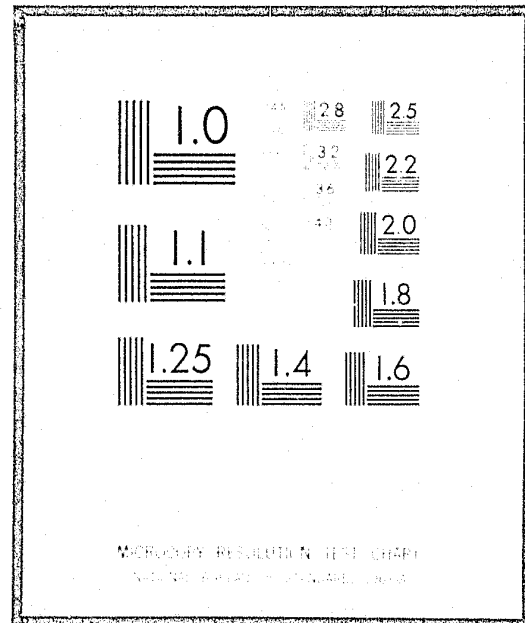


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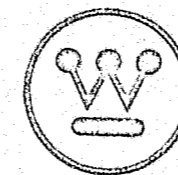
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STATE CRIME  
LABORATORY,  
ARKANSAS

# 233

December 1973



Westinghouse Justice Institute

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ACQUISITIONS

STATE CRIME  
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FOREWORD

Technical assistance to determine the feasibility of establishing an Arkansas State Institute of Forensic Sciences was requested by Dr. Rodney Carlton, State Medical Examiner through Ray Biggerstaff, Director of the Commission on Crime and Law Enforcement, State of Arkansas. Under Contract J-LEAA-016-72, the Westinghouse Justice Institute provided services from one of its subcontractors, the Midwest Research Institute. This report documents activities, findings, and recommendations of John E. Stacy who performed the assignment.

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## I. PURPOSE OF ASSIGNMENT

The Arkansas State Medical Examiner requested technical assistance for determining the feasibility of establishing an Institute of Forensic Sciences in Arkansas. The request stated:

"Examination and investigation normally conducted by a Forensic Science Institute are widely delegated to several agencies in the State of Arkansas. The medical examiner wishes to expand by establishing an Institute of Forensic Science to include a crime lab, proper facilities, increase staff, delineation of responsibilities, long-range plans and legislation."

## II. METHOD, SCHEDULE AND CONTACTS

### A. Method

The project was accomplished through a combination of interviews and analysis of relevant documents.

On the initial trip to Arkansas, John Stacy of MRI met with Jim Thomas of the Crime Commission, Dr. Rodney Carlton, the State Medical Examiner and Burwin Monroe, Toxicologist. At this meeting, the current services rendered by the medical examiner's office and the scope of the projected Institute of Forensic Sciences were reviewed. During this trip, copies of the 1972 and 1973 Comprehensive Law Enforcement Plan were obtained.

On the next trip, Mr. Stacy met with Major W. A. Tudor, Commander, Criminal Investigation Section, Arkansas State Police, to discuss current capabilities and future plans related to crime laboratory operations. Further discussions were held with Captain Paul McDonald, Firearms Examiner. During this trip, a discussion was also held with Ms. Margaret Van Dusen, Chief Drug Chemist in the State Health Department Laboratory.

Analyses of the 1972 and 1973 Comprehensive Law Enforcement Plans and the Uniform Crime Report were then conducted and the results of the study to date reviewed with Joseph Nicol, noted criminalist, Professor of Criminal Justice Curriculum at the University of Illinois, Circle Campus, and long-time consultant to MRI.

The final visit to Arkansas was intended to obtain some reactions from local enforcement agencies regarding their needs and preferences.

A mail survey of enforcement agencies was not desired by the Crime Commission, so personal interviews of four police departments were conducted instead.

B. Schedule

Initial visit to Arkansas - September 11, 1973

Second visit to Arkansas - September 27, 1973

Review with consultant - October 12, 1973

Final visit to Arkansas - October 18, 1973

Final report draft completed - October 26, 1973

C. Persons Contacted

Jim Thomas, Crime Commission

Dr. Rodney Carlton, State Medical Examiner

Burwin Monroe, Toxicologist

Major W. A. Tudor, Commander, Criminal Investigations Section,  
Arkansas State Police

Captain Paul McDonald, Firearms Examiner

Margaret Van Dusen, Chief Drug Chemist, State Health Department  
Laboratory

Chief Weeks, Little Rock Police Department

Assistant Chief Terry, Little Rock Police Department

Captain Gibson, Little Rock Police Department

Lt. Ken Pierson, Little Rock Police Department

Chief Bowman, North Little Rock Police Department

Captain Bob Monk, North Little Rock Police Department

Lt. Tucker, North Little Rock Police Department  
Captain Smith, North Little Rock Police Department  
Chief Joe Crain, Hot Springs Police Department  
Major Keith Daniels, Fort Smith Police Department  
Captain Paul Rivaldo, Fort Smith Police Department  
Sgt. Langston, Fort Smith Police Department  
Charles Karr, Fort Smith Prosecutor  
Orville Clift, Fort Smith Assistant Prosecutor  
Robert Blatt, Fort Smith Assistant Prosecutor

D. Published Data Sources

State of Arkansas Comprehensive Law Enforcement Plan - 1972  
Commission on Law Enforcement  
  
State of Arkansas Comprehensive Law Enforcement Plan - 1973  
Commission on Law Enforcement  
  
Uniform Crime Report - 1972  
Federal Bureau of Investigation.

III. FINDINGS

A. Capabilities

1. Existing laboratories in the state:

a. Criminal Investigation Section, Arkansas State Police:  
This section performs several categories of analysis of physical evidence in addition to normal criminal investigation, namely, firearms identification, questioned documents examination, and latent print processing.

In the two areas normally performed by a crime laboratory, firearms and documents, Major W. A. Tudor, Section Commander, expressed concern over the length of service of the two examiners performing these

functions, and indicated no one was in training to replace them. Major Tudor felt that such functions should be incorporated into a central crime laboratory, not under the direction of the state police. He further indicated that both the firearms officer and questioned documents officer might be willing to retire and join a central crime laboratory organization.

(1) Firearms identification laboratory: This laboratory has one examiner with over 20 years service and no supporting staff. He primarily performs analyses of firearms, bullets and cartridges with some services in toolmark examination, nitrate trace, serial number restoration and trace metal detection.

