

United States Geological Survey  
National Geological and Geophysical Data Preservation Program

**Final Technical Report**

**Award Number: G13AP00079**

**“Kansas Oil and Gas Well Geologic Data, Records, and Samples Preservation,  
FY2013”**

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Project Period: 08/18/2013 – 08/17/2014

Submittal Date of Final Technical Report:  
October 28, 2014

## **Abstract**

The Kansas Geological Survey (KGS), as a research and service division of the University of Kansas (KU) and the geological survey for the state of Kansas, collects, archives, loans, and uses extensive data, sample, and core collections related to the geologic resources of the state. The KGS Data Resources Library (DRL) is mandated by state statute to collect and make available to the public a variety of records for oil and gas wells drilled in the state. These data are made available in paper form on site and/or in electronic form on the KGS website. The KGS also collects, archives, and provides access to oil and gas well sample cuttings in our Wichita facility. The sample cuttings are made available onsite and offsite for examination and testing. The DRL has in storage a number of unprocessed collections of paper records from various sources: a) donations to the KGS from private individuals, companies, and governmental or educational organizations, b) transfers from our Wichita Well Sample Library and our Lawrence Core Barn Facility, and c) records that have come to us normally from the state regulatory agency but have not yet been inventoried and processed due to limited staff time. Some of our paper records in Lawrence and our well sample cuttings in Wichita are at risk of deterioration or loss due to the age of the records and limited and/or unfavorable storage space.

This project was managed and supervised by the PI and Co-PIs, with assistance from the KGS Web Manager, an Administrative Associate Senior, and a Research Technician. We also employed KU students to organize and process records from those irregular collections, to filter out duplicate records, assess the condition of records that were not duplicates, and if warranted, incorporate them into our regular paper collections, create archival digital copies, and enter data and scans of the records into our electronic databases and onto our public website. At the Wichita facility, existing oil and gas well cuttings preserved in sample envelopes and stored in cardboard boxes were examined for deterioration from aging, moisture, and exposure to temperature extremes. The Temporary Geology Assistant, supervised by the Research Technician, organized, re-boxed, barcoded, archived, and digitally catalogued at-risk well sample cuttings.

The KGS has a mature information technology infrastructure with dedicated staff members responsible for managing critical systems such as the Oracle database, web application servers, and internet map servers. This infrastructure and staff support have facilitated our efforts to incorporate these records into digital archives, which in turn have improved our online databases, interactive mapping programs, and web pages. Our efforts this past year allowed us to process a larger number of records than originally anticipated. Metadata records for these items have been submitted to the USGS National Digital Catalog.

## **Introduction**

The mission of the Kansas Geological Survey (KGS) states in part that the KGS will “collect, correlate, preserve, and disseminate information leading to a better understanding of the geology of Kansas, with special emphasis on natural resources of economic value,…” In addition, state statutes dictate that the KGS archive the oil and gas well records, well samples, and water well records entrusted to it and make them available to the public. As part of that mission and in support of the KGS long range data preservation plan and its long term strategic plan, and in keeping with collaborative efforts between the KGS and other Kansas governmental agencies to continue to move toward electronic submission of such records to the state, the KGS has been working for many years to convert its archived geologic records and documents into electronic form.

The Data Resources Library (DRL) has been scanning and electronically archiving oil and gas completion forms and well reports, and water well completion forms since 1999 and wireline logs since 2002. Equipment and staff expertise are in place to continue moving forward with this process. The KGS inventory of collections is large and includes much more than simply the oil and gas and water well records. It also includes information, data, and records of oil and gas production, geologic maps, groundwater levels, aquifers, bedrock brine analyses, core from oil and gas wells, aeromagnetism, gravity, seismic, aggregate and industrial minerals, mines, publications and reports, and other collections. Because of the tremendous volume of collections, and due to reductions in the state budget that placed constraints on our labor pool, our anticipated timeframe to achieve complete digital archives of all paper records has necessarily been extended. Although it will likely take many more years, ultimately the Kansas Geological Survey plans to convert all paper records in its files into electronic form for archiving purposes as well as for ease of access by the users of the data through our website. This NCGDPP-funded project has allowed us to continue forward in that mission.

The KGS Wichita Well Sample Library (WWSL) maintains a collection of well sample cuttings from Kansas oil and gas wells that date back to the early 1900's. In cooperation with oil and gas operators, the WWSL has preserved samples from over 145,900 wells for research or exploration use. More samples continue to arrive, averaging 197 wells per month, as oil and gas drilling activity in the state continues at an elevated rate and is expected to do so for the foreseeable future. The holdings are listed on the KGS public database. Three years ago the KGS invested \$180,000 to install a new roof on the well sample storage facility in Wichita to protect the samples from moisture deterioration as a result of leaks and condensation. In addition, the KGS is exploring options for an enhanced facility that will

better protect, preserve, and provide access to these samples for the long term. The present NNGDPP funding is key to preserving deteriorating well samples that are in immediate need of rescue, and serves as a vital component to our overall long-term preservation plan.

