United States Geological Survey

National Geological and Geophysical Data Preservation Program

Final Technical Report

"Geological and Geophysical Metadata Development & Publication"

Performed by the Kansas Geological Survey

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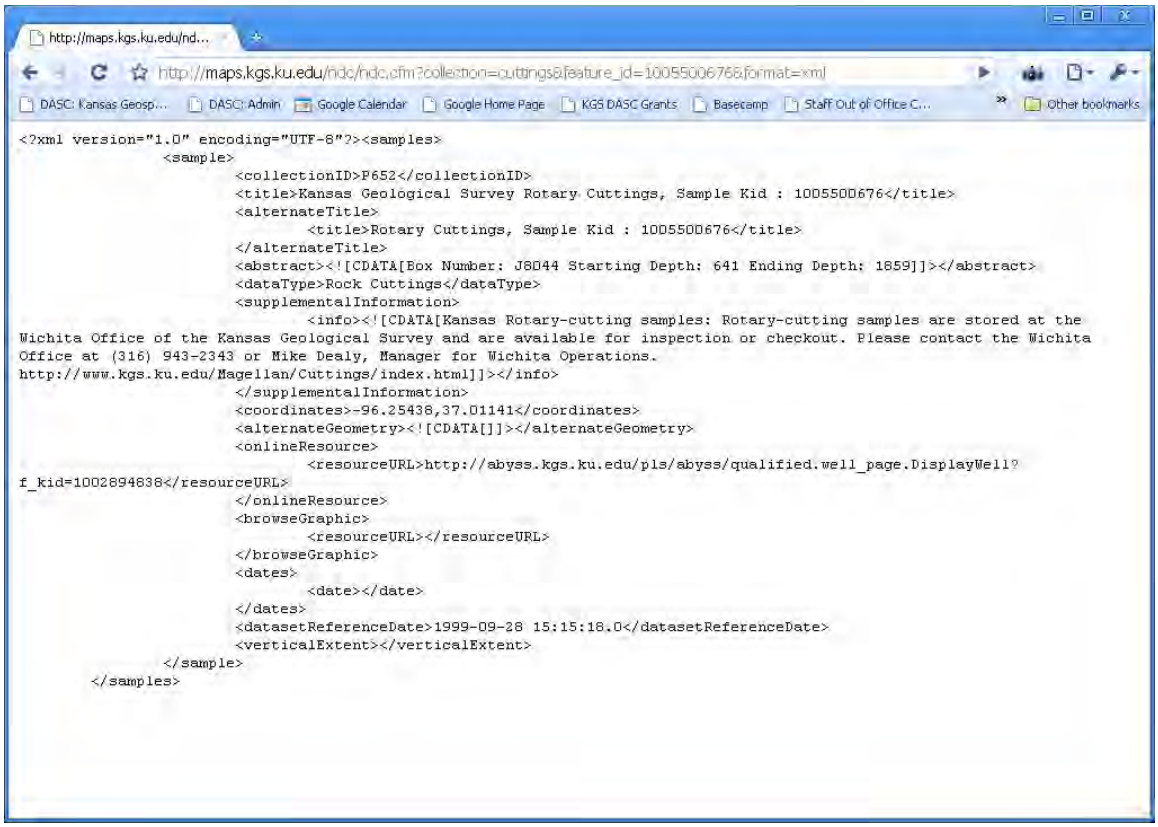
As identified in the statement of work, the Kansas Geological Survey has produced the following deliverables for the 2008 National Geological and Geophysical Data Preservation Program (NGGDPP) grant entitled *'Geological & Geophysical Metadata Development and Publication'*. The items below follow the list of deliverables identified in the original proposal submitted the USGS data preservation program.