During the period of March through July 1973, the Firearms Laboratory was involved in 60 cases for an average of 12 separate cases per month, performing the following examinations:

	<u>Total</u>	<u>Monthly Average</u>
Firearms examinations	272	54
Microscopic examinations	687	137
Chemical examinations	52	10
Trace metal detection examinations	55	10
Serial number restoration	4	1
Toolmark examinations	29	6

The examiner spent a total of 56 hours in eight different courts during this period. The Firearms Laboratory has a good collection of firearms reference materials and is equipped with a NIKON Comparison Microscope with camera. Comments about the firearms examination capability by the four police departments interviewed were generally good with indication that some had more confidence in the FBI laboratory.

(2) Questioned documents laboratory: This laboratory also has one examiner with over 20 years of service and no supporting staff. The examiners processed an average of 750 documents per month based on a recent 6-month period. Comments about the document examination capability by the four police departments interviewed were generally good, with some complaint about slow service and number of inconclusives.

b. State Health Department Drug Laboratory: The State Health Department maintains a laboratory that performs analyses of dangerous



drugs for law enforcement agencies. An interview with Ms. Margaret Van Dusen, Chief Chemist of this laboratory, yielded the following information:

The drug lab is staffed with three professionals in addition to Ms. Van Dusen, who had given her resignation to be effective at the end of the week that she was interviewed. The remaining staff consists of three chemists, one with a B.S. degree and two with masters degrees. They have 18 months, 12 months, and 6 months experience in the drug analysis field.

In the first 9 months of the year the laboratory processed 1,800 drug cases averaging five items per case and had a backlog of 170 cases. The turnaround time was reported as 3 to 4 weeks, with attempts to meet priority needs. Caseloads in calendar year 1972 averaged between 150 and 175 cases per month. The legislation establishing the drug lab authorized the following positions:

- 1 administrator,
- 2 chemists,
- 1 secretary.

LEAA funds are being used to support one chemist, one technician, and a secretary.

Most equipment in the drug lab appeared to be the property of the State Health Department with the exception of a gas chromatograph, an IR spectrophotometer, and a polarizing microscope. These items were purchased with LEAA funds.

The drug cases come from all over the state, with the following agencies providing most of the samples:

<u>Rank</u>	<u>Agency</u>
1st (40%)	Little Rock and Pulaski County
2nd	State Police Drug Unit
3rd	Pine Bluff
4th	Fort Smith
5th	Fayetteville

Examiners from this lab spent 271 days in court during fiscal year 1972-1973. Court appearances consume about one-half day each in Little Rock and about 1-1/2 days in other courts. Lab reports are often stipulated in municipal court, but not often in circuit court.

The types of drugs being analyzed in order, by the volume received, were: marijuana, unidentified, depressants, narcotics, and hallucinogens. Several problems were experienced that hurt the lab's ability to

maintain its capability, including low salaries and department policy on transferring personnel between sections without regard for the difference (due to need to testify in court) between the drug lab and other sections. Comments about the State Health Department drug laboratory service reflected a mixture of reaction, with a recognition that they try but are overworked and underpaid. The result is slow turnaround, unless they carry samples in and ask for rush service. Cases are being dismissed in some instances due to lack of results. One agency felt the laboratory was more interested in Public Health. Difficulty in scheduling testimony was also noted.

Ms. Van Dusen appeared to have been, and was reported by other agencies interviewed to be, the main driving force in the drug lab, and her resignation will reduce the capability, at least temporarily. Her decision to resign appeared to be as a result of frustrations based on relationships with higher management. The reported policy of transferring individuals between the drug laboratory and other sections without respect for the testimony skills which need to be developed for drug analyses and other issues of pay and caseload were apparently the basis for the action.

There is no standard for the caseload that can be handled by a drug laboratory. Factors that influence the cases per examiner include the number of unique samples per case; the skills and experience of the personnel and supervision; the volume and types of drugs received (a large volume of drugs of one type could allow automation or "batching" to reduce set-up time); the methods used; policies of the laboratory regarding (1) duplicate verification testing, (2) how far they go to identify an unknown, (3) performing confirming analyses only after a court date is set; and frequency of testimony vs stipulation of laboratory reports and the distance to the jurisdictions served. Due to the influence of these factors, there are drug laboratories that perform many more cases per examiner and have less backlog than the Health Department Drug Laboratory. The Health Department workload is an average of 150-200 cases per month. When divided between four chemists, this is 38 to 50 cases per month each, or only about 1-3/4 to 2-1/2 cases per working day. A review should be made to determine which of the above factors are influencing the operation.

The Division of Blood Alcohol in the State Health Laboratory certifies breathalyzer operators and performs blood alcohol analyses.

c. State Medical Examiner's Office: The State Medical Examiner's Office is responsible to a commission composed of the Dean of the University of Arkansas School of Medicine, the Director of the State Board of Health, the Director of the Arkansas State Police, a member to be named by the Arkansas Sheriffs' Association, and a member to be named by the Association of the Chiefs of Police of Arkansas.

The staff of the Medical Examiner's Office is composed of two professionals: the Medical Examiner (a forensic pathologist) and a toxicologist. There are three secretarial employees.

Assistant Medical Examiners serve under contract and are located in Texarkana, Fort Smith, Jonesboro, Blytheville, El Dorado, Springdale, and Russelville. Bodies are transported to Little Rock by private ambulance services. During the first 9 months of 1973, 438 bodies were received by this office, and an additional 116 were autopsied under contract.

In addition to the traditional interest in cause of death, the ME is interested in assisting enforcement agencies in identifying the offender. He routinely does examinations of hairs and fibers, blood, clothing for trace evidence, paint and trace metal detections as associated with the body. Drugs are requested to accompany the body when apparently related to the death. He will perform analysis of evidence not related to a death if requested by the agency.

The ME's office conducts classes in death investigation for state police and pathologists and speaks on the subject at special meetings or classes.

In addition to ME functions, the office is involved in a rape program with 100 examinations having been made in the last 3 months.

Dr. Carlton would like to establish an Institute for Forensic Sciences which would combine Medical Examiner functions with Crime Laboratory functions. Eventually, he would like to establish 15 to 20 satellite laboratories across the state.

Lists of equipment and details of caseload are available, but have not been received as of the date of this report.

Dr. Carlton felt that the following organizations were similar to the type he would like to establish:

Location

Director

Dallas, Texas

Dr. Petty, Dr. Mason

Dade County, Florida

Dr. Joe Davis

Los Angeles, California

Dr. Tom Noguchi

Philadelphia, Pennsylvania

Dr. Marvin Aronson

New York City, New York

Dr. Milton Helpern

King County, Washington

(not named)

Washington, D.C.

