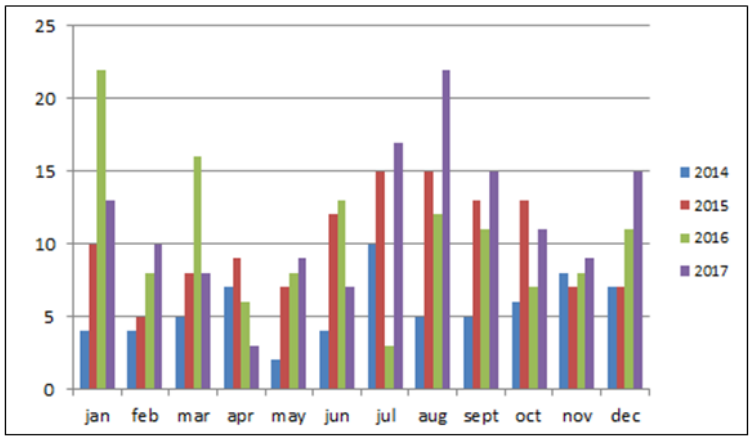
DNA CEBR PROGRAM NARRATIVE - FY2018

DESCRIPTION OF THE ISSUE

The Sedgwick County Regional Forensic Science Center (RFSC) is an independent local government agency which serves as the Crime Laboratory for all of Sedgwick County, Kansas Law Enforcement agencies. In 2016, Sedgwick County increased the number of full time positions in the Biology Section with the addition of one scientist. Currently, all five full time Biology Section positions are filled with qualified case-working scientists.

The Biology Section has seen a dramatic increase in case submissions in the last three years. Heightened media attention and political pressure in various parts of the country concerning untested sexual assault kits (SAKs) led to an evaluation of the untested kits throughout the state of Kansas. Studies conducted by a state-wide Sexual Assault Kit Initiative Multidisciplinary Task Force revealed that over half of the untested kits reside in Sedgwick County. With all levels of government now receiving inquiries about the untested kits, pressure has led to an increase in the number of rape cases submitted for DNA analysis locally. Twice as many sexual assault cases were received for analysis in 2015 as compared to 2014 (immediately following the study) and submissions have had record highs each year since. The trend is illustrated in the figure below.

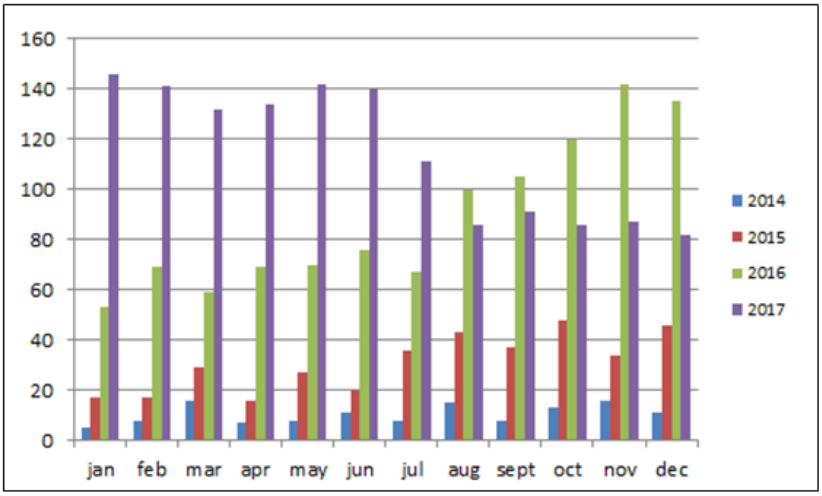
Sexual Assault Kit Submissions (2014-2017)



	2014	2015	2016	2017
Average Number Kits Received per Month	5.6	10.1	10.4	11.6*

Increased SAK submissions have resulted in a backlog that has a negative impact on the turn-around-time for all cases submitted to the laboratory. The table below illustrates the dynamics of the RFSC backlog in recent years. Prior to the statewide sexual assault kit assessment (2014), very few cases were pending after 30 days (11 per month). Throughout 2017, this number has increased drastically to 115 per month pending after 30 days.