## **Project Goals**

Our goals in the Data Resources Library and the Wichita Well Sample Library have been to rescue, preserve, and archive the paper records and the well sample cuttings in accordance with the KGS Long-Range Data Preservation Plan and state statutes, to make the paper records available electronically and the sample cuttings physically to as wide an audience as possible for use in exploration, development, and management activities related to the natural resources of Kansas. We also strive to better preserve both types of records by filing them in better storage conditions and help preserve the paper records by reducing hand manipulation. In years past, much of the data entry and scanning have been done by student employees, and the well sample boxing has been done by regular or temporary employees. However, due to increased patron demands on staff time, and staff shortages resulting from decreases in state funding, unprocessed donations of records in the Lawrence office and records for which there is a great demand but for which we have not had the resources available to convert them to digital form have accumulated over the past several years, including geophysical logs, core analysis reports, drill stem tests, completion forms, and specialized strip logs. Likewise, at the Wichita facility, distressed boxes of well sample cuttings have been deteriorating, and staff-time has not been available to process them.

This NNGDPP-funded project allowed the DRL to carry over four students who had been employed under our 2012 NNGDPP-funded project, hire one additional student employee, and for part of the summer we transferred one of our existing student employees to this project. The Wichita office hired one temporary employee for nearly seven months to process the at-risk sample cuttings.

Thousands of paper oil and gas records in the DRL that were outside our normal processing procedures or that were at risk of deterioration or loss were processed. As a result, the DRL has been able to create digital archival copies of the paper geologic records, add records to our inventoried paper and digital collections, replace deteriorating paper records with the best available copies, add data from the forms into our public databases, and present the data to the public on our website.

The Wichita Well Sample Library was able to rescue thousands of deteriorating well sample cuttings, transfer the samples to new and better envelopes and boxes, and update our online inventory of the collection.

Incorporating these records from both the DRL and the WWSL has improved our oil and gas well database records and our online interactive mapping programs, which serve many web users and will preserve the geologic data for future users.

## Results

The following tables compare the numbers of records that we initially estimated could be processed using the NCGDPP grant funds to the actual numbers of records that we were able to process during the budget period of the project:

<b>Grant Objective 3 – Create or update digital infrastructure</b>			
Paper → Digital conversion	Types and amounts of <u>paper</u> records scanned/digitized:		
	<i>type</i>	<i>Proposed Amount</i>	<i>Achieved Amount</i>
	Strip and Sample logs from oil and gas wells (particularly those produced by the Kansas Sample Log Service, considered by those in the industry to be of exceptional quality).	950	2,273
	Completion forms and miscellaneous oil and gas documents from well files.	470	1,177

<b>Grant Objective 4 – Rescue data at risk</b>			
What was in need of rescue?	Types and amounts of items rescued:		
	<i>type</i>	<i>Proposed Amount</i>	<i>Achieved Amount</i>
	Geophysical logs, mud logs, and geologist reports from oil and gas wells (Donations) (Items transferred to our regular collections were converted to digital format at the same time).	1,330	1,350
	At-risk geoscience data from oil and gas well sample cuttings (Wichita).	1,780 wells	1,805 wells

From the above tables, one can see that we accomplished more than we originally anticipated, both in the DRL and in the WWSL. For the DRL, part of the reason for the increased numbers is that many of the records, especially the strip logs, had already been sorted and organized in the previous grant year, and, in response to outside requests, we focused our early efforts on scanning strip logs that were from a particular geographic area where many new horizontal wells were being drilled in our state. In addition, much of the scanning and processing was done by four of our student employees who had worked on the project in the previous grant year, which eliminated a considerable amount of training

time. Also, we employed one student who was partially funded under the Federal Work-Study program through the University, which freed up monies from the NGGDP grant to fund additional student hours for the project. Finally, our Web Manager, also responding to outside requests, dedicated more time than we had expected to the NGGDP project, which allowed him to scan a significant number of Drill Stem Tests and Geophysical Logs.

At the Wichita facility, 1,805 wells were processed by the Temporary Geology Assistant funded by the NGGDP grant; these are the wells for which metadata was submitted to the USGS National Digital Catalog. Additional wells were processed by the Research Technician and other staff, for a total number of wells for which cuttings were rescued during the 2013 USGS grant period of 2,489 wells. Rescue of this number of well samples was made possible thanks to the NGGDP funds that allowed us to hire someone who was dedicated full time to this effort, the development of an efficient and well-organized rescue procedure, and the additional work of existing WWSL staff.

The Kansas Geological Survey has developed metadata records in eXtensible Markup Language (XML) format that describe the data sets entered into the KGS database for this project, in accordance with the *Metadata Profile for the National Digital Catalog, Version 1.0*. Metadata is available for records already in the KGS database via a REST-based web service, but also have been extended for new records added as part of this project. Metadata records generated as a part of this project were submitted on October 9, 2014 and October 24, 2014 for inclusion in the National Digital Catalog.