Forensic Laboratory Capacity and Expenditure

The Maryland State Police - Forensic Sciences Division (MSP-FSD) provides forensic science services to customers throughout all 23 counties in Maryland and Baltimore City, enabling a pathway to justice for all Marylanders through the scientific and impartial analysis of physical evidence. Customers serviced by MSP-FSD include members of the Maryland criminal justice system (150 allied law enforcement agencies, attorneys, judges, and juries) as well as the citizens served by the Maryland criminal justice system. The MSP-FSD is an accredited full-service crime laboratory operating out of a main facility in Pikesville, two satellite laboratories in Hagerstown and Berlin, and thirteen crime scene offices dispersed throughout the state. These operations focus on providing timely and informative forensic testing within the disciplines of Crime Scene Response, DNA, Seized Drugs, Ante-Mortem Toxicology, Firearms and Toolmarks, Latent Prints and Impressions, Trace Evidence, and Questioned Documents. This work is performed in compliance with established international standards ensuring the highest level of quality assurance. MSP-FSD is continually evaluating operations in an effort to identify ways to better serve the citizens of Maryland. The new Berlin laboratory set to open later this year that will provide the Eastern Shore with regional access to testing that was previously only available in Pikesville and/or Hagerstown is one example. As is the implementation of a new Laboratory Information Management System (LIMS) that will facilitate streamlined testing workflows, enhanced customer interactions, and improved case management.

In addition to expanding services and optimizing business processes, MSP-FSD is also committed to maximizing all available resources. This is accomplished in multiple ways, but one of the most productive is the strategic outsourcing of forensic testing to private laboratories. While MSP-FSD's ultimate goal is to be a fully self-sufficient operation, there are four reasons that outsourcing is used:

1. Emergencies - A short-term event to address an unexpected loss of service.
2. Backlog Reduction - A limited time event to eliminate an excessively high caseload.
3. Limited In-House Capacity - A long-term event to offset a lack of resources.
4. No In-House Capacity - A long-term event to offer a service otherwise not available.

In recent years, MSP-FSD has utilized private laboratories for casework in the disciplines of DNA, Seized Drugs, and Toxicology to address various circumstances related to the four cited reasons for outsourcing. For example, DNA casework outsourcing has been used on a long-term basis to address instances of both limited in-house capacity (insufficient staff and space) and no in-house capacity (inability to test human remains). Meanwhile, outsourcing of both Seized Drugs casework and Toxicology casework has been used primarily to address more temporary issues such as emergencies (unanticipated hemp legislation) and backlog reduction (increased DUI case submissions).

As of FY 2025, the use of outsourcing for Seized Drugs and Toxicology casework is being phased out as the temporary issues that necessitated it have been resolved. The use of outsourcing for DNA casework will continue in FY 2025 and beyond as internal resources remain limited, but efforts are underway to gradually phase out the routine outsourcing of DNA casework. There are several reasons for this. One of the most noteworthy is that the demand on these private laboratories causes them to operate beyond their capacity which results in longer turnaround times, potential analysis errors, and limitations on the availability of expert witnesses for testimony.

In contrast, when MSP-FSD is able to provide in-house testing, members of the Maryland criminal justice system experience an increased sense of customer service from a familiar partner. Furthermore, it is critical to understand that outsourcing still requires significant involvement by MSP-FSD prior to sending a case to the private laboratory as well as upon receiving the case back. It is a very labor-intensive process as MSP-FSD still has to coordinate with the customer to determine what needs to be tested, prepare the evidence for submission to the private laboratory, and document the chain of custody when transferring the evidence. Then on the back end, a complete review of all outsourced DNA work must be performed and documented so that MSP-FSD can take ownership of the work and enter any qualifying DNA profiles into the DNA Database.

To prepare this report an analysis was performed to evaluate the capacity and productivity of MSP-FSD as well as the demand for testing. Furthermore, a cost comparison was conducted that assessed the cost effectiveness of in-house analysis to outsourced analysis of forensic casework. A full evaluation of FY2023 is provided; however, since a budgetary close-out has not yet occurred for FY2024 and only a budget is available for FY2025, no data can be provided beyond FY2023 at this time.

CAPACITY

The capacity of MSP-FSD was evaluated per testing discipline by first identifying the total Full-Time Equivalents (FTEs) dedicated to casework. This was done by determining the percentage of time that each staff member dedicates to performing casework and adding up those percentages. Then average cases per FTE was determined by dividing the total number of cases completed in calendar year 2023 by the total FTEs. This information can be used over time to assess whether the capacity of the unit is sufficient to meet the current caseload. Furthermore, by knowing the ratio of employees to FTEs, a determination can be made to determine the number of employees needed to manage a specific caseload. A breakdown of MSP-FSD's capacity is shown in **Table 1.**

