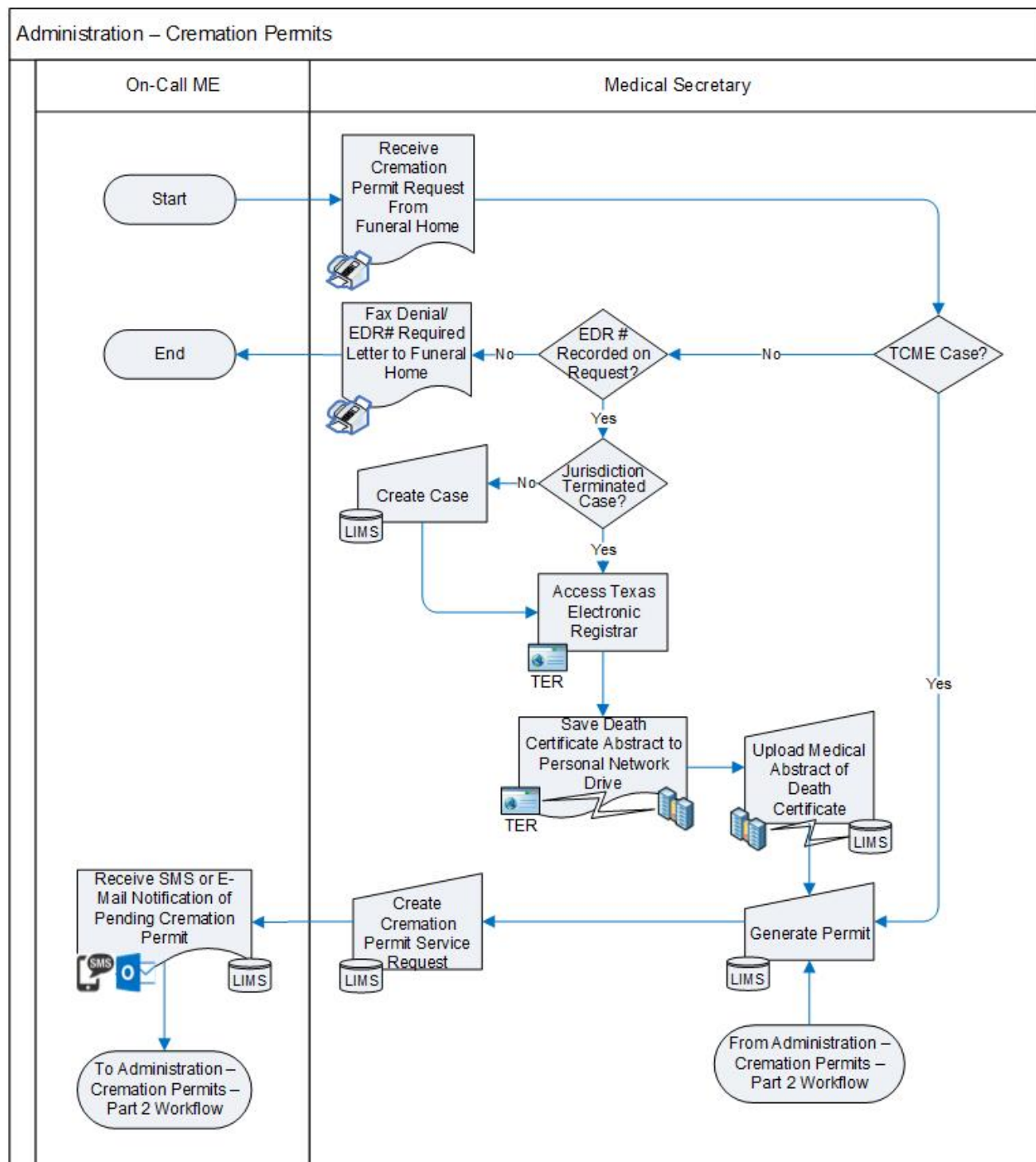


Figure 97 Administration - Cremation Permits - Part 1

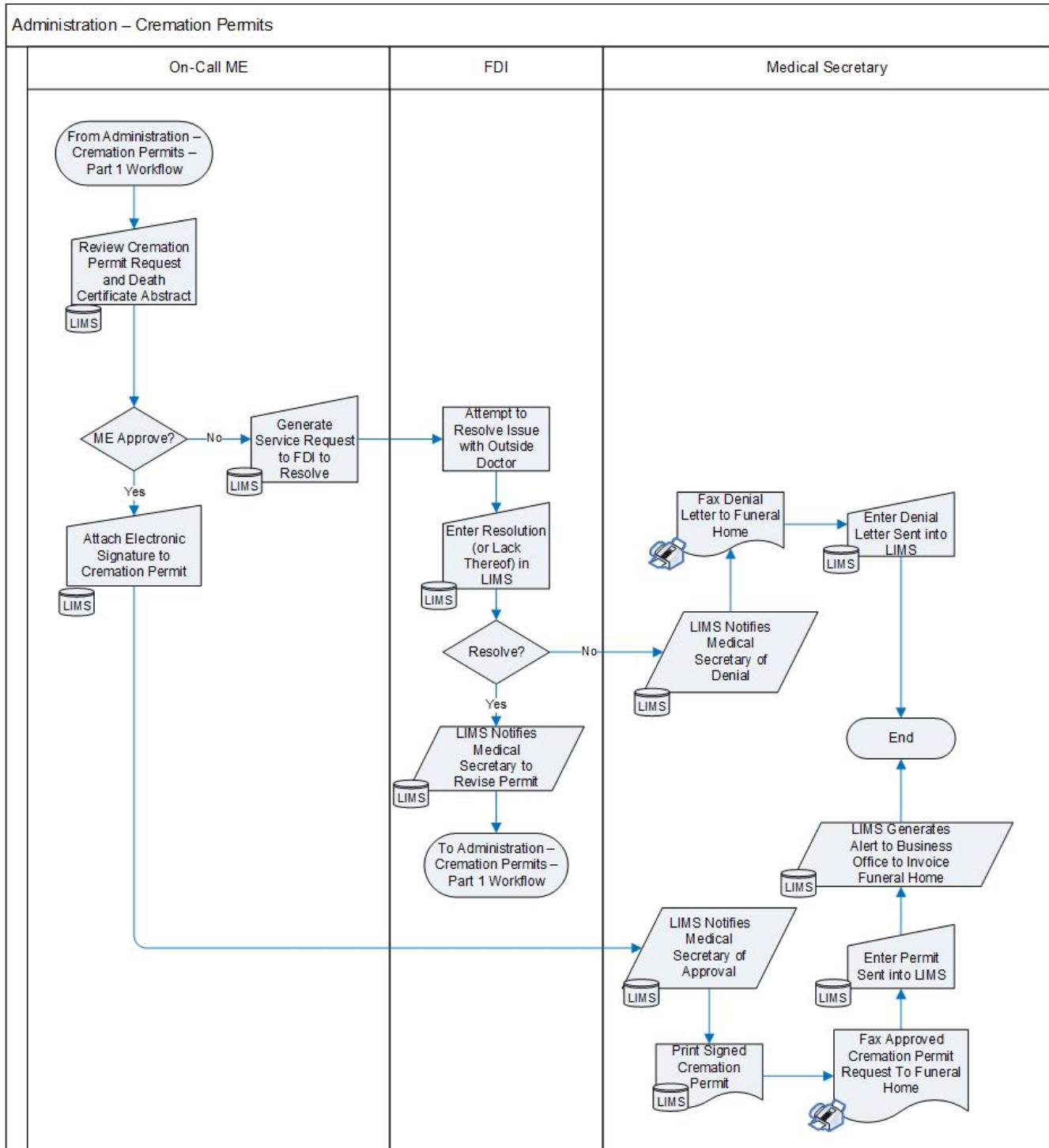


Figure 98 Administration - Cremation Permits - Part 2

15.1.2. Tarrant County Medical Examiner's Annual Report

The TCME is required to generate an Annual Report consisting of statistics relating to all TCME investigated deaths during the previous year. The required statistics would be stored in or calculated by the LIMS. During development and implementation of the LIMS, a custom report would be created allowing the Medical Secretary to query this report in the LIMS. The LIMS would produce a document template pre-populated with the required statistics.