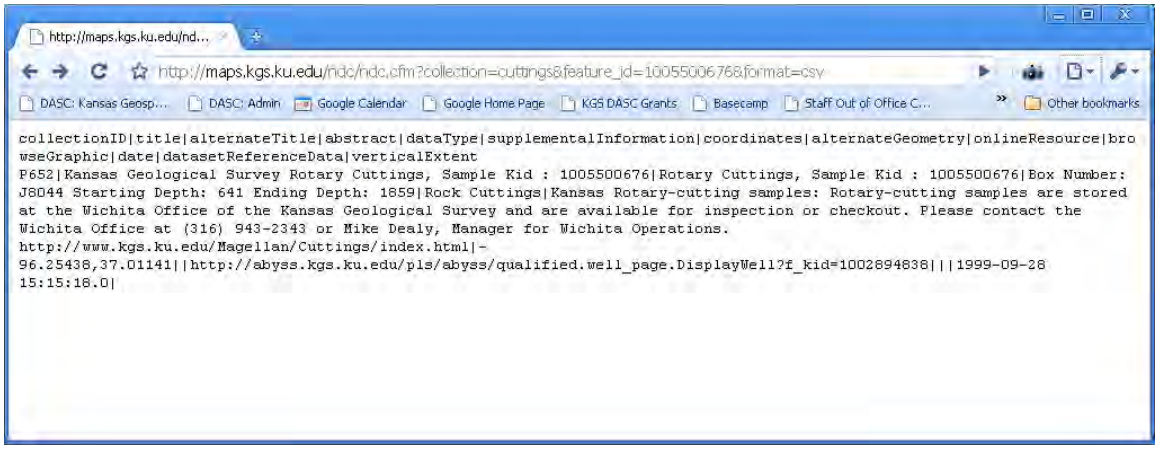
1. REST-based web service for providing access to site-level metadata records in XML format

REST stands for Representational State Transfer and implies a simple method of transferring data via HTTP without an additional messaging layer such as Simple Object Access Protocol (SOAP). While the term REST is unfamiliar to some, its concepts are commonly employed in web-based applications. The REST-based web service developed for this project provides access to metadata records through simple Uniform Resource Locator (URL) calls. The web service allows the user to specify the collection (cores, cuttings, or type sections), the ID of the feature, specify a date range, and format of the output – eXtensible Markup Language (XML) or Comma Separated Values (CSV).

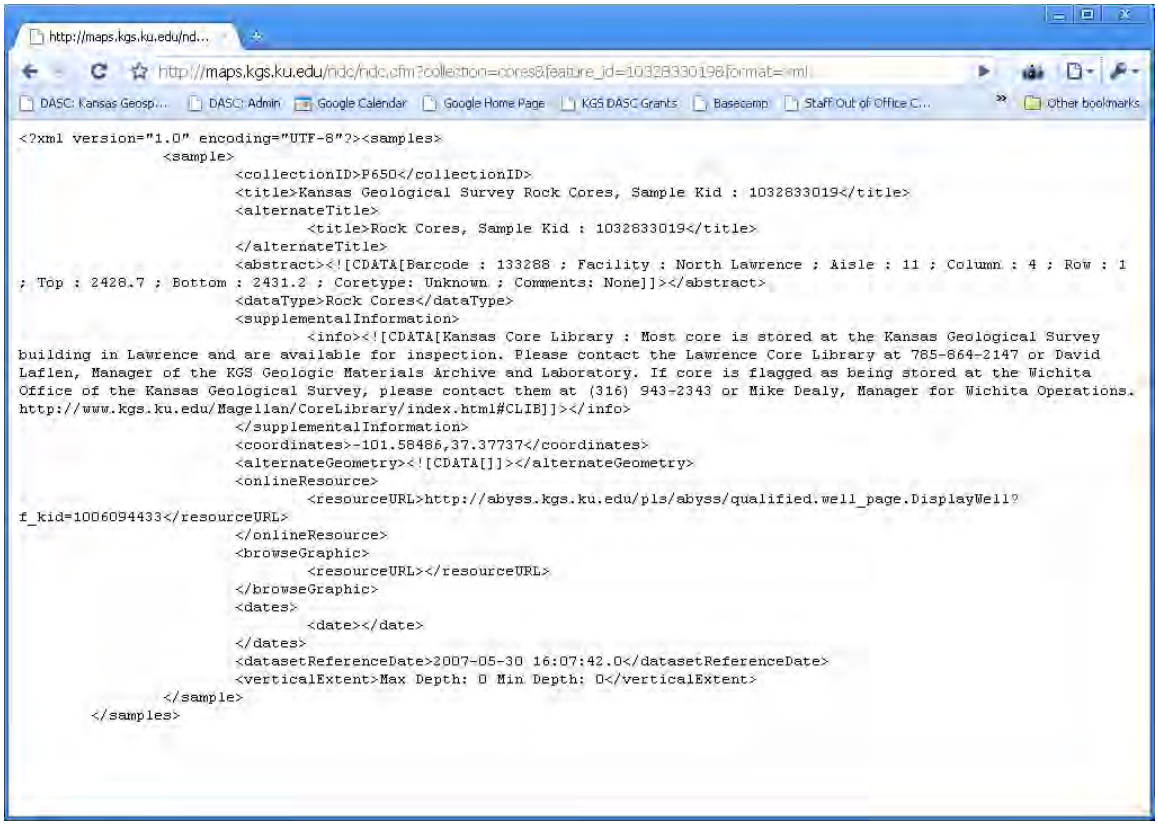
http://maps.kgs.ku.edu/ndc/ndc.cfm?collection=cuttings&feature_id=1005500676&format=xml



http://maps.kgs.ku.edu/ndc/ndc.cfm?collection=cuttings&feature_id=1005500676&format=csv



http://maps.kgs.ku.edu/ndc/ndc.cfm?collection=cores&feature_id=1032833019&format=xml