Dr. Jim Luke

Comments about the service of the Medical Examiner's Office were generally good, with complaints about slow reports and difficulty in scheduling testimony. Caseload was recognized as high. Agencies in the Little Rock area were more impressed with the capabilities of the ME office than those in outlying areas, especially if their contacts were with deputy medical examiners who do not share Dr. Carlton's interest in the needs of law enforcement.

In a return visit to the Medical Examiner's facilities, the following observations were made:

The facilities and the conditions under which the medical examiner and his staff must operate make his job extremely difficult, and border on being intolerable. The problems are primarily associated with having to share facilities with the medical school on a last priority basis. Autopsies by the Pathology Department take preference, and, on the day of this visit, there were six hospital personnel working in the morgue. Four bodies and the organs of one more were in the room and the refrigerated storage area. Bodies, and physical evidence associated with bodies, for examination by the medical examiner are exposed to numerous hospital personnel and even medical students. Bodies can only be held about 3 days, and for this reason, and due to the needs of law enforcement, the medical examiner must often work after hours. A homicide and a suspected suicide autopsy had to wait until the hospital autopsies were finished.

Due to lack of a freezer, bodies must often be buried before investigations are completed.

Organs and tissue samples are stored on the floor among hospital cases, and one court cast was lost recently because organs were mixed up. Samples that should be held 20 years will be disposed of after 5 years because of a lack of storage space.

The supporting laboratory areas for toxicology and other analyses are jammed with equipment, reference materials, supplies and evidence. Other needed equipment cannot be obtained, even though the Crime Commission will buy it, because of the lack of space.

Even these crowded arrangements are the result of concessions by the hospital and are based on verbal agreements with the Pathology Department. The head of this department, who is sensitive to the needs for forensic pathology, is leaving June 30, 1974, and his replacement may feel that even the current arrangement is an imposition on the hospital.

As a result of these conditions, and the desire by the medical examiner and his staff to perform their duties regardless of the obstacles, they work extreme hours and periods without breaks. The medical

examiner reports 2 weeks of vacation since 1967, and the toxicologist reports 8 days vacation since 1969.

During 1972, the hospital performed 303 autopsies in these facilities, while the medical examiner performed 438 and subcontracted 93 more.

For the period between January 1 and November 5, 1973, the hospital performed 243 autopsies while the medical examiner performed 397 and subcontracted more than 58 (the number for which reports have been received).

The private ambulance services used at the option of the local jurisdiction are a compromise on the chain of evidence. A contract service with drivers capable of testifying in court and trained in the preservation of physical evidence would be a definite advantage.

2. Laboratory services from agencies outside the state:

a. Federal Bureau of Investigation: Interviews with four large police departments indicate that the FBI laboratory is being used for services not available in the state, and also for some analyses such as firearms that are available in the state. Agencies indicated they use the FBI for firearms, marks and impressions, blood and semen stains, latent prints, insulation, paint, glass, etc. Service was reported as good, and turnaround time has been adequate due to requests for expediting that resulted in telephone or wire reports from the FBI laboratory.

One large agency reported they did not use certain local capabilities because to do so would saturate the limited capability.

b. Other laboratories: No other laboratories were reported as serving agencies in Arkansas.

B. Needs and Preferences of Law Enforcement Agencies

1. Based on interviews with four agencies: In addition to those comments made previously about the level of satisfaction with the service from each of the laboratories, the departments expressed other needs and preferences:

a. What is needed?

. More capability in forensic pathology, toxicology, and criminalistics - let LEAA help set up and then

state take over the cost. Would be an asset to courts and help speed trials.

- . More drug analysis capability.
- . Faster results, can lose case if analysis takes too long.
- . Services in firearms, fingerprints, drugs, documents and technicians available for special crime scene search.

b. If Arkansas were to have a full-service lab, who should run it? Where should it be?

- . Independent agency  
State Medical Examiner Preferred  
Little Rock
- . State Police Preferred  
Not Health Department  
Little Rock with satellite serving local four-county area
- . All under one roof  
State Medical Examiner Preferred  
Little Rock
- . State should run, but shield from politics  
State Medical Examiner Preferred  
Little Rock

c. What is your crime scene search capability:

- . Limited in formal training  
No evidence technicians  
Have a mobile van
- . Training is adequate
- . Short on collection boxes and bags
- . Have in-service class and on-job training  
No evidence technicians

2. Needs and preferences based on state police interview: Major Tudor expressed his opinion that the crime lab should be independent of any law enforcement agency, should be a single, full-service laboratory, and should be open to receive evidence 7 days a week and be on call at night.

He reported that the Medical Examiner had good support from local enforcement agencies and would be a good candidate for running an overall lab system. He did not feel that the lab should be run by the state police.

3. Needs based on data analysis: The perceptions of needs for crime laboratory services in the state as expressed by selected members of the criminal justice community can be further substantiated by an analysis of data relating to crime laboratory use. It is difficult, however, to specify with precision the size or scope of a crime laboratory to serve the needs of a given criminal justice community. The laws of the state, and the attitude of the courts and prosecutors toward the use of physical evidence or expert witness testimony in court, can have a significant effect on whether or not evidence is sent to the laboratory. Political boundaries, such as county lines, can serve as deterrents to sending physical evidence to a nearby laboratory. Further, individual law enforcement departments exercise considerable influence on the amount of physical evidence that is sent to a lab, regardless of the proximity or jurisdiction of the laboratory. Command emphasis on the physical evidence plays an important role, as does the level of training of the investigators in collection of physical evidence, equipment available, existence of crime scene search teams or evidence technicians, and the priority for allocation of resources.

The crime laboratory itself influences its own volume of work. If the laboratory is able to satisfy an investigator's request for laboratory examinations, then that investigator and others will continue to make similar requests. Conversely, if requests for service are denied, response time is inordinately long, or consistently inconclusive results are provided, then the tendency will be to reduce the number of requests for service that the investigators make to the laboratory.

For planning purposes, however, the experience of other crime laboratories in other state laboratory systems can serve to shed light on this problem. One factor which can be quantified and which is known to significantly influence the use of criminalistics support is the number of sworn police officers available to collect physical evidence. A typical state crime laboratory system can expect to receive approximately one case per sworn officer per year from all of the law enforcement officers served within the state. Using this same approach for the State of Arkansas, and using the total number of sworn full-time law enforcement officers as 1,865, we can estimate the number of cases which can be expected to be sent to a crime laboratory. (The number 1,865 includes only 40 investigative officers of the state police, since the remainder of the state police force is involved only in traffic control activity.) The expectation, then, would be 1,865 criminalistics cases of all types to be submitted to a crime laboratory in a given year. The number of cases that an individual examiner can handle during the year varies considerably due to the type of case and the type of

physical evidence and the number of examinations required for each case. Again, for planning purposes, an average annual workload for a crime laboratory examiner can be considered to be 250 cases. Thus, the estimated 1,865 cases, when divided by 250 cases per examiner per year, yields a requirement for 7.4 criminalistics examiners.

