

## **FINAL TECHNICAL REPORT**

### **Indexing and Inventorying the Lake Superior Legacy Collection – FY2013**

**Program Announcement No. G13AS00013  
Grant / Cooperative Agreement No. G13AP00093**

**Project Period: September 1, 2013 – August 31, 2014**

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#### **Abstract:**

Roland D. Irving, Wisconsin's first true geologist, established the Lake Superior Division of the USGS in 1882. As head of the division, Irving began a detailed survey of the Upper Midwest during which he and his protégé, Charles Van Hise, pioneered the application of microscopic petrography. The Division's fieldwork continued long after Irving's untimely death in 1888, and in the course of 40 years of investigation and research the Survey geologists published nine monographs, three bulletins, and a professional paper. The raw data used to produce these influential works makes up the Lake Superior Legacy Collection and currently consist of approximately 400 field notebooks, 62 maps, 9,800 hand samples, 15,500 thin sections, and 37 ledgers containing a specimen catalog, macroscopic and microscopic lithologic descriptions, and chemical analyses. For the second year of this project, staff and students at the Wisconsin Geological and Natural History Survey have built upon the work completed during the first year. We have created metadata giving the location information for an additional 2,040 hand samples and 2,603 thin sections in our possession. We have, in partnership with the UW Digital Collections, scanned an additional 36 field notebooks and four ledger books of lithological descriptions. We have created metadata for an additional 140 field notebooks, and we have made extensive revisions and corrections to the collection's database.

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## Introduction:

The Wisconsin Geological and Natural History Survey received a grant for FY 2012 from the United States Geological Survey's (USGS) National Geological and Geophysical Data Preservation Program (NGGDPP) to inventory and index the Lake Superior Legacy Collection. During that year, we completed a comprehensive inventory of the collection, created a database to index its various parts, and scanned and placed online approximately 45 field notebooks. We uploaded to the National Data Catalog 6,058 metadata records for hand samples and 8,056 metadata records for thin sections. But at the end of the year, there was still much to do to provide access to this collection. We still had approximately 1,500 thin sections without location information, approximately 300 notebooks in need of metadata creation, and had scanned and placed online only approximately ¼ of the notebooks. A complete inventory of the collection was attached to the FY 2012 technical report. We have attached it to this report as well with an added column showing our progress in creating metadata and a digital infrastructure for each part of the collection.

For FY 2013, we were awarded a similar grant to continue this work. A proposal for a work plan and budget was submitted in March, 2013, and revised in July 2013, for the 12-month period beginning September 1, 2013, and ending August 31, 2014.

For the proposal, we outlined the following goals:

1. Inventory and index:

At the end of FY 2012, we had 1,465 thin sections with no location information, and an additional 5,011 located only at the state level. We proposed to attempt to locate, to the best of our ability, all thin sections from the major research areas of Michigan, Minnesota, and Wisconsin. We also proposed to contact geoscience departments in our region that may possess parts of the collection of hand samples for the purpose of adding locations outside the Survey to our records and to solicit an evaluation of our digital indexes.

2. Create metadata:

We proposed to create metadata, to the best of our ability, for the physical samples, mostly thin sections, that we were unable to create in FY 2012. We also proposed to create metadata for field notebooks that would be scanned as part of this project. We proposed to load this metadata into three databases: the Survey's database dedicated to this collection; GeoBase, the Survey's internal geological database; and the National Digital Catalog.

3. Create digital infrastructure:

We proposed to have approximately 30 field notebooks and four books of lithological descriptions scanned and placed online in conjunction with our digital environment

partner, the University of Wisconsin-Madison Digital Collections (a total of approximately 3,000 pages).

Issues noted in last year's technical report:

--Location corrections: Some of the metadata we intended for inclusion in the NDC in fiscal year 2012 was not uploaded due to problems with conversion. The most common problem was more than one number in the section, township or range field. We noted in last year's technical report that these problems would be addressed in 2013.

