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Technical Report

**Item-level Metadata and Catalog of Former
Arizona Department of Mines and Mineral Resources**

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<u>Introduction</u>	2
<u>Scope and Implementation</u>	2
<u>Item Cataloging & Digitization Plan</u>	2
<u>Metadata & Digitization (Results)</u>	3
<u>Summary</u>	3
<u>Metadata Created</u>	4
<u>Availability</u>	5
<u>Acknowledgements</u>	6
<u>Bibliography and Links</u>	7

Introduction

As part of the Energy Policy Act of 2005, the U.S. Geological Survey was tasked with creating a National Geological and Geophysical Data Preservation Program (NGGDPP). This Program is intended to work principally with the nation's geological surveys to: (1) archive geologic, geophysical, and engineering data, maps, well logs, and samples; (2) provide a national catalog of such archival material; and (3) provide technical and financial assistance related to the archival material.

The Program is envisioned as a national network of cooperating geoscience materials and data repositories that are operated independently yet guided by common standards, procedures, and protocols for metadata. The holdings of all collections will be widely accessible through a single, common, and mirrored Internet-based catalog, the National Digital Catalog, thus maximizing the availability of and interconnectedness of all the collections.

Scope and Implementation

In 2011-2012, the AZGS was provided with \$41,495.62 for Data Rescue and Inventory. The Department of Mines and Mineral Resources (ADMMR) was merged with the AZGS in FY12. In January 2011, the Arizona Geological Survey (AZGS) rescued and stored the records when ADMMR was shut down. In FY12 AZGS began a comprehensive inventory of archival collections formerly held by ADMMR. The collections' contents are geographically focused on Arizona, but many, particularly those donated by companies and individuals, include reports, maps, and files on other states and countries. The first step was to undertake an inventory of the scope and size of the ADMMR collections and develop a plan for estimating and prioritizing the digitization of the records.

In FY13, AZGS item-level cataloged 8,000 mining records from its three primary ADMMR acquisitions: the ADMMR Mining files, ADMMR Map collection, and the ADMMR Photograph collection. These metadata records are stored as ISO 19139 records, XML encoding of ISO 19115, and published through the USGIN catalog at search.usgin.org.

Item Cataloging & Digitization Plan

In FY13, the AZGS focused on creating metadata and scanning artifacts from three of the most requested collections: the ADMMR mining collection, a series of engineer reports and miscellaneous related data; the ADMMR map collection, oversized maps of Arizona's mines and geology; and the ADMMR photo collection, photographs of mines and prospects by ADMMR personnel or taken from reports donated to the Department. The USGIN metadata schema describes the fields necessary to catalog these resources. Using the U.S. Geoscience Information Network (USGIN) portal, the AZGS has made 8,000 of these files available online to its patrons as free, high quality PDFs. Records can either be searched by mine name (e.g. Pima Mine) or by geographic area by drawing a search box on an interactive map. AZGS re-used digital scans of the ADMMR mining collection from prior U.S. Bureau of Land Management (BLM) contracts and scanned the remainder of the collection in-house, approximately 44,000 pages.

Metadata & Digitization (Results)

Summary

This USGIN metadata schema used in this project is related to the geographic metadata standard, ISO 19115, and is interoperable with that standard and the XML encoding for metadata exchange, ISO 19139. Casey Brown and Becky Eden cataloged mine files with USGIN metadata. Required metadata includes a title, description, creator, publication date, distributor contact, metadata contact, metadata date, and a link to the item. Recommended metadata includes thematic keywords, spatial keywords, resource identifier, bibliographic citation, geographic coordinates, and starting and ending dates (USGIN, 2013). For maps, we also created metadata for the map dimensions and scale. Thematic keywords captured types for photographs: a print, slide, Polaroid, or negative. Thematic keywords were used for maps to capture types: a claim map, geologic map, subsurface map and whether it included sample data or geophysical surveys. Although there is no quick way to count the number of keywords assigned to all items, most records were given between half a dozen and one dozen thematic keywords each. Spatial keywords are more easily assigned once the coordinate location is determined. Quadrangle, physiographic area, metallic mineral district, and township-range can be populated from a coordinate location using GIS software.