Another approach to quantifying the need for crime laboratory examiners is the analysis of crime data. Offense data are available for the index crimes, but of these only four have a high potential for evidence yields for the laboratory. These are murder, rape, aggravated assault, and breaking and entering. Offense data are not uniformly available on nonindex crimes such as hit and run, arson, documents, etc., and they are not used in this analysis. However, since a major portion of the crime laboratory's work is in the field of violations of dangerous drug and narcotics statutes, it is useful to develop estimates of drug offenses based on arrests or other data. In the case of Arkansas, information from the State Health Department Drug Laboratory indicates that approximately 2,000 cases of drug and narcotics violations were received in 1972.

1. The number of index crimes of laboratory interest occurring in Arkansas in 1972 was 16,375 (1972 UCR).
2. An assumption of the analysis is that 10 percent of the crimes of laboratory interest will in fact be the subject of laboratory examination.
3. Criminalistics cases (nondrug) usually average 5 hours per case.
4. For planning purposes, the experience of other crime laboratories indicates that the average drug or narcotics case requires about 1/2 hour of an examiner's time.
5. Additionally, examiners can be expected to be unavailable for bench work approximately one-third of the time due to requirements for court testimony, travel, administrative duties, etc.

Using the above factors, then, it can be shown that 6.1 examiners will be needed to process anticipated criminalistics cases, and 0.8 examiners will be required to process anticipated drug caseloads, for a total requirement of 6.9 examiners. This figure is very close to the 7.4 examiners requirement reached by the CPO analysis method above, particularly when one adds additional cases from such crimes as arson, documents, firearms violations, etc. Thus, it would appear that the case can be made for a criminalistics section of a forensic science laboratory consisting of seven to eight examiners.



4. Crime scene search and physical evidence transportation: A crime laboratory is only one element of a criminalistics system which includes the capability for obtaining physical evidence from a crime scene and getting it to a laboratory in acceptable condition for analysis. The first link in this chain of events is the ability to recognize, protect, remove, preserve and package the physical evidence. This link is strengthened primarily through training of local officers and providing the necessary crime scene search equipment and physical evidence containers and supplies. The second link is a means of transporting evidence from the scene to the laboratory in a way that is fast and secure, while reducing the number of individuals that must be in the chain of evidence.

Aside from about 2 hours spent in the basic academy program on physical evidence and lectures by the Medical Examiner on death investigation, there appears to be no other training in the state related to forensic science.

Crime scene search is accomplished by patrol or detectives in larger cities and is aided by the state police in the rural areas.

#### C. Situation Summary

The preceding sections have established a baseline for consideration of strategies for serving the criminalistics needs of Arkansas. The situation at the present time can be summarized as follows:

1. Arkansas has 1,900 officers covering 32,000 index crimes of which 16,400 are defined as crimes of laboratory interest (murder, rape, aggravated assault, and burglary). This is a similar amount of crime to such large cities as Atlanta, Georgia; Boston, Massachusetts; Denver, Colorado; Newark, New Jersey; Phoenix, Arizona; and Washington, D.C.; all of which are served by full-service crime laboratories. Arkansas crime is distributed over a much larger area, of course, and is more difficult to serve.

2. Most of the functions provided by a full-service crime laboratory or a Forensic Sciences Institute are offered in some form in Arkansas. The services are generally understaffed and are spread between several organizations.

3. If something is not done in the near future, Arkansas will lose some of its capability, as the chief drug chemist has already resigned, other personnel state they are overworked and underpaid, and some skilled examiners are near retirement.

4. Law enforcement agencies face the problem of dividing evidence from cases, deciding which lab should receive it, and getting it there between 8:00 and 5:00 on weekdays. Unless special service is received, there are lengthy delays before reports are received.

5. The state and local agencies surveyed generally agree that the capability for physical evidence examination should be provided by the state and located in Little Rock. Most agencies preferred the Medical Examiners Office as the organization to run such an operation. One large department would like its own lab, but is willing to try a state lab to see if it can fill their needs.

6. The State Medical Examiner desires to establish an Institute of Forensic Sciences to include a full-service crime laboratory and no other state agency appears to be seeking a similar role. (No discussions were held with officials of the State Health Department on the subject of whether they desire to operate a full-service laboratory.)

7. The Criminal Investigation Section of the Arkansas State Police has 24 agents well distributed across the state to serve the investigation and crime scene search needs of all agencies that do not have their own investigators. This unit can be the means to insure that all outlying areas receive the benefits of a central crime laboratory.

#### IV. RECOMMENDATIONS AND CONSIDERATIONS

##### A. Recommendations

1. That a plan be developed to establish a forensic sciences organization that combines all skills needed for the full range of analyses including one section performing forensic pathology and toxicology, and a separate section performing criminalistics analyses.

2. That the personnel and equipment of the firearms and documents sections of the Arkansas State Police and the drug laboratory of the State Health Department be assigned to the combined laboratory.

3. The State Medical Examiner Commission appears to be a properly constituted body to insure that the resultant organization meets both medical/scientific standards and the needs of law enforcement. The Commission can be renamed, "The State Forensic Sciences Commission."

Three of the four enforcement agencies surveyed felt that the commission as presently constituted was adequate to insure that local enforcement agencies' needs were met.

Additional members can be added to represent the judicial system. Such representatives could help in arranging stipulation agreements, assist in resolving expert witness scheduling problems and help insure that the needs of the defense are accommodated.

4. That a Forensic Science Utilization Program be established, having the following components:

a. Changes in the basic training program for law enforcement officers to include more training in the effective use of physical evidence. This program to be jointly developed by the State Police Academy and the Forensic Science Institute.

b. Establishment of an in-service program to increase the proficiency of officers in the utilization of physical evidence.

c. Development of a manual to support such training and to be used as a guidebook on the preferred handling and routing of physical evidence in Arkansas.

d. Establish a specialized training program for evidence technicians to improve the crime scene search capability of local departments.

e. Add a Forensic Science Field Operations capability in the Criminal Investigation Section of the Arkansas State Police to handle latent prints and assist local agencies in effective utilization of the new laboratory capability. Such assistance can take the form of insuring that local agencies have the necessary training, equipment and supplies; resolving any user complaints about laboratory service, assisting in crime scene search when requested, operating some form of a Secure Evidence Transit System defined below. The field agents distributed around the state will be a valuable part of this capability. The Field Operation must work closely with the laboratory operations in order for this approach to be successful.