--Large scale maps: We discovered a set of approximately 60 large scale maps shortly before the end of FY 2012. We made a cursory index of them and noted that they would be integrated more fully into our digital infrastructure in 2013.

## **Assessment of FY 2013 Accomplishments Relative to Work Plan**

### **1. Inventory and Index**

At the end of FY 2012, approximately 5,500 thin sections and approximately 3,000 hand samples in our possession had little or no location information. Through a combination of careful digging through the Lake Superior Division's paper records and correcting errors and inconsistencies in our records, we were able to provide locations for an additional 1,600 thin sections and 1,400 hand samples. Unfortunately, as we now have exhausted the information in the paper records, whatever of these samples we have not located, or located only at the state level, will likely remain so. However, this is not necessarily as bad as it may seem. As stated in last year's report, the main area of investigation for the Lake Superior Division was Minnesota, Wisconsin, Michigan's Upper Peninsula and Ontario. Ontario does not have a township and range system, and we determined that trying to locate samples outside the United States would not be a good use of our resources. Over 2,000 samples were taken from Ontario, and another 1,000 from states such as New York, Massachusetts, Missouri and Colorado. The thirteen original colonies also do not have township and range systems, and when working in states outside of the major research area, such as Colorado, the geologist often did not note a PLSS location, but gave only names of nearby towns or natural features. (Note: these numbers refer to the hand samples in our possession and those in notebooks for which metadata has been created. We, of course, will not know the full distribution of the samples until metadata has been created for all of the notebooks.) We chose to focus our efforts on samples taken from Minnesota, Wisconsin, and Michigan, partly because these states (along with Ontario) form the core area of the Division's work, and partly because the focus of the WGNHS is Wisconsin geology, so locating samples in Wisconsin and adjacent states fits best with our own mission statement.

Of the 1,700 hand samples without location, or located only at the state level, 541 are from Minnesota, Wisconsin, or Michigan. Of the 4,881 thin sections, 677 are from these states.

The table below tracks the progress we have made attaching locations to specimens in 2012 and 2013.

<b>Sample type</b>	<b>Number in our possession</b>	<b>Located at township-range-section level in 2012</b>	<b>Located at township-range-section level in 2013</b>	<b>Remaining (not located, or state only)</b>
Hand sample	9,798	6,643	1,455	1,700
Thin section	15,540	9,064	1,595	4,881

We have also made a more complete inventory of the large scale maps which were found near the end of FY 2012. Of the notebooks for which metadata has been created, we have identified nine that relate directly to these maps.

We also proposed to contact other geoscience departments and institutions in our region to add potential sample locations outside the WGNHS to our database, and to solicit evaluations of our database. We did contact the geology department of the University of Wisconsin-Oshkosh and have verified that they are in possession of a number of hand samples collected by the Lake Superior Division. However, we had the opportunity to restructure our database in the summer of 2014. This work was carried out nearly to the end of the FY 2013 grant's term. In August of 2014, we sought input from WGNHS geologists not associated with this data preservation project. They tested the database's usability and made suggestions for changes including adding a county field to the location information for each sample. Because these revisions were made so close to the end of the grant's term, we decided to move the sharing of our database with other institutions to FY 2014. This year, we intend to share our database with UW-Oshkosh and request an evaluation from their faculty. A more detailed description of our database restructuring can be found in our discussion of goal two: create metadata.

## **2. Create metadata**

We have created NDC compliant metadata for the 1,455 hand samples and 1,595 thin sections that were located in 2013. In addition, in last year's technical report, we noted that some of the metadata we intended to upload to the NDC failed to convert from township and range to latitude-longitude, and that the reason for this failure was mainly due to there being more than one number in the township, range, or section field. (Locations had been often entered this way when a sample was shown on a map to lie on a line separating two sections, townships, or

ranges.) As we went through the database to correct this error, we noticed other errors, typos, and misspelling, so in the winter of 2014, we proofread the entire database. During this process, we were able to add some missing locations, and, as a result, we have corrected metadata for an additional 585 hand samples and 1,008 thin sections. In November, 2014, Pete Schoephoester, our GIS specialist, converted our metadata to XML and uploaded it to the Catalog. We have also added these records to GeoBase, WGNHS's database of geological samples, well records and logs.