DNA Case Backlog > 30 Days (2014-2017)



	2014	2015	2016	2017
Average Number Pending >30 days	11	31	89	115

Although the lab has achieved some success in maintaining backlog levels during the latter half of 2017, the total number of violent crimes has continued to increase in Sedgwick County, perpetuating the need for additional resources to address ongoing challenges. Of the 105 counties in Kansas, Sedgwick County is the second most populous but has the highest number of Part 1 crimes reported, with a criminal offense rate five times that of Johnson County. Throughout the state in 2016, violent crimes were nearly 6% above the 10 year average. In particular, murders were 24.4% above the 10 year average and rapes were 22.1% above the 10 year average. Higher incidences of crime correspond naturally with an increase in lab requests. The RFSC provides forensic examinations to a variety of law enforcement agencies, but the vast majority of the forensic laboratory requests come from Wichita Police Department (WPD). The following table provides a snapshot of local trends in crime (data reported by WPD), and illustrates the 35% increase in the number of violent crimes reported to the Wichita Police Department since 2014.

	2014	2015	2016	2017
Homicide	26	31	32	38
Rape	280	349	350	415
Robbery	555	739	685	626
Aggravated Assault	1502	1732	2104	2124
TOTAL	2363	2851	3171	3203

Investigating agencies and prosecutors are also requesting more samples be tested per case than ever before. In 2017, the Biology Section issued more than twice the number of reports/notifications as the year prior (560 vs. 262) and analyzed 35% more exhibits (1660 vs. 1226).

In addition to factors related to SAK submissions and higher workload, the RFSC is also facing a massive influx of SAKs in addition to those already selected for submission. In April 2018, the statewide Sexual Assault Kit Initiative Multidisciplinary Task Force formally recommended that 100% of SAKs collected be submitted for laboratory testing. Approximately 30% of all sexual assault kits collected statewide are in Sedgwick County. Of those, the RFSC is only receiving about 30% for analysis. With an already overwhelming caseload, a "test all" approach will severely compromise the laboratory's capability to provide timely scientific results. Baseline backlog data (compiled in the table below) illustrates the current status of analytical turn-around time. Testing of all kits collected will create an inconceivable bottleneck in the processing of cases and further the need for capacity enhancement in Sedgwick County.

Casework Laboratory Metrics	
Number of untested/not completed forensic biology/DNA cases on hand on January 1, 2017.	165
Number of untested/not completed forensic biology/DNA cases more than 30 days old **(backlogged)** on January 1, 2017.	137
Please estimate percentage of these cases that were from property crimes.	45.9%
Number of new **cases** for forensic biology/DNA received in 2017.	526
Please estimate the percentage of these **cases** that were from property crimes.	41.4%
Total number of forensic biology/DNA **cases** completed in 2017.	560
Please estimate percentage of these **cases** that were property crimes.	49.2%
Forensic biology/DNA cases closed by administrative means in 2017. These are referred to as Notifications of Evidence Return.	138
Number of untested/not completed forensic biology/DNA cases on December 31, 2017.	109
Number of untested/not completed forensic biology/DNA cases more than 30 days old **(backlogged)** on December 31, 2017.	79
The average number of days needed to complete (including peer review and report) non-priority forensic DNA cases for calendar year 2016. Please indicate violent crime time with a **"V"** and the nonviolent crime time with **"NV."** If the applicant cannot separate violent and nonviolent cases, give the number with no other markings.	NV= 137 days V= 143 days

