Forensic Toxicology and Chemistry Service Manual

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Forensic Chemistry Section

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Tel: +66 8 1909 0695

Laboratory Address:

Forensic Chemistry Section, 2nd Floor, Laboratory Building Division of Scientific Examination

Central Institute of Forensic Science 111 Moo 4, Ban Mai Subdistrict, Mueang Pathum Thani District, Pathum Thani Province 12000

Tel: +66 81 849 8469

Scope of Services

The Forensic Chemistry Section provides forensic toxicology and chemical analysis services for specimens obtained from living individuals, deceased persons, and crime scenes. These services are conducted to support the administration of justice.

The scope of services includes:

1. Determination of alcohol concentration in blood, vitreous humor, and urine
2. Detection of drugs of abuse in urine, hair, and physical evidence from crime scenes
3. Detection of toxic substances, such as pesticides
4. Identification of pharmaceutical substances in submitted specimens
5. Analysis of petroleum products in fire-related cases or other relevant exhibits
6. Detection and analysis of explosive substances
7. Identification of fiber types

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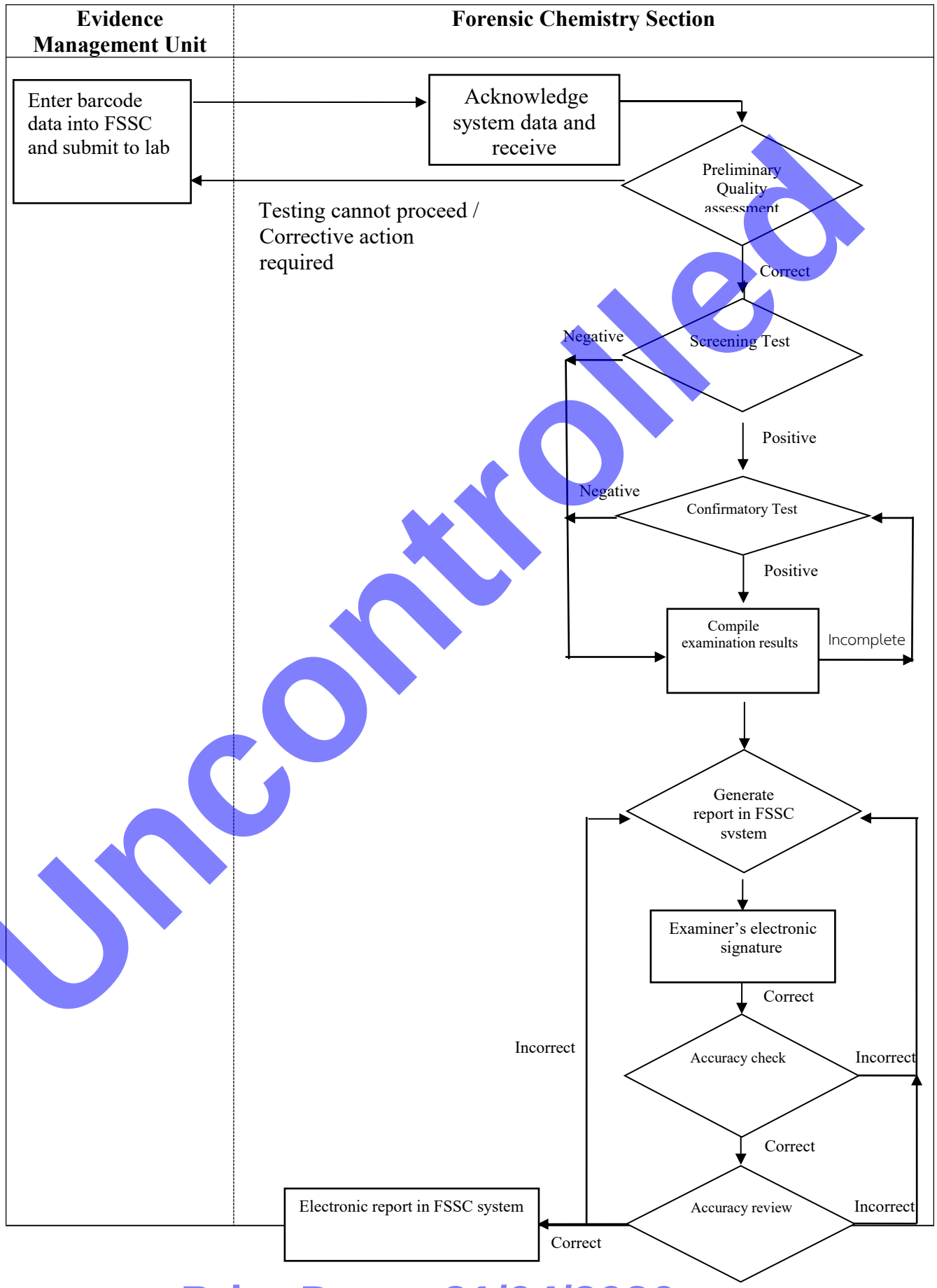
1. Workflow Chart for Forensic Toxicology and Chemical Analysis



