Montana Bureau of Mines and Geology
Montana Tech of The University of Montana

INVENTORY OF GEOLOGICAL AND GEOPHYSICAL DATA AND SAMPLES AT THE MONTANA BUREAU OF MINES AND GEOLOGY

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FINAL TECHNICAL REPORT

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Abstract

When the Montana Bureau of Mines and Geology (MBMG or Bureau) was established in 1919, it was purposely located in Butte, Montana, site of the world-class Butte mining district. A major part of the legislature's directive to the MBMG was to collect drawings, maps, reports, minerals, and models of the mining industry, not only in Butte but across the State. As a result, the MBMG now possesses an expansive collection of mining-related data on properties throughout Montana, including Butte and the famous Berkeley Pit. These reports are irreplaceable sources of information about Montana's resources, and particularly Butte, as all of the Butte underground mines and much of the Berkeley Pit are now flooded and inaccessible. The importance of this information is underscored by the fact that the US Geological Survey has referenced Butte as the largest remaining copper deposit in the US.[1]

More generally, the MBMG's collections include historical mines and minerals data such as mine maps, drilling records and assays, geochemical and geophysical maps, and production records; water-well logs; oil and gas well logs; coal records; seismic data; a one-of-a-kind collection of thin sections, polished sections, and samples from the Butte underground mines (the Anaconda Collection); nearly a quarter-million aerial photographs spanning multiple decades that provide information on land change; and about 15,000 fine mineral specimens that are the foundation of Montana's only true mineral museum. The collections are routinely used by local, state, and federal agencies, lawyers, small miners, mining companies,

[1] Long, K.R., DeYoung, J.H., Ludington, S.D., Database of significant deposits of gold, silver, copper, lead, and zinc in the United States, Part A: Database Description and Analysis; USGS Open-File Report 98-206A, 1998, 60 pp.

researchers, mining/engineering students, realtors, teachers as well as the general public.

In Phase I of the National Geological and Geophysical Data Preservation Program (NGGDDP) the MBMG conducted and electronically submitted an assessment as to the estimated volume, quality, and accessibility of seven of its current collections. Phase II funds were used to develop a Data Preservation Plan, inventory portions of selected MBMG data collections, create USGS-appropriate metadata for the inventories and upload collection metadata to the USGS National Digital Catalog. The MBMG did not participate in Phase III.

In December 2009, the MBMG relocated to its newly constructed building. The building included almost three times the space for its archives department that was available in the old building. The archival space is climate controlled and secure. With the availability of additional space, the MBMG more than doubled its storage capacity with the purchase of new map cabinets and a compact storage system in which to store mining property files. Collections that had been donated and put into storage in the former location were "resurrected", stabilized, catalogued and filed.

In 2010, the MBMG secured Phase IV NGGDPP funding to:

- Assess information holdings at its branch office in Billings, Montana;
- Continue to create metadata for holdings in each of its collections; and
- Protect the fragile paper and linen documents (some dating back to the late 1800s) by digitizing them for use in an electronic format and archiving the original media in long-term storage.

This technical report is submitted in fulfillment of the Phase IV grant award requirements. Quarterly SF 272 financial reports have been submitted as required and the final financial report and the SF 269, Final Financial Status report have been submitted.

Collection Assessment

Phase IV funds were used for the principal investigator to travel to the MBMG office in Billings, Montana to assess the amount and condition of coal, oil and gas information held in that office. The holdings are located throughout the building in several different staff offices and consist of draft maps that were later revised and made part of formal reports, environmental assessments and monitoring reports on coal, oil and gas deposits in eastern Montana, reference publications, and a small aerial photo collection. The aerial photo collection has been inventoried and those data added to the existing MBMG aerial photo database. A database of the reports and reference materials (approximately 500 records) was compiled and shared with Billings' office personnel for use. Information about the collection was entered into the USGS online state survey.