2. Metadata records for the following collections - rock cores, rock cuttings, and type stratigraphic sections

All metadata records provided via the web service conform to the *Metadata Profile for the National Digital Catalog, Version 1.0.* Additionally, an extract of all records for each collection (cores, cuttings, and type sections) is available for download in both XML and CSV format from the following location:

XML

`http://maps.kgs.ku.edu/ndc/downloads/type_Sections_xml.zip`

`http://maps.kgs.ku.edu/ndc/downloads/cores_xml.zip`

`http://maps.kgs.ku.edu/ndc/downloads/cuttings_xml.zip`

CSV

`http://maps.kgs.ku.edu/ndc/downloads/type_Sections_csv.zip`

`http://maps.kgs.ku.edu/ndc/downloads/cores_csv.zip`

`http://maps.kgs.ku.edu/ndc/downloads/cuttings_csv.zip`

3. WFS access to site level data/metadata for the collections identified above

Open Geospatial Consortium (OGC) compliant Web Mapping Services (WMS) and Web Feature Services (WFS) have been created for each collection (cores, cuttings, and type sections) to enable the association of geospatial locations with the sites, allow for integration of geographic display within WMS/WFS-compatible GIS software, and provide a web-service mechanism for spatial queries to the database. The following URLs are the REST endpoints to the map services in both their native ArcGIS Server format, as well as the OGC WMS/WFS formats.

Cores Collection

ArcGIS Native Map Service:
http://giselle.kgs.ku.edu/arcgis/rest/services/DataPreservation/cores/MapServer
OGC WMS:
http://giselle.kgs.ku.edu/arcgis/services/DataPreservation/cores/MapServer/WMSServer?request=GetCapabilities&service=WMS
OGC WFS:
http://giselle.kgs.ku.edu/arcgis/services/DataPreservation/cores/MapServer/WFSServer?request=GetCapabilities&service=WFS

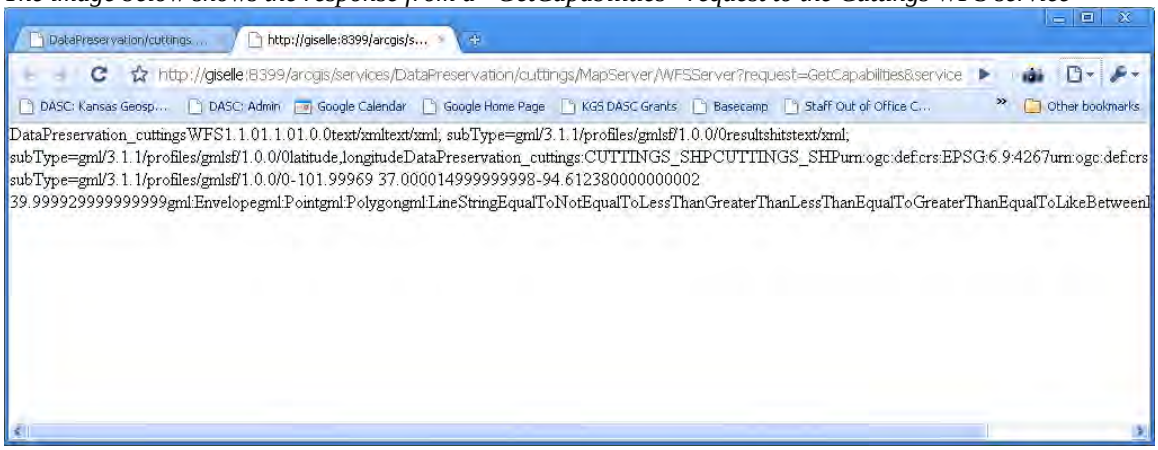
Cuttings Collection

ArcGIS Native Map Service:
http://giselle.kgs.ku.edu/arcgis/rest/services/DataPreservation/cuttings/MapServer
OGC WMS:
http://giselle.kgs.ku.edu/arcgis/services/DataPreservation/cuttings/MapServer/WMSServer?request=GetCapabilities&service=WMS
OGC WFS:
http://giselle.kgs.ku.edu/arcgis/services/DataPreservation/cuttings/MapServer/WFSServer?request=GetCapabilities&service=WFS