2. Procedure of Forensic Toxicological analysis

1. External users shall enter specimen information via the *e-One Stop Service System*, specifying details of the specimens and the purpose of the examination, and submit the specimens to the Evidence Management Unit, 2nd Floor, Office Building, Central Institute of Forensic Science, 111 Moo 4, Ban Mai Subdistrict, Mueang Pathum Thani District, Pathum Thani Province 12000. Contact numbers: 081 909 0695, 094 231 3377 (outside official hours). Submission may be made in person or by postal service.

2. Internal users shall enter specimen information via the *Forensic Science Service Center System (FSSC)*, specifying details of the specimens and the purpose of the examination, and submit the specimens to the Evidence Management Unit, 2nd Floor, Office Building, Central Institute of Forensic Science, 111 Moo 4, Ban Mai Subdistrict, Mueang Pathum Thani District, Pathum Thani Province 12000.

3. Forensic Chemistry Section receives the specimens from the Evidence Management Unit and verifies the correctness and completeness of the specimens to determine whether they are ready for examination, and records the receipt in the FSSC system.

4. If the specimens are correct and complete in accordance with the service conditions, the responsible receiving officer assigns the case to the designated examiner.

5. The assigned examiner performs a preliminary examination. If the substance can be identified, confirmatory examination shall be conducted.

6. Upon completion of the examination, the assigned examiner compiles the examination results and records them in the FSSC system.

7. The assigned examiner prepares the report in the FSSC system, signs the examination results electronically, and submits the report to two additional examiners for verification of the reported results and accuracy, and for review of the examination report.

8. The electronic examination report is automatically delivered to the users via the FSSC system after report verification. (The detailed examination results and reports are stored electronically in the FSSC system.)

Table 1 Forensic Toxicology and Chemistry Service

No.	Test	Specimen	Preservative	Minimum volumn	Method	Turnaround time (working day)	
						Normal	Urgent
1	Ethanol	Blood Vitreous humor Urine others	NaF - - -	2 ml 2 ml 2 ml	GC-FID-Headspace	8	5
2	volatile substance - Acetaldehyde - Acetone - Methanol	Blood Vitreous humor Urine others	NaF - - -	2 ml 2 ml 2 ml	GC-FID-Headspace	8	5
3	Confirmatory Drug Testing 3.1 Amphetamines 3.2 Cannabinoids 3.3 Opiates 3.4 Ketamine	Urine	-	20 ml	GC-MS, LC-MS/MS	18	-
4	Confirmatory Drug Testing 4.1 11-Nor-D9-THC-COOH 4.2 6-Monoacetylmorphine 4.3 Alprazolam 4.4 Amphetamine 4.5 Benzhexol 4.6 Benzoylecgonine 4.7 Clonazepam 4.8 Cocaine 4.9 Codeine 4.10 Diazepam 4.11 EDDP 4.12 Flunitrazepam 4.13 Ketamine 4.14 MDA 4.15 MDMA	Hair	-	100 mg	LC-MS/MS	18	-

No.	Test	Specimen	Preservative	Minimum volumn	Method	Turnaround time (working day)	
						Normal	Urgent
	4.16 Methadone 4.17 Methamphetamine 4.18 Midazolam 4.19 Mitragynine 4.20 Morphine 4.21 Nitrazepam 4.22 Nordiazepam 4.23 Norketamine 4.24 Oxazepam 4.25 Oxycodone 4.26 Temazepam 4.27 THC 4.28 Tramadol						
5	Drug Identification by GC-MS	Blood Gastric content Urine others	- - - -	5 ml 20 ml 20 ml -	GC-MS	21	10
6	Drug Identification by LC-MS	Blood others	- -	5 ml 5 ml	LC-MS/MS,LC-MSn	21	10
7	Insecticides	Blood Gastric content Urine others	- - - -	5 ml 20 ml 20 ml -	GC-MS	21	10
8	Cyanide (Screening Test)	Blood Gastric content	EDTA -	5 ml 20 ml	Color test	21	10
9	Paraquat (Screening Test)	Gastric content Urine	- -	20 ml 20 ml	Dithionite test	21	10
10	Fuel	Fire debris others	-	-	GC-MS	30	-
11	Explosive Compounds	Ion scan swab	-	-	GC-MS	30	-
12	Explosive Compounds	others	-	10 g	GC-MS	30	-

