FY 2014 FINAL TECHNICAL REPORT

NATIONAL GEOLOGICAL AND GEOPHYSICAL DATA PRESERVATION PROGRAM

Award No. G14AP00155

Virginia Geologic Information Catalog

Report Prepared By:
Christina M. Wood-Smith
Virginia Department of Mines, Minerals and Energy
Division of Geology and Mineral Resources
900 Natural Resources Drive, Suite 500
Charlottesville, VA 22903
Tel : (434) 951-6322, Fax (434) 951-6366
chrissi.wood-smith@dmme.virginia.gov
November 7, 2015

Budget Period: 09/01/14 – 08/31/15

ABSTRACT

The Department of Mines, Minerals and Energy (DMME), Division of Geology and Mineral Resources (DGMR) serves as Virginia's geological survey. The primary mission of the DGMR is to gather and disseminate geologic and mineral resources information that supports sustainable development and a more productive economy. Since the early 1900's, DGMR has maintained collections of geologic materials including rock specimens and associated thin sections, core samples, well cuttings, and fossils that are stored in warehouse facilities in Charlottesville, as well as collections of geologic maps, historical photographs, aerial photographs, geophysical and geochemical datasets, manuscripts and publications, and mineral locality information.

Recognizing the need to both preserve these valuable collections and improve the ability of staff and customers to search and access this information, DGMR implemented a long range data preservation plan. With support from the U.S. Geological Survey (USGS) National Geological and Geophysical Data Preservation Program (NGGDPP), DGMR began standardizing and consolidating data collections into the Virginia Geologic Information Catalog (VGIC). DGMR serves this data to the public on-line using both text-based query tools as well as ESRI's Flexviewer GIS interface.

For the grant year starting September 1, 2014 and ending August 31, 2015, DGMR added one new collection to the VGIC, "Geologic Sections", a dataset consisting of site-specific, large-scale geologic cross-sections (composite sheets) from bridge work done by Virginia Department of Transportation (VDOT). In achieving the NGGDPP grant deliverable

commitment, DGMR uploaded 5,500 location-specific metadata records that were previously only available on Mylar to the Science Base Catalog.

Each of the 5,500 records represents one Mylar composite sheet from the Virginia Department of Transportation (VDOT) used as part of an analysis as they conducted testing for bridge locations from 1949-1999 and includes core, auger, and split-spoon logs. The data on each sheet can hold up to 24 logs providing valuable subsurface insight as to the geology such as depth-to-bedrock and lithology information. These composites were rescued from VDOT as they no longer had a need for them. The sections are useful as indicators of subsurface geology in large parts of Virginia that have yet to be mapped in detail, and will aid geologic mapping in areas where outcrop is sparse.

In addition to uploading metadata records, DGMR was able to scan the sheets as well as collect and catalog valuable information captured on them. This data is available on Science Base Catalog (dataset “Geologic Sections Collection”), on our web site, and we have plans to make it available on our Flexviewer as a separate layer of GIS data.

INTRODUCTION

The Department of Mines, Minerals and Energy's (DMME's) Division of Geology and Mineral Resources (DGMR) collects, maintains, and distributes information related to the geology, mineral and energy resources, and geologic hazards of Virginia. DGMR's customers include the general public, schools and educational programs, mineral and energy production industries, construction industries, land use planning authorities, and local, state, and federal government agencies.

DGMR seeks to encourage sustainable economic development though the wise management of Virginia's energy, mineral, land, and water resources. A key strategy to achieve this objective is to enhance the integrity, accessibility and distribution of geologic information contained in the DGMR archives.

The archives comprise a variety of collections of geologic materials and data that vary in format, size, and complexity. The format of our published and unpublished map products that depict geologic, geophysical, geochemical, mineral and energy resources data includes hard copy media (paper, mylar, sepia, etc) and digital data. The collections also include historic photographs, rock thin sections, results of petrographic and microscopic analyses, geochemical laboratory results, reports on groundwater and mineral spring characteristics, historic and out-of-print publications, well logs, well cuttings, drill cores, and extensive collections of rock, mineral, and fossil specimens. These collections continue to grow as DGMR gathers new data.