PROJECT DESIGN AND IMPLEMENTATION

i. Goals, objectives, and expected results

The goal of this project is to enhance the sexual assault screening process through the introduction of an automated extraction platform. Specifically, the RFSC seeks to implement technology that will allow automated differential extraction of mixed stains with the QIAcube and EZ1 Advanced XL robotic workstations, followed by male DNA screening via real time PCR quantification. This will replace the current classic "serological" screening techniques (presumptive color tests for blood/semen/saliva, microscopic sperm searches, etc.). SAK exhibits would be differentially extracted and evaluated quantitatively for male DNA, now considered the gold standard for sexual assault kit sample assessment consistent with nationally recognized standards. Rather than taking weeks to screen and differentially extract several cases, the same will be achieved in approximately 2 days. Upon completion of screening, the DNA will already be extracted and ready for amplification. The expected result is higher throughput of SAKs while decreasing the overall back log and analytical turn-around time of the RFSC.

ii. Plan for meeting programmatic goals

Because approximately 1/3 of the cases received are sexual assaults, increasing the efficiency of screening rape evidence will increase the throughput of the DNA laboratory overall. Implementation of automated methods for interrogation of SAK exhibits will speed up the screening and DNA extraction aspects of testing. As throughput increases by the introduction of robotic extractions and replacement of "serological" screening techniques, the number of samples awaiting analysis will decline.

The technology proposed to assist in meeting the programmatic goals is implementation of two QIAcube EZ1 Advanced XL extraction platforms for automated differential extraction of

mixed stains. Once acquired, the systems will require validation. Therefore, the laboratory is requesting a technician to carry out the various extractions required for the validation and to assist with data compilation and other ongoing laboratory tasks. Chemistry for validation is also required and included in this program request. The stepwise plan for this project and timeline for completion is detailed in the table below.

OBJECTIVE	TIME FRAME
Develop DNA Laboratory Technician job description and training manual; post job opening	January-February 2019
Conduct DNA Lab Tech interviews	March 2019
DNA Lab Tech onboarding	March-April 2019
Complete PR and begin purchase of QIAcube EZ1 Advanced XL	March 2019
Instrumentation bid process	April 2019
DNA Lab Tech training and draft validation proposal	April-May 2019
Install QIAcube EZ1 Advanced XL	May 2019
Carry out and summarize validation	June-October 2019
Develop SOPs, conduct competency testing, implement workflow	November 2019

iii. Addressing bottlenecks

Biology Section staff have evaluated current resources and identified the screening of sexual assault cases using body fluid classification techniques as one bottleneck in workflow. The implementation of automated methods for the differential extraction of sexual assault exhibits will alleviate the need for lengthy "serological" screening techniques and advance samples to the next stage of analysis (STR PCR analysis) immediately following completion of the male quantification.

iv. Anticipated impacts

The main anticipated increase in DNA submissions is related to the statewide recommendation to test 100% of SAKs collected. In April 2018, the statewide Sexual Assault Kit Initiative Multidisciplinary Task Force formally recommended that 100% of SAKs collected

be submitted for laboratory testing. Approximately 30% of all sexual assault kits collected statewide are in Sedgwick County. Of those, the RFSC Biology Section is only receiving about 30% for analysis. Considering the already overwhelming caseload, if the RFSC is unable to implement automation to assist with screening these kits as proposed herein, our limited number of staff members will struggle to meet the needs of the judicial system.

v. Statement of estimated number of cases to be processed

The implementation of automated differential extraction of mixed stains is expected to assist in the completion of 500 cases during the 24 month period. The technology will be directed toward SAKs in the queue for analysis. Expediting samples in the queue will allow analysts to work through the backlog more rapidly. The laboratory hopes the automation requested herein will eventually allow the lab to better manage testing of 100% kits collected in Sedgwick County.

CAPABILITIES AND COMPETENCIES

The laboratory has identified key staff members, all of whom have been employed with the RFSC for over a decade. The key staff members have defined relationships within a structured chain of command. The RFSC Director holds the ultimate responsibility for RFSC operations, including management of grants/awards. The DNA Technical Leader/Laboratory Manager (Dr. Shelly Steadman) reports directly to Dr. Rohrig and will serve as Program Director for this particular project. Dr. Steadman will devote sufficient time to allow for successful completion of all goals and objectives of the grant. Dr. Steadman will also provide technical oversight to the DNA Laboratory technician conducting the validation for the project and will assign staff members to assist with the studies as needed. The Quality Assurance Manager

(Robert Hansen) will conduct metrics analysis and assist with reporting. The Quality Assurance Manager also reports directly to Dr. Rohrig. The CODIS Administrator (Sarah Geering) reports directly to Dr. Steadman and will assist with metrics analysis for CODIS related objectives and performance measures. The RFSC has demonstrated the ability to manage such efforts through the fulfillment of requirements of previous awards of this nature.