5. Explore the feasibility of a Secure Evidence Transit System to expedite the flow of physical evidence from the enforcement agencies to the laboratory. The system could use postal, common or private carriers or could be operated by the State Police. This system could also be used for the transportation of bodies to overcome present shortcomings in such arrangements.

#### B. Organizational Considerations

Although we recommend a total Forensic Science Institute headed by the Medical Examiner, there are some organizational elements that should be made about the risks in such a system. There are some risks of the

corresponding benefits of a joint operation are discussed in a section of a report (previously furnished to the Crime Commission) prepared for Florida dealing with the potential for combining the crime laboratory and medical examiner functions in that state. Comments on the MRI report received from Dr. Joseph H. Davis, the Dade County Medical Examiner, were also furnished to the Crime Commission. It should be noted that in Florida, full-range crime laboratories already existed as separate organizations.

We feel that Dr. Carlton has the proper view of the total scope of need, including crimes and services beyond traditional Medical Examiner interest. The use of a commission with enough representation of local law enforcement to insure that criminalistics needs are being met, and organizing criminalistics as a separate section of the laboratory under the direction of an experienced full-range criminalist reporting to the Medical Examiner, will be a safeguard in the event that a successor to Dr. Carlton does not share his concern for apprehending the offender as well as determining the cause of death.

The State Health Department is another organization that could be expected to desire a role in a future crime laboratory. Discussions with five key law enforcement officials reflect a viewpoint that this would be the least desirable of the organizational options at this time. This impression is further reinforced by the resignation of the Chief Chemist (the individual cited by the enforcement officials as being the principal asset of the drug laboratory) who claimed that department policies were not consistent with the needs of law enforcement.

The State Police are currently providing some of the criminalistics services in the state and would be a likely candidate for operating a crime laboratory. It is more common across the nation for a crime laboratory to be operated by a state police department than by either a health department or a medical examiner. In this case, however, there are factors that make this a less desirable option:

- (1) the Arkansas State Police do not feel that they should operate a full-service crime laboratory;
- (2) the relatively small crime laboratory proposed for Arkansas would probably benefit from association with, and management by, a scientific organization rather than by an enforcement agency.
- (3) the State Police could then concentrate on increasing their assistance to local agencies in a vital part of criminalistics, namely crime scene search and physical evidence transportation.

V. INITIAL PLANNING FOR AN ARKANSAS INSTITUTE  
OF FORENSIC SCIENCES

As previously discussed, the Medical Examiner of Arkansas desires to establish an Institute of Forensic Sciences to include medical examiner and criminalistics laboratory functions. An initial plan, including staffing, equipment, facility requirements and budget data was desired in order to allow further consideration of the proposed action by the Crime Commission and the State Medical Examiner Commission.

This initial plan was prepared by Midwest Research Institute using prior experience in the planning of criminalistics laboratories and interviews with the medical examiner and his staff on their requirements for the medical examiner function. The services of Professor Joseph Nicol, noted criminalist, Professor of Criminal Justice Curriculum, University of Illinois, and long-time criminalistics consultant to Midwest Research Institute were used for a review of the staffing, equipment and space requirements.

The plan is divided into sections covering Organization, Staffing, Equipment, Facilities Requirements, Cost Factors, Other Data, Field Operations and Initial Steps Toward Implementation.

A. Organization

The organization proposed for the Arkansas Institute of Forensic Sciences is depicted in the organization chart (Figure 1). It should be noted that the governing body is a Forensic Sciences Commission converted from the present Medical Examiner Commission. Because the present commission is composed of extremely busy persons, it may be desirable to add additional members who have more time to spend working with the institute or for each member to nominate an alternate who would serve on behalf of the member.

The position of Associate Director for Administration was created to relieve the director of the myriad of business-related activities so that he can concentrate on managing the technical aspects of the operation--and continue his direct professional involvement with criminal justice agencies. All director-level positions must be filled with qualified professional personnel, as they will perform much of the technical effort.

Although the medical examiner laboratory and the criminalistics laboratory are separate sections, they will work closely together and share major equipment items. The proposed combined organization will effect savings and allow services that should be more efficient and effective than separate organizations.