15.1.3. Public Health Reportable Diseases or Conditions

The Texas Department of State Health Services requires that certain communicable diseases and injuries be reported to the relevant public health authority. Reporting times and methods vary depending on the condition discovered. When a reportable condition that is not immediately reportable by the diagnosing physician is discovered by the TCME, the ME would flag the case in LIMS and select the condition from a dropdown pick list. The LIMS would notify the Medical Secretary of the condition, and the Medical Secretary would make the proper report to the Texas Department of State Health Services or Tarrant County Public Health.

15.2. RECORDS ADMINISTRATION

The Records Administration Section would no longer be required to maintain physical signed copies of case files.

If physical copies of the case file are requested, the Medical Secretary would query the LIMS for a case file report. The LIMS would generate an appropriate document consisting of the Autopsy Report, FDI Report and Narrative and Body Release Form. If present within the LIMS the following would also be included in this report:

- Toxicology Report
- Photographs
- Crime Lab Report
- Identification Report
- Outside Medical Report
- Outside Lab Report

The Records Secretary would scan or print the requested documents and send them to the requesting parties via fax, E-mail, or postal service.

16. BUSINESS OFFICE

The Business Office is responsible for the day-to-day management of the business aspects of the TCME. The Business Office is composed of a Business Manager and a Bookkeeper, who provide support for the financial aspects of the TCME including: budget preparation and reporting, accounts payable, accounts receivable (See Section 13), approval to issue cremation permits (See Section 15.1.1), approval for County burials, personnel matters and other related fiscal issues.

All burials paid for by the contract counties constituting the jurisdiction of the TCME must be approved by the Business Office.

The following figure illustrates a conceptualized future state county burial approval workflow:

