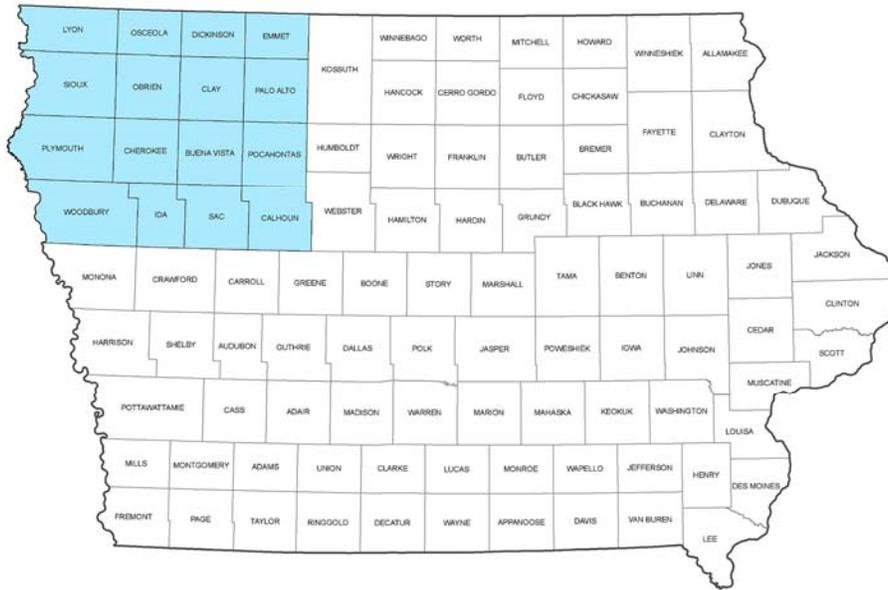


Metadata for Iowa Geologic Data Collections and Northwest Iowa Additions



**IGWS Contract Report
National Geologic and Geophysical Data Preservation Program
United States Geological Survey Grant # 08HQGR0129**

**Iowa Geological and Water Survey
Iowa Department of Natural Resources**

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Introduction

This report documents the development of National Geologic and Geophysical Data Preservation Program-standard metadata for the physical and electronic data collections maintained by the Iowa Geological and Water Survey (IGWS); and the conversion of data held as paper records to electronic formats for sixteen counties in northwest Iowa. This work was conducted as part of the U.S. Geological Survey - National Geological and Geophysical Data Preservation Program (NGGDPP), under award #08HQGR0129 for 2008.

IGWS and Geologic Data Storage

The IGWS was established as the Iowa Geological Survey (IGS) in 1892. After periods of being part of the University of Iowa and later an independent state agency, IGS became part of the newly formed Iowa Department of Natural Resources in 1986. In 2008 the survey changed its name to Iowa Geological and Water Survey to reflect the agency's long-term role as the state's lead earth and water science agency.



Figure 1. IGWS Oakdale laboratory and sample repository building.

IGWS occupies two building on the University of Iowa Campus. Most staff offices are located in Trowbridge Hall on the main campus of the University which is shared with the Department of Geosciences. The laboratory and sample storage building is located on the University's satellite Oakdale Campus. The 11,000-square foot Oakdale building (fig. 1), built in 1977, functions as the repository for most physical geologic material storage, such as cores, cuttings, and hand samples. Sample preparation, cataloging, and

descriptions as well as a variety of laboratory work is carried out at the Oakdale building. The Oakdale facility provides storage space for the bulk of the paper files that document the physical collections. In addition a wide variety of older paper files and unpublished and archived maps are stored at the Oakdale facility.

The majority of the most critical and widely used information for the state, mainly from cores and well cuttings, logs, and construction data, are electronically held in the IGWS Geologic Sample Database (GEOSAM) as a combination of a relational database developed to reflect the site-based nature of the data and electronic documents. Access is provided through a web-based interface (<http://www.igsb.uiowa.edu/webapps/geosam>) which provides tools to query the database and view the electronic documents. GEOSAM and GEOSAM-compatible databases form the backbone of the current IGWS data preservation system and its ongoing preservation plan.