Type Sections Collection

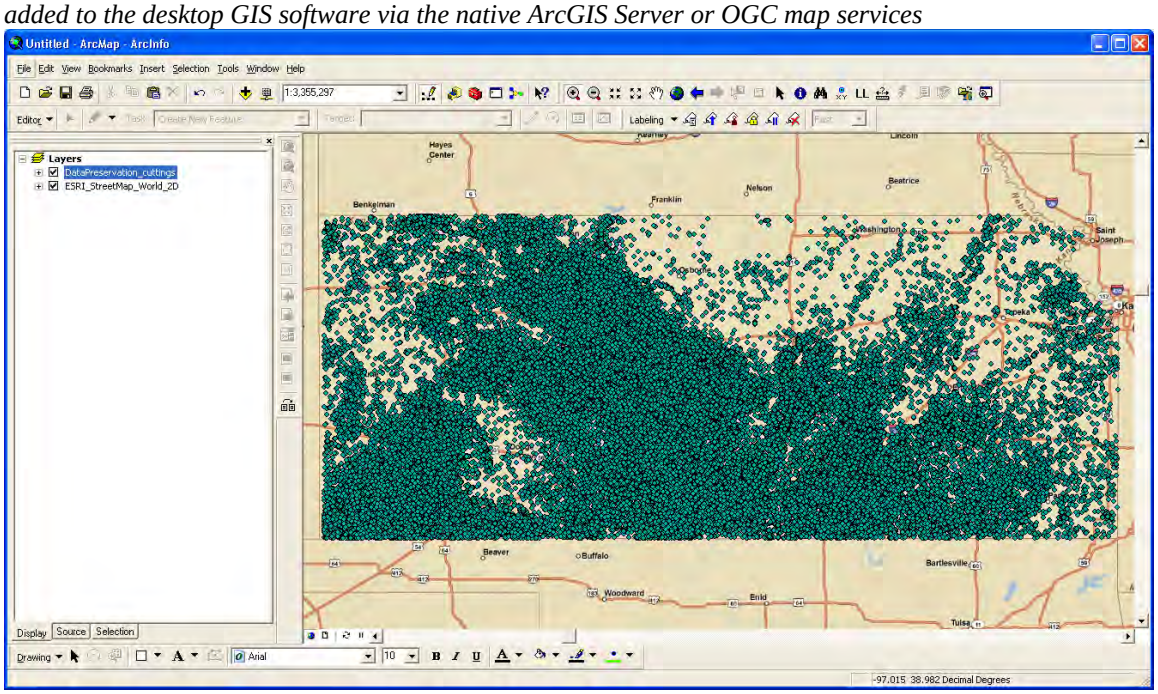
ArcGIS Native Map Service:
http://giselle.kgs.ku.edu/arcgis/rest/services/DataPreservation/cuttings/MapServer
OGC WMS:
http://giselle.kgs.ku.edu/arcgis/services/DataPreservation/cuttings/MapServer/WMSServer?request=GetCapabilities&service=WMS
OGC WFS:
http://giselle.kgs.ku.edu/arcgis/services/DataPreservation/cuttings/MapServer/WMSServer?request=GetCapabilities&service=WFS

The image below shows the response from a "GetCapabilities" request to the Cuttings WFS service



Desktop GIS software integration via map services:

The image below shows the cuttings collection map service added to an ArcMap Project. The data can be added to the desktop GIS software via the native ArcGIS Server or OGC map services