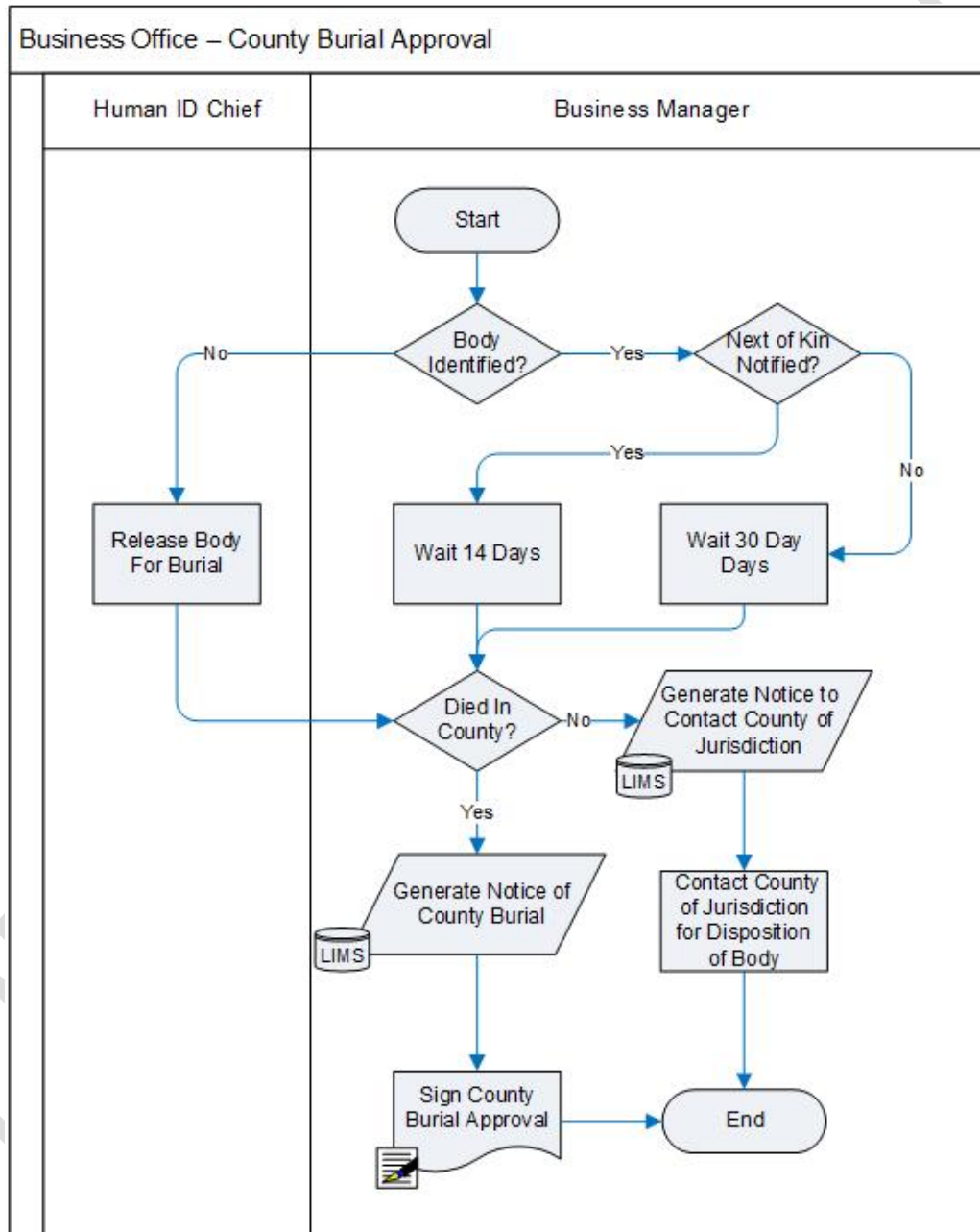


Figure 99 Business Office – County Burial Approval

17-INTERACTIONS WITH TARRANT COUNTY DA'S OFFICE

17.1-REQUESTS FOR REPORTS

The TCME sends original laboratory reports to the requesting LEA. If the DA has not received the report from the LEA by the time the case is to go to trial, the DA requests the report from the TCME.

The introduction of a new LIMS would introduce the following changes to the workflow for DA requests for reports:

- All requests would be entered as Service Requests in the LIMS
- The LIMS would enable the Toxicology/Crime Lab Secretary to determine if a report has already been written
- Reports would be generated from the LIMS eliminating the need to scan paper reports
- The LIMS would allow the Toxicology/Crime Lab Secretary to record when a report is issued to the DA
- The LIMS would alert the Toxicology/Crime Lab Secretary when a report that was not previously available becomes available eliminating the need to check a follow up spreadsheet as reports are completed

The following figure illustrates the conceptualized future state process for receiving requests and sending reports to the DA:

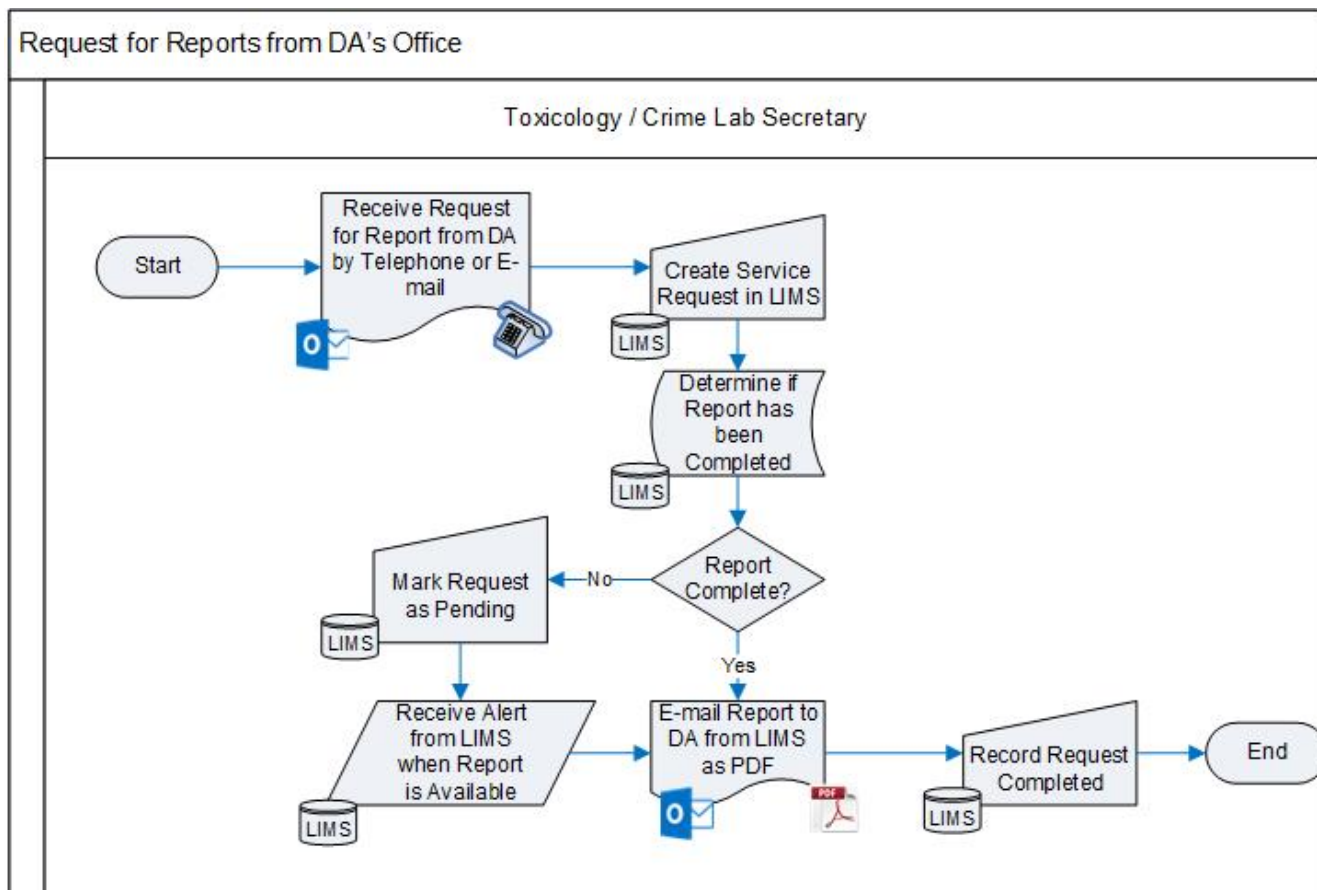


Figure 100 Request for Reports from DA's Office

The Crime Lab Director releases results from each Crime Lab section as the results are completed and reviewed, whereas the Drug Chemistry and Toxicology Chief only releases reports when the case has been completed.

By allowing multiple case identifiers, i.e., TCME, LEA and DA, to be associated to a case, the LIMS will facilitate finding cases that are requested by the DA.

17.2. REQUESTS FOR INFORMATION

If a Defense Attorney or the media contacts the TCME for information, the TCME Laboratory Chiefs E-mail or phone the DA's Office. In these situations, the TCME will send requests for

information to the DA's Office and the latter will determine the response to the request. The applicable Laboratory Chief or the Laboratory Secretary sends the requested information as a PDF document. When the DA's Office receives information that was requested by a Defense Attorney, the DA's office uploads the information to their Tech Share Prosecutor application. For the other information, the DA's Office releases the information to the requestor.