Below is a table showing our respective progress on uploading metadata records in 2012 and 2013. Again, for reasons outlined in the above section, it is unlikely that any further records from this collection will meet the criteria for uploading to the NDC.

<b>Sample type</b>	<b>Number in our possession</b>	<b>Number of records uploaded to NDC in FY 2012</b>	<b>Number of records uploaded to NDC in 2013</b>	<b>NDC collection loaded into</b>	<b>Number of records not loaded</b>
Hand sample	9,798	6,058	2,040	P517	1,700
Thin section	15,540	8,056	2,603	P1590	4,881

In addition to metadata for our physical samples, we have also created metadata for approximately 140 notebooks (which reflects metadata for about 11,900 hand samples, though many of these samples are not in our possession). The metadata extracted from the notebooks includes, author, year the book was written, and an entry for each sample giving its location, rock type, state, informal location, and the page number on which the sample is described. By doing so, we provide to potential researchers access to the geologists' work even if we do not possess the physical sample described in the notebook. We intended to progress through this metadata as the notebooks were scanned, but, largely thanks to a few students accomplishing an extraordinary amount of work, the creation of metadata is now far ahead of the scanning process. While we have notebooks 1-108, plus those authored by Charles van Hise scanned and online, we have created metadata for notebooks 1-325. The table below shows the progress we have made in recording metadata from the notebooks over the last two years.

<b>Field notebooks in our possession</b>	<b>Numbers for which metadata was recorded in 2012*</b>	<b>Numbers for which metadata was recorded in 2013*</b>	<b>Number of notebooks w/ unrecorded metadata</b>
409	1-45	46-325	142
	Also, 65 notebooks authored by Charles Van Hise		

\*Note: These are the numbers that appear on the notebooks' spines. Missing notebooks and Van Hise notebooks are excluded.

We have also loaded the index of large scale maps into a table in the database dedicated to the Lake Superior Legacy Collection.

In addition to extensive proofreading, we have also given our database a complete overhaul. Because the USGS NNGDPP grant allowed us to continue work on this project, we were able to secure the skills of Hanwen Dong, a library school student at UW-Madison engaged in an independent study on the design and construction of databases. Hanwen worked on the database through the summer of 2014 cleaning up data, importing new data from spreadsheets, and normalizing and linking the tables. Before Hanwen worked on it, most of the data was contained in a single sprawling table with a few ancillary tables and very few points at which the data was linked together. We also had a table of notebook metadata that repeated information contained in the main table, such as PLSS location, state, rock type and notes. Hanwen and Pete Schoephoester worked together to make the database easier to manage and easier to use, discarding repeated information and linking the tables with identifiers. The Lake Superior Legacy Collection database now is comprised of three main tables, with two smaller tables for notebooks and maps. The three main tables are:

1. Sample—this table provides information common to both thin sections and hand samples including its location, rock type, and notebook and page number of its description.
2. Hand sample—this table provides information relating only to the hand sample, namely its hand sample number, whether or not WGNHS is in possession of the sample, and if so, its location in our research facility.
3. Thin section—as with the hand sample, this table provides the thin section number, whether or not we are in possession of the section, and its location in our research facility.

These three tables are tied together by a sample ID. This structure allows us to make changes to sample information in one table while assuring that all information about a sample will be tied to one unique identifier.

The notebook table ties samples to their respective descriptions in the field notebooks. It contains the notebook number, author, and year written. This table is tied to the sample table with unique notebook identifiers. The maps table gives a PLSS location for each map, and a title, scale and Lake Superior Division number where that information was available.