GC-FID-Headspace	Gas Chromatography - Flame Ionization Detector Headspace
GC-MS	Gas Chromatography - Mass Spectrometry
LC-MS/MS	Liquid Chromatography Tandem Mass Spectrometry
LC-MSn	Liquid Chromatography- Multistage Mass Spectrometry
PLM	Polarized Light Microscope

3. Specimen Collection for Toxicological Analysis

3.1 Alcohol Analysis

3.1.1 Collect 2 mL of blood into a NaF tube and mix gently.

3.1.2 Do not use alcohol-based disinfectants; use Betadine or non-alcohol antiseptics.

3.2 Volatile Substances Analysis

3.2.1 Collect 2 mL of blood into a NaF tube and mix gently.

3.2.2 Do not use alcohol-based disinfectants; use Betadine or non-alcohol antiseptics.

3.3 Drugs Analysis

3.3.1 Collect 5 mL of blood into a clot blood tube.

3.3.2 Collect 30–45 mL of urine or perform a 24-hour urine collection.

3.3.3 Collect approximately 20 mL of gastric contents.

3.4 Drugs of Abuse Analysis

3.4.1 Collect 5 mL of blood into a clot blood tube.

3.4.2 Collect 30–45 mL of urine or perform a 24-hour urine collection.

3.4.3 Collect approximately 20 mL of gastric contents.

3.5 Pesticides or Herbicides Analysis

3.5.1 Collect 5 mL of blood into a clot blood tube.

3.5.2 Collect 30–45 mL of urine or perform a 24-hour urine collection.

3.5.3 Collect approximately 20 mL of gastric contents.

3.6 Cyanide Analysis

3.6.1 Collect 5 mL of blood into an EDTA tube.

3.6.2 Collect approximately 20 mL of gastric contents.

Post-Collection Procedures

- In the case of blood specimens requiring the use of an anticoagulant, after collecting the blood into the tube, the blood must be mixed with the anticoagulant; otherwise, clotting may occur. However, excessive mixing must be avoided as it may cause foaming or hemolysis, which may interfere with the analysis.

- Labeling of containers must be clear and legible. Specimens must be properly sealed, and the responsible collector must sign and indicate the date of specimen collection.

- One important principle is to prevent contamination of specimens. Containers must be kept separate, especially for specimens such as water bottles, drinking glasses, tablets, etc.

Postmortem Toxicological Examination

1. Collect specimens in the same manner as for clinical toxicological examination.
2. Collect 2 mL of vitreous humor.
3. Collect organs, if necessary, in cases where blood, gastric contents, or urine specimens cannot be obtained.

4. Specimen Collection for Chemical Analysis

4.1 Types of Chemical Specimens

Chemical specimens can be classified into 2 types as follows:

4.1.1 **Specimens from explosive substances**, including debris from explosions, soil samples, chemical substances, explosive residues from the hands and clothing of suspects, or other related specimens.

4.1.2 **Specimens from fuel products**, including fire debris, solid samples, liquid samples, fuel residues from the hands of suspects, or other related specimens.

4.2 Chemical Specimens Collection

4.2.1 Explosives

1) Debris from explosions, soil, water, or other specimens

Wear clean gloves. Collect the specimens into a container or glass bottle of an appropriate size depending on the size of the specimen and tightly close the lid. In cases where the specimen is large or cannot be collected, use gauze moistened with acetonitrile, acetone, or methanol, or use an Ion Scan swab to wipe the specimen, then place it into a glass bottle (or into a paper envelope for Ion Scan swabs) and tightly seal it. (In the case of liquid specimens, place them in a glass bottle and tightly close the lid.) Record the characteristics of the specimen and the collection location on the container, sign the collector's name, indicate

the date of collection, and promptly submit the specimen to Forensic Chemistry Section laboratory.

2) Explosive residues from the hands and clothing of suspects

Wear clean gloves. Use gauze slightly moistened with acetone to wipe the hands or clothing of the suspect thoroughly. Then place the gauze into a glass bottle and tightly seal it. Record the characteristics of the specimen and the collection location on the container, sign the collector's name, indicate the date of collection, and promptly submit the specimen to the Forensic Chemistry Section laboratory. Alternatively, use an Ion Scan swab to wipe the hands or clothing of the suspect thoroughly, then place the swab into a paper envelope and seal it. Record the characteristics of the specimen and the collection location on the envelope, sign the collector's name, and indicate the date of collection.