Supported by a FY 2007 Phase 1 grant from the U.S. Geological Survey (USGS) National Geological and Geophysical Data Preservation Program (NGGDPP), DGMR identified and characterized existing inventories of physical materials, maps and other key data sets. Starting in FY 2008, and supported by NGGDPP grant funds, DGMR began standardizing and consolidating its data collections into a centralized system called the **Virginia Geologic Information Catalog (VGIC)**. Enhancements including on-line access to this catalog have significantly improved the ability to search for and access geologic information using web-based search tools. In the five year period from FY 2008 to FY 2015, DGMR added 27 prioritized data collections to the VGIC. Feature-specific metadata records

describing these collections were uploaded to the Science Base Catalog at the close of each respective grant year.
`

PURPOSE AND JUSTIFICATION

To better manage the archival of geologic materials and information in the VGIC, and ensure that these resources are readily accessible to customers, DGMR developed a long range data preservation plan. This plan includes best management practices for archival methods, converting key information from non-digital format to digital, developing metadata, enabling web-based access, and participating in the effort to build the National Digital Catalog (now ScienceBase Catalog). Since most geologic information is tied to a geographic location on the earth, DGMR has established the goal of delivering and enabling searches using the VGIC based on key spatial information. A web-based mapping interface powered by ESRI, Flexviewer, enables searches using geographic coordinates, allowing direct access to the information by clicking on points, polygons, and polylines that represent available data. For many commonly requested data sets, DGMR is able to provide scanned digital versions in PDF format. Examples include core logs, seismic lines, sample descriptions, and results of chemical analyses.

The VGIC serves as a database management system for the organization, management, preservation, and distribution of data. Among the many benefits of this system, we find:

- Direct 24x7 access to geologic information on-line;
- Ability to search based on specified geographic locations;
- Access to unpublished and out-of-print data.
- Reduces the response times to customer requests;
- Reduces the costs of data handling, copying, and shipping.

STRATEGY FOR LONG-TERM DATA PRESERVATION

The work accomplished to date has effectively advanced DGMR's long range data preservation goals, which are:

1. Data collections will be preserved for future generations;
2. Data collections will be organized and stored in a secure and accessible manner;
3. Data collections will be incorporated into the Virginia Geologic Information Catalog;
4. Data collections will be standardized, consolidated, and normalized;
5. The Virginia Geologic Information Catalog will be accessible on-line.

This project ensures that all of DGMR's geologic information is preserved, standardized, and accessible to its customers in a secure, robust relational database that is readily queried using keywords and geographic coordinates.

FY2014 GOALS

For FY 2014 (September 1, 2014 to August 31, 2015) DGMR proposed to expand the VGIC by adding a collection of site-specific large-scale geologic cross-sections composite sheets from the Virginia Department of Transportation (VDOT). These sections contain extensive core, auger, and split-spoon logs, providing a unique record of subsurface geological and geotechnical data along roadways throughout Virginia. The thousands of feet of vertical subsurface data represents millions of dollars of investment in data acquisition by VDOT that would otherwise have been lost (Figure 1).The sections are useful as indicators of subsurface geology in large parts of Virginia that have yet to be mapped in detail, and will aid geologic mapping in areas where outcrop is sparse.

Figure 1 :Mylar sheets from VDOT

All metadata developed for this project was to comply with the USGS National Catalog Metadata Products requirements. Building upon the work accomplished as part of the NGGDPP-supported programs in FY 2007 through FY 2012, the activities for work proposed for FY 2014 included the tasks listed below:

NGGDPP Objective – Create Metadata

a. Review native format, scan and digitally convert, edit data records for accuracy and completeness.
b. Georeference each composite sheet.
c. Collect pertinent data such as depth-to-bedrock and lithology.
d. Create a layer in our Flexviewer online tool to disseminate the data with links to the scanned composite sheets.
e. Develop feature-specific metadata (meeting National Digital Catalog Metadata standards) for the collection. Upload metadata records to the ScienceBase Catalog using the established procedure.

f. Complete and deliver Final Technical Report that summarizes all activities and accomplishments for FY 2014.

FY2014 RESULTS

NGGDPP Objective – Create Metadata

The collection targeted for preservation and metadata creation in FY 2014 included large-scale geologic cross-sections from the Virginia Department of Transportation (VDOT). The Mylar composite sheets were scanned (Figure 2),georeferenced, indexed and metadata created using the specified attribute fields and guidelines provided in the USGS document *Metadata Profile for the National Digital Catalog*.