Section	Area of Investigation	Person to FTE Ratio	Total FTE's	Average Cases per FTE	In-House Capacity	2023 Caseload
Biology	DNA Casework	2.02	5.85	93	544	970
Biology	DNA Database	2.02	2.10	5,005	10,511	8,088
Controlled Dangerous Substances	Seized Drugs	1.69	10.10	639	6,454	5,997
Toxicology	Blood Alcohol	1.82	0.98	532	521	559
Toxicology	Blood Drug	1.82	3.62	291	1,053	388
Pattern Evidence	Latent Prints	1.54	6.30	176	1,109	923
Pattern Evidence	Firearms	1.73	6.33	207	1,310	1,114
Trace Evidence	Trace Evidence	2.07	0.63	54	34	27
Trace Evidence	Document Examination	2.07	0.59	31	18	8
Trace Evidence	Fire Debris	2.07	1.25	51	64	78

Table 1 - A breakdown of MSP-FSD's capacity showing the number of cases able to be completed per forensic discipline with current staffing versus the actual caseload. The most significant deficiency in regard to in-house capacity exists within the DNA casework operations.

PRODUCTIVITY

In order to assess the productivity of a unit within MSP-FSD, the average number of cases per FTE within that unit can be compared to data representative of the global forensic science community. Project FORESIGHT is a program through the John Chambers College of Business and Economics at West Virginia University that collects and processes data contributed by over 200 forensic science laboratories throughout the world to establish benchmarks within the field of forensic science. A summary of MSP-FSD's productivity is shown in **Table 2.**

Section	Area of Investigation	MSP-FSD Average Cases per FTE	Foresight 25th Percentile	Foresight Median	Foresight 75th Percentile
Biology	DNA Casework	93	78.20	101.00	133.60
Biology	DNA Database	5,005	1,204.90	2,515.70	3,702.90
Controlled Dangerous Substances	Seized Drugs	639	300.30	360.50	481.50
Toxicology	Blood Alcohol	532	318.80	605.40	983.40
Toxicology	Blood Drug	291	139.90	185.50	266.80
Pattern Evidence	Latent Prints	176	94.40	133.00	162.20
Pattern Evidence	Firearms	207	481.70	748.20	1,204.60
Trace Evidence	Trace Evidence	54	29.80	33.70	38.50
Trace Evidence	Document Examination	31	16.50	21.00	26.60
Trace Evidence	Fire Debris	51	26.40	43.40	70.40

Table 2 - A summary of MSP-FSD's productivity measured in average cases per FTE per forensic discipline compared to national benchmarks established through Project FORESIGHT. Productivity levels for DNA casework, Seized Drugs casework, and Toxicology casework at MSP-FSD are consistent with or exceed national averages.

DEMAND

The demand of testing within each discipline can increase, decrease, or stay the same from year to year based on various factors. In recent years caseloads have been impacted by things such as escalating gun crime, legislation to legalize cannabis, and the emergence of fentanyl and other synthetic drugs. A summary of case submissions to MSP-FSD per discipline from 2021 through 2023 is shown in **Table 3.**

		Cases Received per Year		
Section	**Area of Investigation**	**2021**	**2022**	**2023**
Biology	DNA Casework	933	846	970
Biology	DNA Database	6,474	7,918	8,088
Controlled Dangerous Substances	Seized Drugs	8,121	6,833	5,997
Toxicology	Blood Alcohol	693	547	559
Toxicology	Blood Drug	566	355	388
Pattern Evidence	Latent Prints	916	824	923
Pattern Evidence	Firearms	1,291	1,233	1,114
Trace Evidence	Trace Evidence	17	11	27
Trace Evidence	Document Examination	14	8	8
Trace Evidence	Fire Debris	121	100	78

Table 3 - A three-year summary of the demand for testing by MSP-FSD per forensic discipline. It should be noted that cases submitted to MSP-FSD for analysis come from MSP as well as from approximately 150 allied law enforcement agencies throughout Maryland. On average, 67% of MSP-FSD casework originates from allied agencies while 33% are from MSP.

COST COMPARISON

The total amount spent on outsourced casework along with the average cost per outsourced case was calculated for Seized Drugs, Toxicology, and DNA, which were the three disciplines that utilized outsourcing in FY23. Similarly, the total amount spent on in-house casework along with the average cost per in-house case during FY23 was also calculated for Seized Drugs, Toxicology and DNA. In-house casework expenses included supplies, equipment, and service contracts. A comparison of costs is shown in **Table 4.**

Discipline	FY 23 In-House Cases	FY 23 In-House Total Casework Costs	FY 23 In-House Cost per Case	FY 23 Outsourced Cases	FY 23 Outsourced Total Casework Costs	FY 23 Outsourced Cost per Case
Seized Drug Casework	5,649	$494,296	$88	1,622	$959,122	$591
Toxicology Casework	598	$146,751	$245	712	$121,434	$171
DNA Casework	478	$604,782	$1,265	303	$314,145	$1,037

Table 4 - A comparison of costs for performing in-house casework versus outsourcing casework to a private laboratory per forensic discipline. The cost of in-house casework for Toxicology and DNA casework are slightly higher than outsourcing casework in those disciplines; however, it should be noted that the outsourcing costs do not include the cost for MSP-FSD staff to prepare cases for shipment prior to outsourcing nor to review the private laboratory's work product after outsourcing.