PLAN FOR COLLECTING DATA

The Sedgwick County Regional Forensic Science Center (RFSC) is equipped with case tracking databases and understands that gathering and reporting of specific data will be required. This is demonstrated by the laboratory's ability to provide baseline data and historic compliance with data reporting requirements under previous awards.

Tracking case metrics within the RFSC depends upon commercially available software programs that have been proven robust in various industries. The laboratory collects information in searchable fields and allows for filter queries of those fields or combined fields. Data that is collected includes, but is not limited to, laboratory case number; submitting agency and agency case number; submission number and date; item numbers; analysis start and completion dates; review dates; report type(s) and date(s); and the number of questioned and known samples submitted and analyzed. Metric information is entered by RFSC support staff and DNA scientists. The RFSC currently uses a lab-wide system that has a Microsoft Access front end with a SQL Enterprise back end for tracking of casework statistics. The data warehouse is now maintained in the SQL back end. A business objects universe is created from the database back end, which is a semantic layer that resides between the database back end and the data user.

The RFSC also utilizes the Web Intelligence (Webi) software, which is part of SAP Business Objects product suite that is used for analytical and ad hoc reporting in real time. This reporting tool analyzes data from our casework tracking database, which is a SQL database that is routinely backed-up. This system has been validated to be a reliable tool by comparing returned numbers from several Webi generated reports with the corresponding hand calculated raw hard numbers. The database was also verified against a legacy Access-based database maintained by the Biology Section for over a decade to ensure accuracy and for verification against duplicate records that may result in "double counting." Performance measure data will be derived from the Webi reports, provided at the required intervals, and will remain available for review indefinitely. The following Webi reports and CODIS reports (each described briefly) are already established:

- **Number of forensic biology/DNA cases submitted to the laboratory**

The Webi report "Laboratory Case Submission Count" will be utilized to generate a report that tracks submissions to the laboratory in a given period of time. This report will return data for case submissions to the laboratory from the various contributing agencies.

- **Average number of forensic DNA samples analyzed per analyst per month**

The Webi report "Number of Qs and Ks (BIO)" will be utilized to generate a report that tracks the sum of DNA samples, both forensic questioned (Qs) and forensic known (Ks), and the average for each reporting DNA Analyst over an assigned period of time.

- **Average number of days between submission of a request to delivery of results**

The Webi report "Laboratory TAT" will be utilized to generate a report that tracks the average number of days between submission of a request for analysis and delivery of the test results (TAT).

- **Number of backlogged forensic biology/DNA cases (30 Days)**

The Webi report "30 Day Blog" will be utilized to generate a report that tracks the number of backlogged cases on the first of each month. The report will return data for cases that have not had the delivery of results to the submitted agency within thirty (30) days of submission, based on whether or not the administrative review date is null.

- **Number of forensic biology/DNA cases analyzed**

The Webi report "Report Type Tracking" will be utilized to generate the number of casework reports issued in a given period of time. This report will return data for cases that have a laboratory report issued that delivers the results to the submitting agency.

- **Number of DNA profiles entered into CODIS**

Data is obtained with a customized view in the Specimen Manager module of the CODIS software that tracks the date a specimen is marked, which for this lab is the date it is entered into the LDIS. The customized view can track any given time frame of interest.

- **Number of CODIS hits**

Data is obtained with a customized view in the Match Manager module that tracks matches by date. The customized view can be modified to track any given time frame of interest.

The Microsoft Access frontend and a SQL express backend (lab-wide Access/SQL) database system is maintained by the Quality Assurance Manager (QAM). The QAM will be responsible for database maintenance and will validate the performance measure data at the applicant level.