Metadata creation

Metadata was compiled for the collections noted below:

Collection	% Metadata Completed Phase II	% Metadata Committed Phase IV	% Metadata Completed Phase IV
• the water well logs (2.3 million records)	25%	25%	25%
• Anaconda collection- thin and polished sections (13,083 records)	47.5% 6,182 records	Completed	Completed
• Mineral Museum mineral specimens;[1] (12,474 records)	Withdrawn	—	—
• historical mining files; (3,813 records)	26.2% (1,000 records)	26.2% (1,000 records)	94.5% [1] (3,040 records)
• the historic mining engineering-related maps; (26,200 records)	10% (2,600 records)	10% (2,600 records)	10% (2,600 records)
• the aerial photo collection (of 233,000 records)	0% (inventory completed; lats/longs needed)	10%[2] (23,300 records)	Removed [2]
• seismograms (137,200 records)	0%	10% (20,000 records)	0% [3]

1 Total percentage is greater than 100% because since the completion of Phase II, 1,072 additional historic property files have been added to the collection. Metadata has been created for a total of 4,040 files. The remaining files (approximately 900) had insufficient data with which to create all the necessary metadata (i.e., coordinates).

2 Aerial photos in the MBMG collection are duplicated on the USGS EarthExplorer site.

3 When the MBMG relocated to its new facility, the hard copy inventory of these records was misplaced, Rather than spend time on recreating this inventory (which is infrequently used), it was decided to devote time to the creation of metadata for the collections that are frequently used (i.e., water well logs, historical mining property files, mining maps).

Metadata for the collections noted above have been uploaded to the National Digital Catalog.

Digital Infrastructure Support

The MBMG's ongoing efforts to identify and accept appropriate collections ensure that unique and irreplaceable information will be rescued, stabilized, catalogued and made available to its customers. Because the information was in hard copy form, access to it had to be in person at the MBMG archives, sometimes at great expense (both in terms of time and money) to the requesting party. Limited MBMG staff access to existing scanners to digitize frequently requested records limited our ability to respond to inquiries through electronic transmission of the records.

Funding through the Phase IV grant allowed the MBMG archives office to purchase an ImagePro GtX 42 D large-format scanner and a Fujitso fi-6770 document scanner. Both scanners are located in the archives department and allow the archives' staff to scan documents without having to leave the department (as was the case in the past). Therefore, the office remains open during normal business hours and staff can scan while still being accessible both in person, on the phone and by email to MBMG staff and customers needing information.

Thus far, 600 mining property files and 750 historical mining maps have been scanned. Scanning is done at a 400 dpi resolution and in color. Original .tif and .jpg files are retained in a dedicated directory on the MBMG's main server, which is backed up nightly. Many of the documents are old and discolored and, therefore, not readily legible in the original scanned format. Using Photoshop, the files are adjusted to make them more readable. Color is retained on those documents where it provides meaningful information. Otherwise, the documents are saved in gray-scale mode to reduce disk space. The documents are then optimized in Adobe

Acrobat, run through its OCR text recognition program and saved in a .pdf format as a single document.

Two part-time student workers have assisted with document scanning. All files scanned and adjusted by the student workers are saved in a temporary directory for final review by the archives manager. The manager ensures that all pages in each file are scanned and adjusted before applying the optimization and OCR text-recognition functions on them and saving them as pdfs. Discussions with the MBMG's database administrator have led to a future modification of this process. Each single page of every mining property file will be categorized as a specific type of document so that eventual searches via the web can be customized by the user (e.g., searching only for assay or mine production information). For the time being, the entire multiple-page mining property files will only be available as single, multi-page pdf documents.

Preliminary work has begun on the development of a webpage for the Mining Archives. The webpage will be housed on the main MBMG website. The principal investigator has met with the Bureau's database administrator to begin constructing the architecture for populating the webpage and the information technician to develop the webpage's design.

Summary

The Montana Bureau of Mines and Geology continues to recognize the immense value of historical mining, geology, hydrology, mineralogy, and seismic information and, particularly, the irreplaceable information and physical specimens from mines and areas that are no longer accessible. It will continue to expand its collections, collaborate with the USGS by contributing metadata about those collections to the National Digital Catalog, make the information available electronically to its customers via the MBMG website, and use outreach efforts to educate the public about the availability of the information. These goals would not have been

possible to pursue in a timely fashion without the financial support of the USGS NGGDPP program.