Summary of 2008 Grant Activities

IGWS included the following in its 2008 NGGDPP grant proposal:

- Develop metadata, in accordance with National Catalog standards, for all current GEOSAM sites
- Establish locations as needed for physical and paper data collections from sixteen counties in Northwest Iowa (fig. 2) that were not held in GEOSAM.
- Make any needed changes to GEOSAM to accommodate different site/data types.
- Move these locations and site types to GEOSAM. Develop metadata for these additions.
- Submit all developed metadata to the National Catalog

The data collections planned for addition to GEOSAM from Northwest Iowa included:

- Outcrop records/descriptions from publications, field notes, and other sources.
- Physically archived hand specimens and bagged quaternary specimens.
- Mechanical and clay mineralogical data for Quaternary materials
- Thin sections
- Geochemical Analyses consisting primarily of general and contaminant groundwater analyses
- Municipal water supply well information

Of these collections, the need for three minor changes to the original plans became apparent during the work. First, the concept of “municipal water supply well information” as a separate “collection” became illogical, as data from these wells was already included in other collections –cuttings, cores, construction data—that were already present in GEOSAM., or contained in new collections such as groundwater quality analyses. So while a variety of municipal well data from Northwest Iowa was added to GEOSAM, “municipal water supply wells” are not reported as a separate collection. GEOSAM is searchable by a variety of criteria such as “well type”, which includes a municipal well category. Second, little in the way of “mechanical or clay-mineralogical data for Quaternary materials” was found to be archived for this part of the state. Most of IGWS Quaternary studies have focused on the central and eastern parts of

the state and we will likely populate this collection when those parts of the state are being done. Third, we added a “Field Notes” collection to the NGGDPP on-line inventory. This collection had been overlooked and/or included in other collections during our initial inventory, and it became apparent it should be handled separately.

Summary of project results

NGGDPP Metadata Development

The IGWS collections defined for NGGDPP are broadly defined and may include physical samples, derived data, and documents. Iowa’s data was prepared in XML format as the bulk of the data from which metadata was extracted is stored in SQL Server databases. XML was selected over a delimited text format as the simpler of the formats to develop from a relational database. The necessary relationships between tables and views are modeled as views/queries for output to the required format from this source as described below.

Metadata preparation was carried out as follows:

- 1) SQL server tables, views and custom functions needed to produce the necessary text strings and were developed.
- 2) Develop queries to select the data from the views prepared in step one to a temporary XML-type data item then export this data item to a text-based XML file
- 3) When the text-based XML was successfully exported it was validated against a simple “noNamespace” schema with a simple Visual Basic program.
- 4) When the local validation was successful, the file was upload to the NGGDPP site and the validity of the XML tested using the tool available there.
- 5) Following successful validation with the NGGDPP-provided tool, a request was made to the DBA to load the data into the catalog.

The NGGDPP metadata elements are listed in table 1, along with a description of the data items provided for each element. In instances where required data elements were not available, metadata records were not prepared, e.g. if latitude and longitude had not been stored for a data item, the item was omitted from the metadata.

The IGWS metadata supplies data for the optional items in some cases. For most collections, optional items were either populated for all records or no records. For example, the optional item, verticalExtent, is populated for most collection, but was omitted for the Geochemical Samples collection (water quality) as not relevant to the data being presented. In other cases, the optional items were populated where the data to be supplied was available.

Table 1. Description of metadata elements developed from IGWS data.

Tag/Data Element	Description of data supplied
collectionID	Collection ID from previously defined Iowa NGGDPP collections
title	Name of collection and IGWS identifier for the sample/log
alternateTitle	
abstract	General descriptive information about the site and/or data item including identifier and site type. Other information, depending on the collection being documented, includes total depth, sample depth, completion date, collection date, aquifer, and log or
dataType	NGGDPP catalog supplied values
supplementalInformation	Statement concerning archive location of samples/logs and a URL where additional information may be accessed.
coordinates	Longitude and latitude in decimal degrees (NAD83) derived from coordinates stored in Geologic Sample Database (Geosam)
alternateGeometry	County, tier, range, section, and quarter sections for sites where this information is available.
onlineResource/resourceURL	
browseGraphic/resourceURL	not used
dates/date	Last update of the record for some collections; sampling date for some collections
datasetReferenceDate	The date the metadata for the collection was prepared.
verticalExtent	Total depth supplied for wells, length of section measured/described for field notes

***bolded** elements indicate required data

Additions to IGWS Collections for Northwest Iowa

Sixteen counties in Northwest Iowa (fig. 2) were selected for more focused development of digital data from samples not yet completely cataloged in IGWS databases or from archived documents. Samples that were cataloged for the area and paper records converted to digital formats included the following:

- Field notes / measured section descriptions from 106 locations. Notes scanned and in GEOSAM.
- Hand specimens from 23 locations (some multiples per location). Descriptive information in GEOSAM.
- Thin sections from 90 locations (some multiples per locations). Descriptive information in GEOSAM-compatible format. Will be integrated into GEOSAM.
- 3,991 groundwater chemical analyses. Compiled and entered into GIS-based data incorporating identifiers that link directly to GEOSAM.
- Well logs from 3,176 locations. Scanned and stored as .pdf-format documents, added to the document store associated with GEOSAM.