A specific instance of a request for information is a subpoena for records pertaining to a DWI Case. The following figure illustrates a conceptualized future state process for releasing records pertaining to DWI subpoenas:

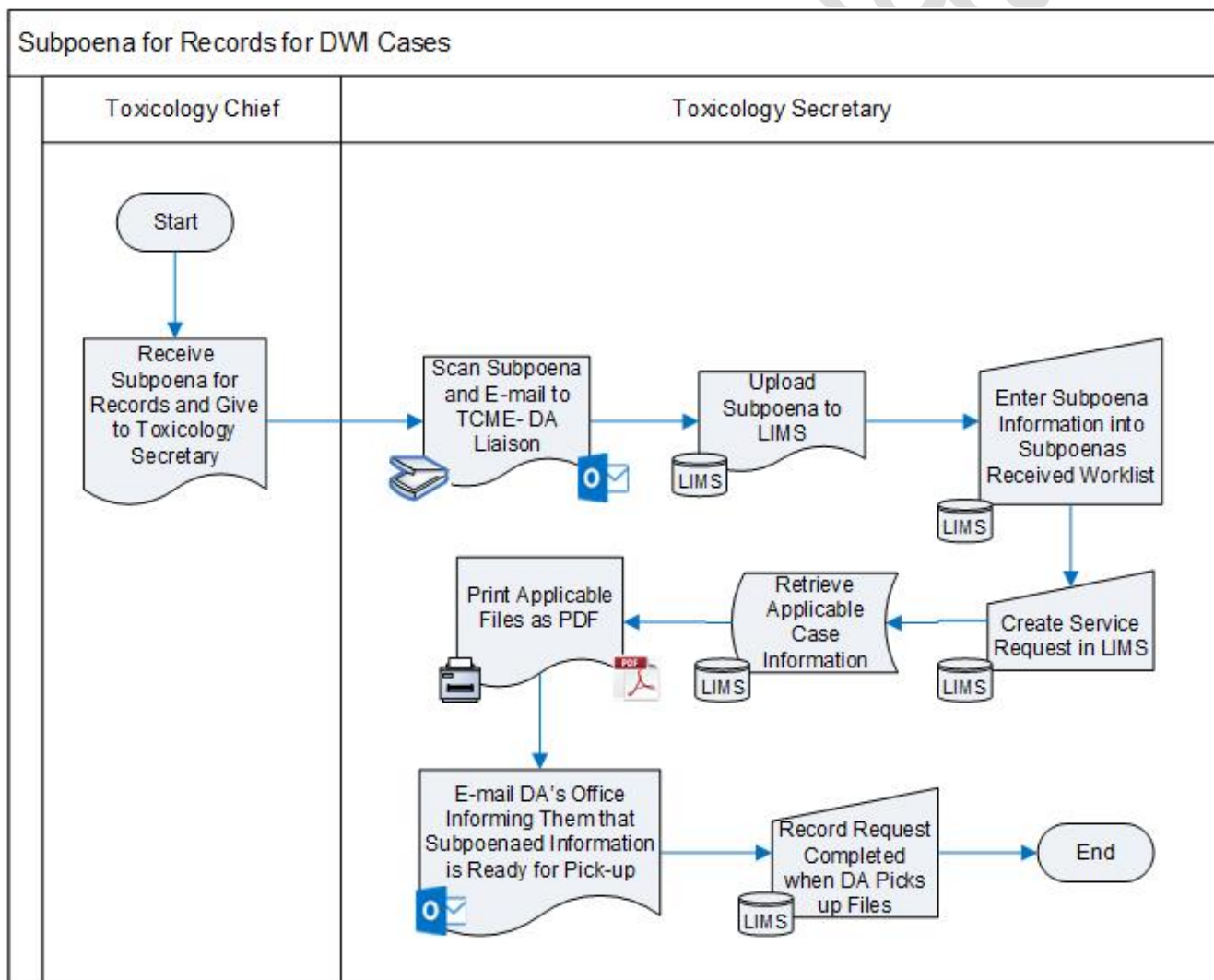


Figure 101 Subpoenas for Records for DWI Cases

18. REQUESTS FOR TISSUE PROCUREMENT

The TCME provides human tissue for donation or research purposes when requested. Agencies contact the FDIs to request organs or tissues from a decedent. This request is forwarded to the duty ME who decides if organs or tissues are available and if any restrictions are required. If the procurement is approved and to be performed at the TCME facility, the agency harvest team is admitted to the building and performs their work. Information regarding the time spent at TCME would be recorded in the LIMS for processing by the Business Office.