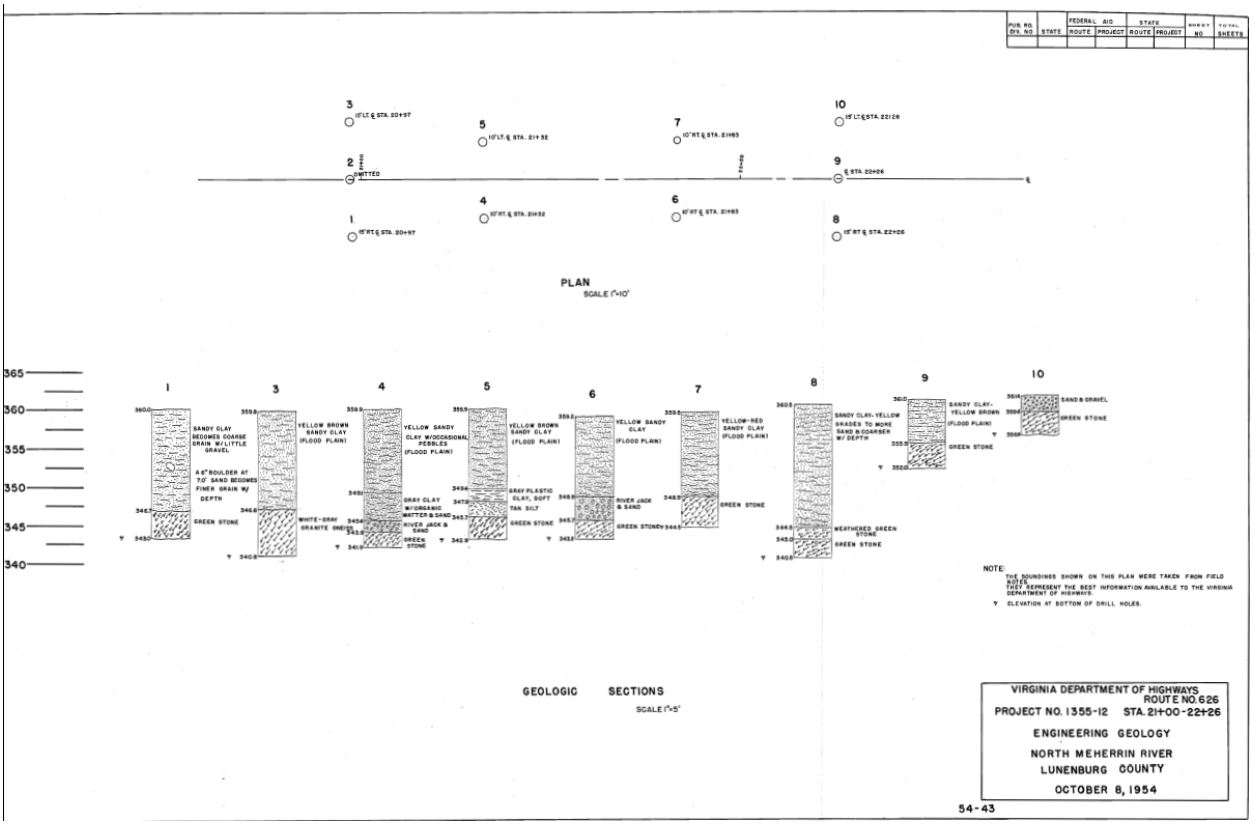

Figure 2: Sample scan of composite sheet

The dataset will be made available through our Flexviewer (ESRI) tool on our website, including hyperlinks to the pdf version of the scanned composite sheet.

The metadata records were submitted to the USGS in the CSV file format at the close of the FY2014 grant year. Nine (9) files were uploaded for each of the 9 VDOT districts. Though we originally estimated 4,700 geological profiles, there were almost 1,000 more sheets, all of which were completed. A total of 5,500 records were uploaded to the ScienceBase Catalog (Figure 3).