Using the Microsoft Access database developed in the prior year for inventorying the collections, we cataloged 4,376 mining records, 906 maps and 4,169 photographic prints. The number of ADMMR records currently in the USGIN catalog is slightly lower due to duplicates or missing or merged items. These items included in prior indices by ADMMR, thus the records were kept for tracking purposes. The records prepared using USGIN standards are as follows: 4,058 mine files, 678 oversized maps, and 3,571 photographic prints. These records were exported from MS Access, converted to XML, and uploaded to the USGIN catalog. These figures are slightly less than the 11,000 item-level metadata records projected for completion in the original proposal.

Keywords were used to indicate the commonly occurring contents of mine files with subject and format terms, e.g. geologic maps, claim maps, chemical analyses, reports, environmental assessments, drilling, mineral resources, exploration, etc. If a file contained drill logs, it received the keyword “drilling and coring”. If it contained a plan of the underground workings in a mine, it received the keyword “subsurface maps.” Part of cataloging the mine files at the folder level, instead of items, meant prioritizing authors. Catalogers captured authors of significant mine reports and company reports, primarily by registered engineers, rather than including every name from the numerous letters and memos. Our customers are primarily concerned with finding engineering and geological reports, instead of being inundated with search results where there is only correspondence.

Diane Bain used her considerable knowledge of Arizona mining history and experience with the ADMMR to identify and catalog the photographic prints. What the untrained eye might have described as mining equipment could be more accurately described as solvent extraction and electrowinning, thanks to her expertise. In many cases, she was able to identify locations and photographers which would have otherwise remained a mystery because the lack of information accompanying the images.

At the onset of the Mining Preservation Project, the AZGS adopted digitization specifications that meet national standards (NARA, 2013). The AZGS determined that a 400 ppi resolution image produced an excellent reproduction product in terms of clarity and legibility. Likewise, the Library of Congress National Digital Newspaper program uses a resolution of 300-400 ppi (LoC, 2012). At AZGS, textual documents were scanned at 400 ppi in grayscale or color, considered necessary because handwritten notes and drawings often accompany the text. An online “access” copy is converted to PDF, optical character recognized (OCR), and compressed to 300 ppi for online access. Digital files are reviewed for legibility, primarily bleed through from double sided pages. Access copies are reviewed for removal of published materials, mainly periodicals which would exceed fair use for research purposes. Scanning at higher resolution, particularly for large-format maps, was deemed impractical because the size of the digital files greatly exceeded the ability of many software programs to handle them.

Earlier digitization projects conducted by ADMMR used lower digitization standards than have been established by national institutions such as National Archives and Records Administration (NARA) and the Library of Congress (LoC). Projects completed as recently as 2006 used 200 ppi (pixels per inch) resolution and bi-tonal (black and white) bit depth for text documents. In 2011, ADMMR changed those settings to 400 ppi with bi-tonal bit depth for two scanning projects contracted by the BLM. Although these images do not meet our specifications today, they are of good quality and are in use for the time being.

Photographs were scanned at much higher resolution, up to 1500 ppi in the case of a 3x3” print, depending on the size of the original. The target for photographic print digitization was not a fixed resolution, but a pixel length, four thousand pixels across the longest side, as determined by numerous standards, including NARA. The pixel length can be calculated by multiplying the print’s size by the scanning resolution, so an 8x10” print scanned at 600 ppi produces a 4,800 x 6,000 pixel digital image.

Metadata Created

Table 1. **Number of records (property file, map, or photograph) by county.**

County	Folders	Photos	Oversized Maps
Yavapai	829	946	164
Mohave	489	303	154
Maricopa	406	350	25
Pinal	394	473	112
Cochise	393	105	26
Pima	364	219	38
Gila	309	214	49
La Paz	281	188	12
Santa Cruz	267	37	1
Graham	99	93	24

Coconino	94	121	15
Yuma	62	55	9
Greenlee	45	162	21
Apache	18	18	0
Navajo	16	0	0

The AZGS has more collections of mining files from several professional geologists which it intends to catalog and digitize. Those collection inventories were submitted to the National Digital Catalog as part of the FY12 NGGDPP project. Going forward, the AZGS intends to only catalog and digitize materials focused on Arizona for inclusion in the online catalog. Materials from these collections covering areas outside Arizona are available in our Phoenix offices during regular business hours. Customers may request these items be digitized on a case-by-case basis.

The following are Arizona items remaining to be digitized and/or described.