### 3. Create Digital Infrastructure

We delivered an additional 3000 pages to the UW-Madison Digital Collections to be scanned. These consisted of 36 field notebooks and four ledger books of microscopic/macrosopic lithological descriptions. All six books of the lithological descriptions in our possession are now available online. The table below shows the progress of field notebook scanning in 2012 and 2013.

<b>Field notebooks in our possession</b>	<b>Numbers scanned prior to the Lake Superior Legacy project</b>	<b>Numbers scanned in 2012*</b>	<b>Numbers scanned in 2013*</b>	<b>Count of notebooks that have not been scanned.</b>
409	65 notebooks authored by Charles Van Hise**	1-45	46-108	267

\*Note: These are the numbers that appear on the notebooks' spines. Missing notebooks and Van Hise notebooks are excluded.

\*\* The field notebooks of Charles Van Hise were scanned by the UW Digital Collections for a project that was completed prior to our work on the Lake Superior Legacy Collections.

The UWDC presented their work to us in July, 2014. Only minor corrections were needed, and the new pieces of the online collection went live in September. They can be viewed at:

<http://uwdc.library.wisc.edu/collections/EcoNatRes/WGNHS>

The UWDC has provided us with high resolution copies of these scans for our own archive and for future inclusion in our web site.

The large scale maps were scanned and have been stored on the WGNHS network. Digital images will be delivered to the UW Digital Collections when we have determined to which field notebook or notebooks each map is related.

Appendix: Inventory of the Lake Superior Legacy Collection

<b>Collection element</b>	<b>Original extent</b>	<b>Portion in our possession</b>	<b>Brief description</b>	<b>Possible reasons for gaps</b>	<b>Work performed / Percentage complete*</b>
Hand samples	App. 80,600	9,798	Rock samples taken from the field	Unused sample numbers, samples lost in field, in a fire, or in transportation, samples loaned to other institutions.	Metadata (location information): 83%
Thin sections	App. 18,000	15,440	Microscope slides made from hand samples	Same as above, also, slides are easily damaged. Some may have been discarded.	Metadata (location information): 69%
Field notebooks**	486	409	Geologic and topographic notebooks, including drill hole logs	Unknown.	Metadata: 65% Scanning: 35%
Thin section catalog	3 ledger books	3 ledger books	Catalog correlating hand sample numbers with thin section numbers		Metadata: See below
Chemical analyses	Unknown	2 ledger books	Chemical analyses of samples—not all are Lake Superior Division samples		Metadata: See below
Photograph negative catalog	Unknown	1 ledger book	List of photograph negatives including location taken and corresponding notebook and page number	Unknown. The photographs have not been located.	N / A
Specimen catalog	24 ledger books	24 ledger books	Listing of specimens from 1 to 80,816, some with location information, thin section number, notebook number and page		Metadata: See below

Lithological descriptions	9 ledger books	6 ledger books	Microscopic and macroscopic descriptions of samples written by Irving and Van Hise, organized by rock type	Unknown	Metadata: 100% Scanning: 100%
Maps	Unknown	62	Plat maps showing sample numbers and rock types, mostly of parts of Michigan's Upper Peninsula	Unknown	Metadata: 100% Scanning: 100%

\*Note: For percentage of work completed, numbers were calculated using the complete number of items in our possession, so not all work will show a 100% completion. For example, though we have not completed metadata for 100% of the hand samples, we have likely exhausted the resources available to us, leaving a percentage of the work incomplete.

\*\*52 field notebooks were delivered to us from the USGS library in Reston in October of 2014. These will be incorporated into the project, but as they arrived after the grant period for FY 2013 had ended, they have not been included in the figures in this report.

Metadata from the specimen and thin section catalogues has been created to supplement metadata from the notebooks and to create metadata for the hand samples and thin sections. As such, attaching a percentage complete is quite difficult. For the chemical analyses, we have noted only whether or not an analysis exists for each specimen.