PROPOSED ARKANSAS FORENSIC SCIENCE ORGANIZATIONAL CHART

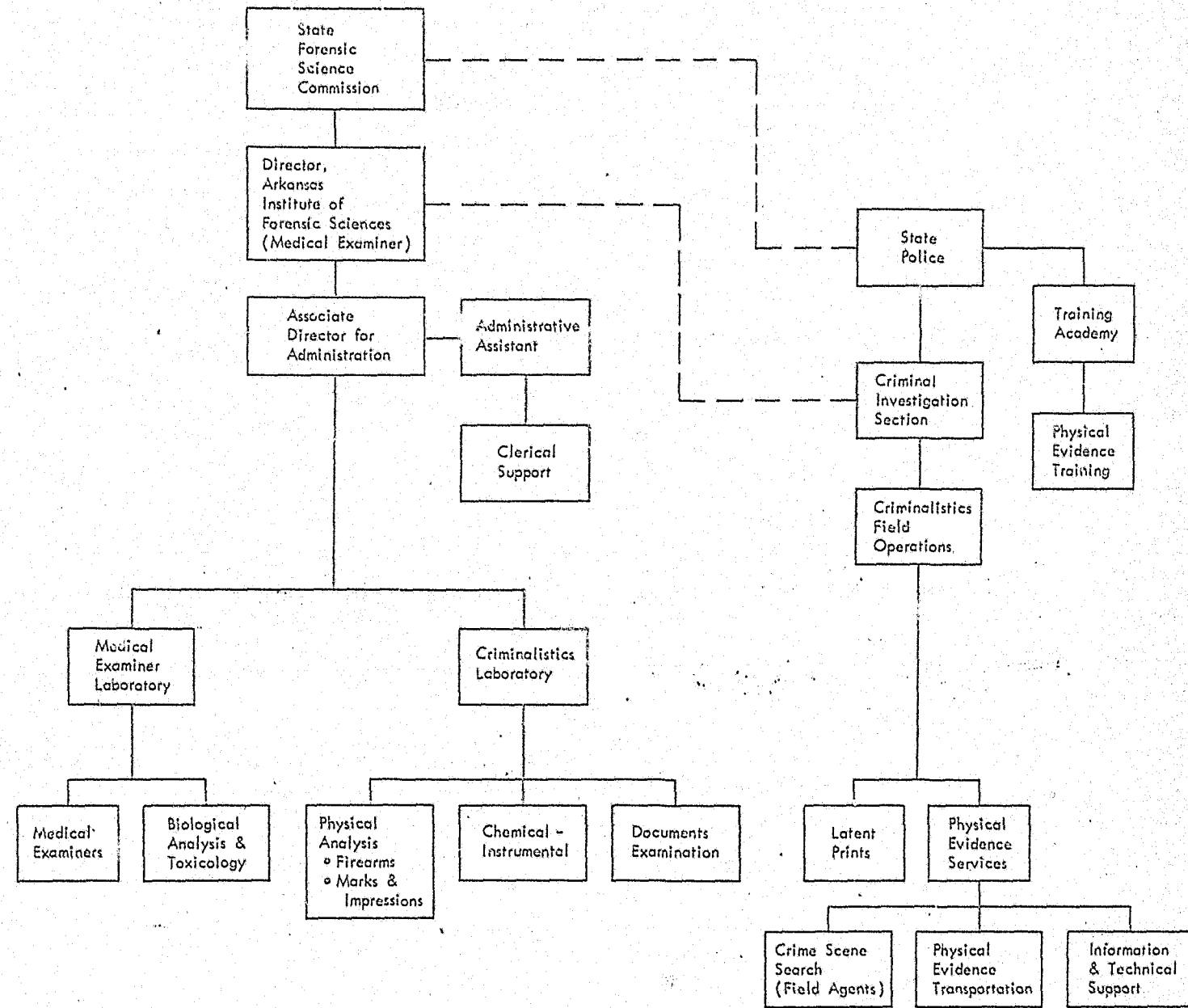


Figure 1 - Organization Chart

B. Staffing

The following page is a tabulation of the professional and support-  
ing staff proposed for the new institute. Staff has been divided into the  
three categories of Administration, Medical Examiner Laboratory, and Crim-  
inalistics Laboratory. Positions that are already authorized in existing  
organizations are noted. Salaries of existing positions have been modified  
upward in some cases to a level that we feel is equitable and necessary to  
hold present personnel.

As noted in the table, the total salary requirement of the insti-  
tute is estimated to be \$340,740 for a total staff of 28. An analysis of  
those positions that would transfer from existing organizations yields the  
following comparisons:

	<u>Positions</u>	<u>Related Salary</u>
Total Requirements	28	\$340,740
Authorized Positions in Existing Organizations:		
State Health Lab	5	49,940
State Medical Examiner	10	143,300
State Police Lab.	<u>2</u>	<u>27,000</u>
Total Existing Positions	17	\$220,240
New Positions	11	\$120,500

PROPOSED STAFF AND SALARY LEVELS

<u>Position</u>	<u>Number</u>	<u>Annual Pay Rate</u>	<u>Salary Budgeted</u>
<u>Director and Administration</u>			
Director, Institute of Forensic Sciences	1	\$ 34,000	\$ 34,000 <sup>a/</sup>
Associate Director for Administration	1	15,000	15,000
Administrative Assistant	1	8,800	8,800 <sup>a/</sup>
Clerk Typist	<u>2</u>	6,400	<u>12,800</u>
Total Director and Administration	5		\$ 70,600
<u>Medical Examiner Laboratory</u>			
Associate Medical Examiner	1	\$ 30,000	\$ 30,000 <sup>a/</sup>
Medical/Legal Secretaries	2	7,000	14,000 <sup>a/</sup>
Toxicologist	1	20,500	20,500 <sup>a/</sup>
Assistant Toxicologist	1	13,300	13,300 <sup>a/</sup>
Senior Biologist	1	16,600	16,600
Medical Technician	1	6,100	6,100
Medical Investigator	1	7,700	7,700 <sup>a/</sup>
Clinical Chemist	1	8,900	8,900 <sup>a/</sup>
Histology Technician	1	6,100	6,100 <sup>a/</sup>
X-Ray Technician	<u>1</u>	9,000	<u>9,000</u>
Total Medical Examiner Laboratory	11		\$132,200
<u>Criminalistics Laboratory</u>			
Director of Criminalistics	1	\$ 20,000	\$ 20,000
Medical Legal Secretary	1	7,000	7,000 <sup>b/</sup>
Medical Legal Secretary	1	7,000	7,000
Firearms and Toolmark Examiner	1	14,000	14,000 <sup>c/</sup>
Physical Examiner Trainee	1	8,700	8,700
Senior Chemist	1	16,600	16,600
Chemist	2	12,720	25,440 <sup>b/</sup>
Chemist	1	11,500	11,500 <sup>b/</sup>
Documents Examiner	1	13,000	13,000 <sup>c/</sup>
Documents Examiner Trainee	1	8,800	8,700
Lab Aide	<u>1</u>	6,000	<u>6,000<sup>b/</sup></u>
Total Criminalistics Laboratory	<u>12</u>		<u>\$137,940</u>
Total Forensic Science Institute	28		\$340,740

- a/ Presently authorized - State ME Lab.
- b/ Presently authorized - State Health Lab.
- c/ Presently authorized - State Police Lab.



C. Equipment

The following page is a tabulation of the equipment estimated to be required for the new institute. Suitable equipment that has already been purchased for an existing function that would transfer to the new organization has been credited toward the requirements. The same is true for items that are already on order. As previously noted, many items of equipment can be shared between medical examiner and criminalistics laboratories.

A broad allowance for benchwork and office furniture has been included, but it has not been verified against needs or compared with what is already available.

Most items of equipment were recommended based on our prior studies of the needs of crime laboratories. Some items such as the X-ray equipment are the needs as expressed by the medical examiner. In one case, the GC-Mass Spectrometer at an estimated cost of \$31,000 was requested by the State Health Department for drug analysis. Before this item is purchased, however, a review should be made as to whether such a unit at that price will have sufficient capability to perform a broad range of analyses for the entire laboratory. A more versatile unit at \$50,000 might well be of more value to the laboratory.

The total equipment requirement of the institute is \$279,000. The value of existing equipment that would be transferred from other organizations along with the staff is \$85,000. The estimated cost of equipment still required for the institute is then \$194,000.