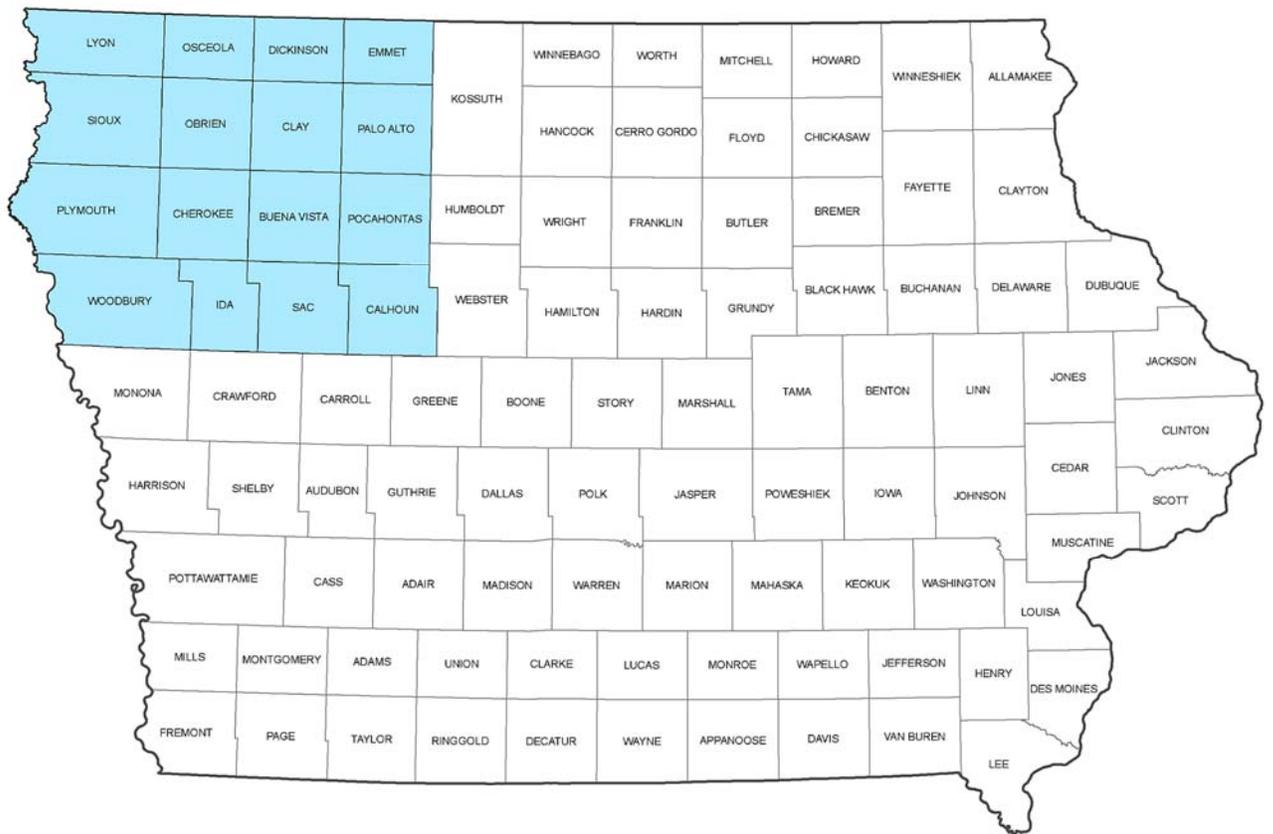


Figure 2. Northwest Iowa study area.

Metadata records from GEOSAM added to the National Catalog

Metadata describing the information held in GEOSAM were loaded into the National Catalog in October, 2009. This number of data items included in the metadata are summarized by collection as follows:

Well Logs	50,995 records
Well Cutting Samples	34,611 records
Rock Cores	1,612 records
Geochemical Analyses	20,022 records
Thin Sections	137 records
Hand Specimens	248 records
Field Notes / Measured Sections	944 records

Note: these totals reflect holdings that previously existed in GEOSAM as well as the additions for the 16-county block of Northwest Iowa.

Award 2008 Summary and Award 2009 Plans

The goals proposed for the 2008 project year were met with the minor changes described above. Metadata was created for most collection types described for Iowa. The IGWS sample management database underwent modifications to accept new data types.

For the IGWS 2009 award from NCGDPP, the focus on developing digital data from paper archives will shift to a block of twenty-four counties in Southwest Iowa. Updated metadata will be developed near the end of the project period to replace the records provided in 2009. Work to improve integration of the new digital data types into GEOSAM will continue as needed.