4.2.2 Fuel

1) In the case of fire debris specimens

Wear clean gloves. Prepare a container with one charcoal strip. Collect the specimen into the prepared container and tightly close the lid. Record the characteristics and collection location on the container, sign the collector's name, indicate the date of collection, and promptly submit the specimen to the Forensic Chemistry Section laboratory.

2) In the case of liquid specimens

Wear clean gloves. Pour or use a dropper to transfer the suspected liquid into a glass bottle (volatile vial) to prevent evaporation. Tightly close the lid and seal with parafilm. Record the characteristics and collection location on the container, sign the collector's name, indicate the date of collection, and promptly submit the specimen to the Forensic Chemistry Section laboratory.

3) In cases where the specimen is large and cannot be collected, or when collecting from the hands of a suspect

Wear clean gloves. Prepare a container with one charcoal strip. Use a cotton swab to wipe the suspected area or the hands/clothing of the suspect. Place the swab into the prepared container and tightly close the lid. Record the characteristics and collection location on the container, sign the collector's name, indicate the date of collection, and promptly submit the specimen to the Forensic Chemistry Section laboratory.

5. Specimen Storage

- Normally, after specimen collection, the specimens should be submitted to the laboratory immediately. However, in cases where immediate submission is not possible, the specimens shall be stored at a temperature of 2–8°C or kept refrigerated (freezing is not

recommended). In cases where analysis of volatile substances is required, evaporation must be prevented by using parafilm or sealing tape around the junction between the blood collection tube and the cap.

- For long-term storage (more than 30 days), specimens shall be stored at a temperature of -20°C.

6. Specimen Submission

Specimens should be submitted promptly, as prolonged storage may affect the accuracy of the examination. Transportation of specimens from the originating agency to the laboratory must be carried out using sealed containers with proper signatures, and placed in a tightly closed plastic container. Specimen tubes and containers must be kept in an upright

7. Conditions for Forensic Toxicology and Chemical Examination Services

In order to ensure that the examination is accurate, efficient, and standardized, all submitted specimens, whether biological specimens or other types of specimens, must comply with the requirements for forensic toxicological and chemical examination.

Any specimen that does not comply with such requirements shall be considered a defective specimen and must be processed according to the type of nonconformity identified, as specified in Table 2.

Table 2 Handling Procedures for Defective Specimens

Defect Code	Specimen Defect Details	Action
Irr 1	Specimen received without an examination request form	- Reject the specimen in the FSSC system to return
Irr2	Specimen type or Specimen quantity do not match the request form	
Irr3	Specimen container is broken or the seal is damaged	
Irr4	Specimen is missing a barcode, or the barcode is scratched/torn/blurred	
Irr5	Specimen barcode does not match the FSSC system	
Irr 6	Other defects	- Record the defect in the Record of Non-conforming Specimens Form (FM-FCS-008) - Submit to the Head of Forensic Chemistry Section for further consideration
Irr 7	Specimens unsuitable for laboratory examination	- Record the defect in the Record of Non-conforming Specimens Form (FM-FCS-008) - Submit to the Head of Forensic Chemistry Section for further consideration

8. Request for Additional or Repeat Examination

Specimens shall be retained under appropriate conditions for a period of 1 year and 6 months after submission to the laboratory, except in the case of urine drug testing from the Department of Juvenile Observation and Protection and the Department of Corrections, which shall be retained for a period of 1 month.

Therefore, authorized persons may request additional or repeat examination within the specified period. Authorized persons include the responsible physician, the police officer in charge of the case, or the head or authorized representative from the Evidence Management Unit.

9. Reporting of Examination Results by Forensic Chemistry Section

Upon completion of laboratory examination, the examination results shall be reported via the FSSC system only.

10. Inquiry of Examination Results by Telephone

There is no policy to report examination results verbally via telephone or facsimile.

11. Delayed Reporting of Examination Results

When the scheduled time for issuing the examination report has been reached, but the examination process has not yet been completed or the report cannot yet be issued, the assigned laboratory personnel shall prepare an official memorandum to notify the submitting individual or the submitting agency without delay.

12. Amendment or Supplement of Examination Reports after Issuance

In cases where errors are found in the examination report, such as typographical errors or incomplete information, or when the service recipient requests correction or addition of information in the report, the following shall apply:

12.1 Authorized persons who may request correction or supplementation include the case owner, the responsible physician, the police officer in charge of the case, the service recipient, or the head or authorized representative from the Evidence Management Unit.

12.2 Correction of the examination report that has already been issued must be carried out only by issuing a new examination report. An additional report shall be issued in cases where further examination results are added to those already reported.

12.3 A formal request shall be submitted in writing to the Head of the Chemical Examination Unit for consideration and further action.

12.4 Amendment of the report shall be made only upon approval by the Director of the Central Institute of Forensic Science.

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