LABORATORY EQUIPMENT

<u>Major Equipment Purchase</u>	<u>Items Required</u>	<u>Items Available*</u>			<u>Balance Items Required</u>	<u>Unit Cost</u>	<u>Total Cost</u>
		<u>a</u>	<u>b</u>	<u>c</u>			
Stereomicroscope	4				\$ 800	\$ 3,200	
Phase Microscope	1				3,000	3,000	
Polarizing Microscope	2	1			2,500	2,500	
Comparison Microscope	2			1	6,000	6,000	
Refractometer	1				800	800	
IR Spectrophotometer	2	1	1**		12,000	0	
UV Spectrophotometer	1		1**		12,000	0	
Still and Storage	1				800	800	
Dishwasher	1				600	600	
Camera MP3	1				1,000	1,000	
4 x 5 35 mm Camera	1				1,000	1,000	
Enlarger	1				500	500	
Print Dryer	1				250	250	
Film Dryer	1				150	150	
Print Washer	1				200	200	
Camera (Documents)	1			1	2,500	2,500	
Thin Layer Chromatograph	2			1	2,500	2,500	
Electrophoresis	1				1,000	1,000	
X-ray Diffraction Unit	1				10,000	10,000	
Spectrograph, Microprobe	1				31,500	31,500	
Gas Chromatograph	2	1	1		10,500	0	
XRD Goniometer	1				10,500	10,500	
Atomic Absorption Spectrofluorometer	1		1**		10,000		
Medical X-ray Equipment	1		1			0	
Centrifuge	1				11,500	11,500	
Thermoconductivity GC	1				1,500	1,500	
Benchmark and Furniture					5,000	5,000	
Auto X-ray Processer and Developer	1					50,000	
GC Mass Spec	1				7,000	7,000	
Data Processor				1	31,000	31,000	
					10,000	10,000	
<b>Total Recommended Major Equipment Purchase</b>						<b>\$194,000</b>	

\* a = State Health Lab  
 b = Medical Examiner Lab  
 c = State Police Lab  
 \*\* Equipment on order.

D. Facility Requirements

The floor space required to adequately support the personnel and equipment specified in previous sections has been estimated and is presented in Figure 2.

The space for the criminalistics laboratory is based on previous MRI studies while the medical examiner space is based on his estimates of need. The floor space presented is viewed as being adequate for immediate staffing, and could support considerable staff growth.

If a new building is to be built, decisions will have to be made regarding whether more space for future use should be provided in order to allow functions or volume not presently foreseen. For example, if a highway safety program were to require autopsies of crash victims, this would increase the volume of activity for the Medical Examiner. A more detailed analysis of floor space and facility requirements should be made before firm commitments are made. Options such as second shift operations and decentralized expansion must be considered along with expansion of a facility.

Due to uncertainty about exact building size requirements and actual building costs, a table has been prepared to indicate the cost of building a facility within a range of sizes and costs.

The usable floor space depicted in the table must be inflated to allow for hallways, stairwells, mechanical equipment areas, restrooms, etc., which is estimated to be 30 percent of the total building. The usable space requirement of 13,240 square feet when divided by 0.7, yields a gross requirement of 18,915 square feet. If building costs are assumed to be \$40 per square foot, then the building construction cost may be estimated as \$756,600.

Recognizing the variance in costs by locality and construction start time, the table below depicts alternative cost per square foot calculations, ranging from \$35 to \$45. Additionally, construction costs are shown for increments of 10, 25, 50, and 75 percent above the basic floor space requirement in anticipation of possible future demand. While this depiction of growth is not time dependent nor does it directly relate to service level of the laboratory, it does, however, provide a rough estimate of the costs to construct a physical facility adequate to meet the needs of present and expanded laboratory services.

Figure 2

OFFICE AND LABORATORY SPACE REQUIREMENTS

	<u>Dimensions (ft.)</u>	<u>Area (sq. ft.)</u>
<u>Administrative Offices</u>		
Director's Office	12 x 20	240
Assistant Director's Office	12 x 15	180
General Office (Administrative Assistant and Clerk/Typist)	20 x 20	400
<u>Laboratories and Special Purpose Areas</u>		
Storage Vault	10 x 20	200
In-service Training Room	20 x 20	400
Photographic Laboratory X-ray	20 x 20	400
1 Dark Room	15 x 15	225
2 Dark Rooms	10 x 10	200
1 Library-Conference Room	20 x 30	600
Shop and Instrument Repair	20 x 20	400
Evidence Receiving and Reception Area	12 x 20	240
Physical Evidence Screening Room	<u>15 x 15</u>	<u>225</u>
Total Administrative Floor Space Requirements		3,710 sq. ft.
<u>Medical Examiner Laboratory Offices</u>		
Medical Examiner Office	15 x 20	300
Associate Medical Examiner Office	12 x 15	180
Toxicology Office	12 x 15	180
Biology Office	12 x 15	180

	<u>Dimensions (ft.)</u>	<u>Area (sq. ft.)</u>
<u>Laboratories</u>		
Toxicology Laboratory	20 x 30	600
Histology Laboratory	15 x 15	225
Forensic Analytical Laboratory (Serology, microscopy)	20 x 30	600
3 Examining Rooms	10 x 10	300
Analytical Section Dark Room	10 x 12	120
Morgue Examination Room	25 x 25	625
Cooler Room	12 x 20	240
Storage Room	20 x 40	800
Special Problems Lab	15 x 20	<u>300</u>
Total Medical Examiner Floor Space Requirements		4,650 sq. ft.
<u>Criminalistics Laboratory Offices</u>		
Director's Office	12 x 15	180
Criminalistics Office	15 x 20	300
Chemistry Office	12 x 15	180
<u>Laboratories</u>		
Chemical Laboratory	20 x 30	600
Instrumental Laboratory (emission spectra & XRD)	20 x 20	400
Instrumental Laboratory (IR & UV spectra)	20 x 20	400
Instrumental Laboratory (GC & TLC)	20 x 20	400
Firearms Laboratory	25 x 30	750
Shooting Room	6 x 15	90
Microscope Room	10 x 12	120
Document Laboratory	20 x 30	600
2 Examining Rooms	8 x 10	160
GC-Mass Spec & Data Processing	20 x 20	400
Special Problems Lab	15 x 20	<u>300</u>
Total Criminalistics Laboratory Floor Space Requirements		4,880 sq. ft.
Total Office and Work Space Requirements		13,240 sq. ft.

COST RANGE FOR FACILITY CONSTRUCTION

Cost per Square Foot	Floor Space Requirements (square feet)				
	Base Level	+10%	+25%	+50%	+75%
	18,915	20,805	23,695	28,375	33,100
\$35	\$662,025	\$728,175	\$ 827,575	\$ 993,125	\$1,158,500
\$40	756,600	832,200	945,800	1,135,000	1,324,000
\$45	851,175	873,810	1,064,025	1,276,875	1,489,500

A separate estimate received from a source in Little Rock indicated that a building of 25,000 square feet could be built for \$1,100,000, including site preparation, parking lots, etc. This estimate, as well as the ones above, assume that land would be furnished by the state.