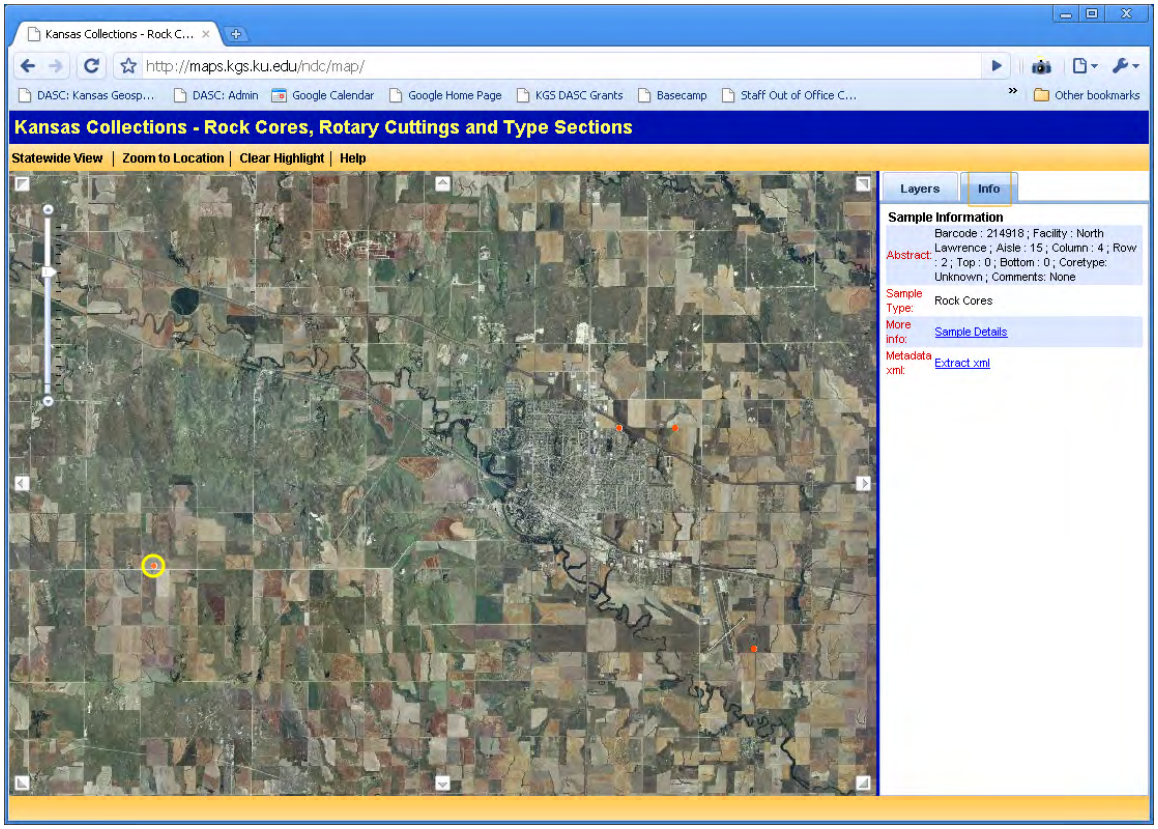


4. Integration of XML records into related applications on the KGS web site;

The KGS has an extensive web site, including numerous database-driven applications. The REST-based web service developed under this project provides an ideal mechanism for integrating NGGDPP metadata records into existing web sites and applications. Since the web services already utilize the KGS primary record ID within the web service URL, linking from an existing application to the REST-based web service to return the metadata, in either XML or CSV format, is rather simple.

5. Web-based mapping application

A lightweight web-based mapping application was also developed that provides a simple geographic interface to the collection data. Utilizing ESRI's ArcGIS Server technology and the JavaScript Automated Programming Interface (API), the web mapping application provides basic pan, zoom, and identify functionality, and links to the metadata records developed for the *National Digital Catalog*. The URL to the interactive mapping application is http://maps.kgs.ku.edu/ndc/map



6. On-the-fly GIS database (Shapefile) extract capabilities with hyperlink to REST-based metadata service;

A database extract routine was developed to provide the location of the collection data in Shapefile format to support utilization of the data within desktop GIS software. To enable access to the NGGDPP metadata, an attribute item was added to the Shapefile that contains a hyperlink to the REST-based web service that provides the metadata in XML format. The Shapefiles can be downloaded from the following location:

`http://maps.kgs.ku.edu/ndc/downloads/type_Sections_shp.zip`

`http://maps.kgs.ku.edu/ndc/downloads/cores_shp.zip`

`http://maps.kgs.ku.edu/ndc/downloads/cuttings_shp.zip`

7. Full documentation of technical methodologies for items listed above

The enclosed report provides an overview of the associated technologies used provide the deliverables under this agreement. KGS would be happy to provide additional detail regarding the various technical components of this project upon request.

Integration, maintenance, and update of metadata records with the *National Catalog*:

The metadata records for each collection (cores, cuttings, and type sections) have been uploaded to the *NGGDPP Item Metadata Upload website* in XML format. KGS will provide incremental updates to the metadata records on a quarterly basis. It is also important to note that the web services developed under this project connect to the live KGS database, and, therefore, will always reflect the most current version of the database and metadata records.