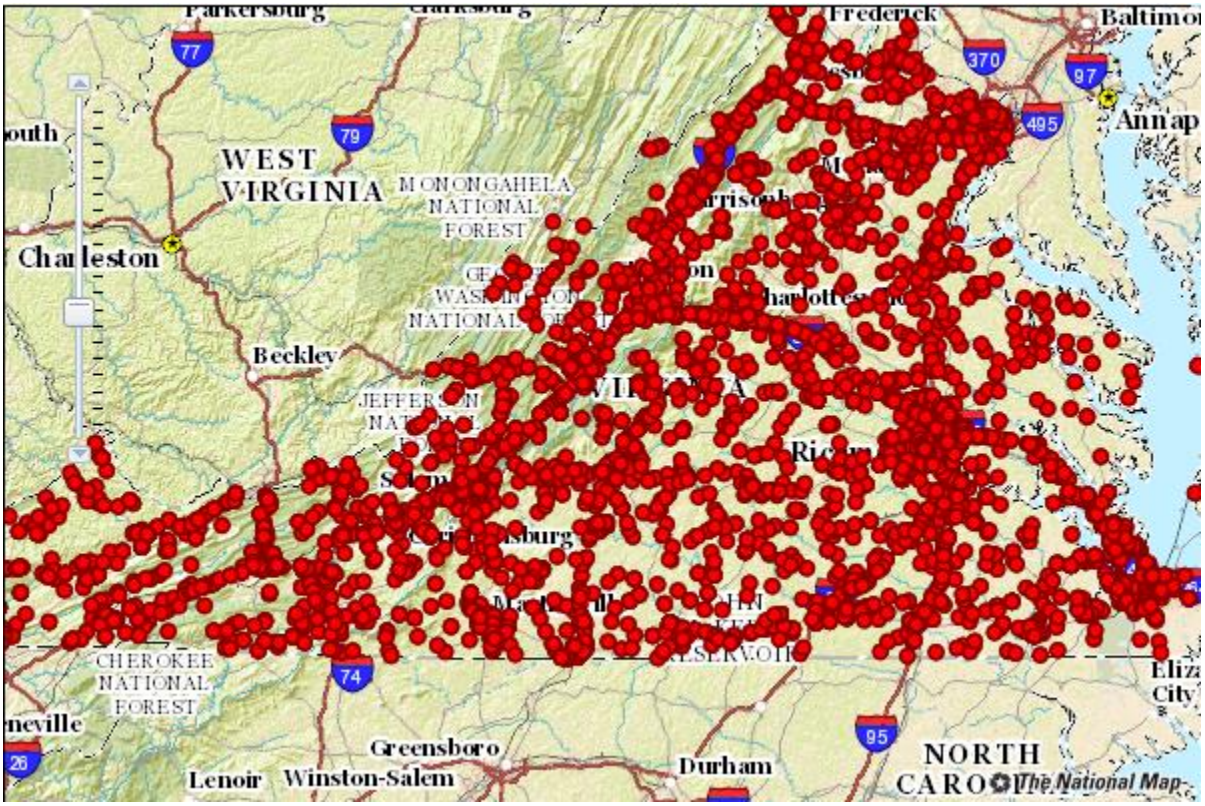

Figure 3: Geologic Sections Collection in ScienceBase

Table 1 shows the current status of Virginia's data collections in the USGS ScienceBase Catalog and indicates the number of uploaded records for each of the prioritized collections.

NGGDPP Collection ID	***Collection Name***	***Number of metadata records uploaded***	***Year uploaded***
P0826	**Fossil repository**	**1,141**	**FY 2010**

P1233	**Well cuttings**	**7,376**	**FY 2010**
P1246	**Historic uranium exploration information**	**1,320**	**FY 2010**
P0637	**Rock cores**	**447**	**FY 2008**
P1229	**Rock (specimen) repository**	**7,712**	**FY 2008**
P1231	**Historic topographic maps**	**313**	**FY 2011**
P1232	**Historic photographs**	**9,180**	**FY 2011**
P1111	**DGMR Publications Index**	**5,237**	**FY 2008**
P0830	**Rock thin sections**	**4,525**	**FY 2012**
P0835	**Carbonate geochemical database**	**6,193**	**FY 2009**
P0836	**Aerial photographs**	**7,622**	**FY 2011**
P0838	**Silica sample analyses**	**51**	**FY 2012**
P0839	**Clay sample analyses**	**870**	**FY 2012**
P0840	**Geophysical data**	**1,734**	**FY 2009**
P0841	**Borehole database**	**6,721**	**FY 2009**
P0843	**Sinkhole maps**	**336**	**FY 2010**
P1362	**Mineral resources inventory (MRV)**	**10,442**	**FY 2009**

P1442	**Unpublished geologic maps**	**670**	**FY 2008**
P1653	**Coal quality database**	**401**	**FY 2009**
	UVA Mineral and Rock Collection	**6,273**	**FY 2012**
	Economic Geology Mineral Resources Files	**256**	**FY 2012**
	Geologic Sections	**5,500**	**FY 2014**
TOTAL		**84,320**	

2015-2016 WORK PLAN

The USGS NGGDPP award for 2015-2016 will allow us to continue our data preservation efforts.

- The first project addresses an existing inventory of approximately 160 DGMR open-file reports (OFR) that are presently in paper format only. These reports, authored between 1936 and 2005, include text narratives, graphs, chemical reports, cross sections, and maps at various scales.
- The second project addresses an existing collection of approximately 265 unpublished geologic field notebooks and maps that represent nearly 100 years of field data collection by Virginia geological survey staff.
- The third project will rescue rock cores that are presently stored at Virginia Tech in Blacksburg, Virginia and are at significant risk of deterioration or complete loss.