E. Cost Factors

Costs associated with staff, equipment and facilities have been presented in previous sections. These costs, plus other initial and recurring expenses, are tabulated in this section. Although these are many of the unique costs to be incurred in a Forensic Science Institute, they are not all inclusive. Items such as building maintenance, insurance, utilities, security services, etc., are not included.

Specific initial, or one-time, costs to be incurred for the Forensic Science Institute include:

Equipment	\$194,000
Facility	756,600
Vehicles (2)	8,000
Morgue Cooler	(no estimate)
Refrigerated Storage	(no estimate)
Total	\$958,600

Specific recurring cost items to be incurred for the Forensic Science Institute include:

Salary Related

Staff (total)	\$340,740
Staff Fringe Benefits	<u>34,074</u>
Includes Existing Staff of	242,264
Includes New Staff of	<u>132,550</u>
Total Salary Related	\$374,814

Equipment Support

X-Ray Film and Supplies	\$ 8,000
Miscellaneous Equipment Expense	5,000
Miscellaneous Expendables	6,000
Maintenance and Repair	<u>20,000</u>
Total Equipment Support	\$ 39,000

Other Operating Expenses

Expert Witness Travel	\$ 12,400
Vehicle Operating Expense	2,400
Professional Development	2,500
Books and Periodicals	<u>1,000</u>
Total Other Operating Expenses	\$ 18,300

Total of Recurring Costs Included Above:	\$432,114
---------------------------------------------	-----------

F. Other Data

Model legislation data were requested, but cannot be furnished at this time. Contacts were made with other organizations that are similar to the proposed institute, but one reply that was received to date did not yield the desired data. Other replies will be furnished when received.

Results of a phone discussion with Dr. Petty of Dallas and a sample of letters sent to other combined medical examiner/crime laboratory operations follow:

Telephone conversation with Dr. Charles Petty, Medical Examiner and Head, Criminal Investigation Laboratory, Dallas, Texas, October 29, 1973.

- . This is a joint city-county operation which combines the medical examiner and crime lab functions in a single organization.
- . Has a total staff of 50 of which about 15 are qualified expert witnesses.

4 Medical Examiners (MD)  
4 Ph.D.'s  
2 Firearms Examiners  
1 Toxicologist  
1 Questioned Documents Examiner  
+ Others

. Budget is \$750,000 per year with about a 50-percent split between Medical Examiner functions and Criminal Investigation Laboratory.

. They have no legislation--only an agreement between county and city.

. They spent 360 hours in the last 6 months providing training to enforcement agencies.

. They have a new building attached to the medical school and Parkland Memorial Hospital with 25,000 square feet.

. He indicated that joint ME/crime lab operations are rare, but named three that he knew of:

Dr. Samuel Gerber, M.D.  
Coroner  
2121 Adelbert Road  
Cleveland, Ohio

Dr. Ali Z. Hameli, M.D.  
200 South Adams Street  
Wilmington, Delaware 19801

Dr. Frank P. Cleveland, M.D.  
3159 Eden Avenue  
Cincinnati, Ohio



November 1, 1973

Dr. Samuel R. Gerber, M.D.  
Coroner, Cuyahoga County  
2121 Adelbert Road  
Cleveland, Ohio

Dear Dr. Gerber:

Midwest Research Institute is providing technical assistance to the State Medical Examiner of Arkansas in his efforts to develop an Institute of Forensic Sciences. The planned scope of this institute would include both medical examiner and criminalistics laboratory functions.

In a recent discussion with Dr. Petty in Dallas, your organization was identified as one that offers such a combined service. We would appreciate receiving some data about your activity, including, if possible,

1. Copy of any legislation or other documents that established your organization or authorized its functions.

2. Copy of any legislation that authorizes acceptance of reports in lieu of testimony in certain types of cases.

3. Data about budget, staffing, equipment and floor space available and needed. What percentage of budget is devoted to Medical Examiner vs. criminalistics?

4. How many expert examiners do you have (1) in the medical examiner field, (2) in the criminalistics field, and (3) in toxicology?

5. Data about services offered including the scope of services, number of different type cases received and agencies served.

6. Your plans for the future or shortcomings in current operations. Any suggestions that you feel would be of value to a new forensic sciences activity.

Thank you for your assistance to MRI and Dr. Carlton of Arkansas.

Sincerely,

John E. Stacy, Jr., Manager  
Public Systems Programs

G. Field Operations

The organization chart reflects a role in the expanded criminalistics system for the Arkansas State Police. Working closely with the forensic institute, the State Police would provide a field operations capability.

Field operations will consist of:

1. Crime scene search support for local police;
2. Crime scene search training;
3. Secure Evidence Transit System (SETS).

It is envisioned that field operations support for the Forensic Science Institute would be provided by the Arkansas State Police through its Criminal Investigation Section (CIS) and Training Academy.

Crime Scene Search support would be provided by its 21 now-existing field investigators of the CIS Investigations Unit assisted by four to five SETS drivers. Training would be conducted by the Academy staff with the advice and assistance of the laboratory staff.

The SETS drivers would cover:

<u>Region*</u>	<u>Major Crime Area (County)*</u>	<u>Major Crime Area (City)*</u>
1. Northeast (3033)	Crittenden (702)	West Memphis (428)
2. Northwest (2145)	Sebastian (577) Washington (614)	Fort Smith (394) Fayetteville (118)
3. Central (1587)	Garland County (443)	Hot Springs (283)
4. Southern (3730)	Jefferson (1214) Union (533) Miller (519)	Pine Bluff (1043) El Dorado (457) Texarkana (407)

\* Figures in parentheses are 1971 Index Crimes of Laboratory Arrest.

The southern region might have to be divided into two parts because of both geographical size and potential caseload.

A Physical Evidence Coordinator would be added to the Investigations Unit. His responsibilities would be to assist local police agencies in proper utilization of the Institute of Forensic Science, assist in training and crime scene search operations, resolve any problems that may arise, and supervise the Secure Evidence Transit System.

The cost of the system would be as follows:

Physical Evidence Coordinator-----	\$15,000
21 Field Investigators-----	no additional cost
21 Crime Scene Search Vehicles---	no additional cost
21 Crime Scene Search Kits @ \$735-----	\$16,485
4 SETS Drivers @ \$7,200-----	\$28,800
4 SETS Vehicles @ \$4,000-----	\$16,000
SETS Vehicle Maintenance @ \$1,200---	\$4,800

The cost of the training program is dependent on availability of instructors and facilities and the number of courses and students to be taught.

### X. Initial Steps Toward Implementation

Information concerning alternatives for initial implementation actions that could be accomplished during 1974 has been furnished to the State Crime Commission under separate cover.

**END**

7 10/10/11