Table 2. **Assets Requiring Further Processing**

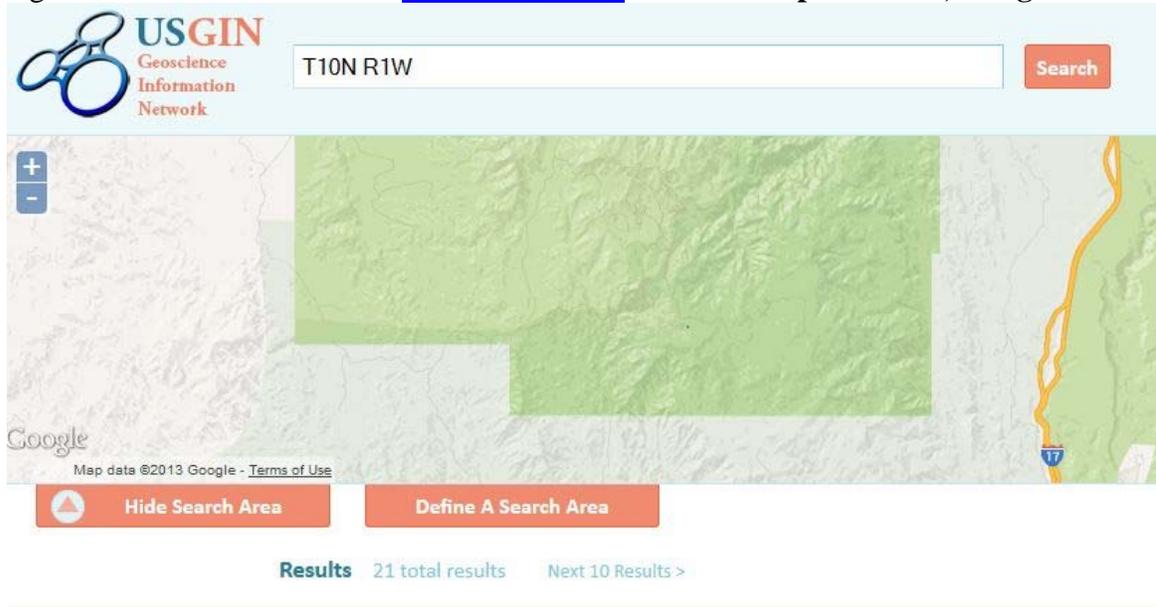
Document Type	Digitization	Cataloging
Folders	4,600	4,600
Photographic Prints	0	2,370
Slides	1,430	1,430
Digital Photographs	0	2,391
ADMMR Maps	200-300	6,000
Walter Heinrichs Maps	Approximately 260 map tubes	Approximately 260 map tubes

Availability

Records can be searched multiple ways at USGIN, search.usgin.org. The primary method is to search by the mine's name. USGIN aggregates many diverse datasets, so we recommend prefacing search terms with the collection name, ADMMR, (e.g. Admmr Mission Mine). Users may also define a search area on the map by drawing a bounding box. Lastly, since mines were primarily located using a township, range and section description, the records can be searched using a township and range format as shown below.

These records are fuller item-level metadata of collections which are available via the National Digital Catalog at www.sciencebase.gov. AZGS will work with the NGGDPP coordinators to either have the records harvested from USGIN or will resubmit the new records via ScienceBase if harvesting proves impractical.

Figure 1. Search results from search.usgin.org for Township 10 North, Range 1 West.



More Details

Show Area on Map

Full XML Metadata

Access Options

Downloadable File

Contact Distributor

ADMMR mining collection file: Fat Jack Group

This location is part of the Arizona Mineral Industry Location System (AzMILS), an inventory Crown King - 7.5 Min quad. This collection con...

By John W. Holt - Published on Fri Mar 01 2013 - Modified on Sat Jun 15 2013

Keywords: economic geology gem resources geologic structure maps and atlases metallic ores mineral resource XI 1940s 1980s 1990s 2000s United States Arizona Yavapai County Slim Jim Crown King - 7.5 Min T10 N R1W

ADMMR mining collection file: Ford Lode Claim

This location is part of the Arizona Mineral Industry Location System (AzMILS), an inventory King - 7.5 Min quad. This collection con...

By Interior Board of Land Appeals - Published on Fri Mar 01 2013 - Modified on Sat Jun 15 2013

Keywords: metallic ores mineral resources reports Gold 1970s United States Arizona Yavapai County Patent

ADMMR mining collection file: Fairview

This location is part of the Arizona Mineral Industry Location System (AzMILS), an inventory King - 7.5 Min quad. This collection cons...

By John Slak - Published on Fri Mar 01 2013 - Modified on Sat Jun 15 2013

Keywords: claim maps geology maps and atlases mineral resources mining and quarrying natural resource asse Claims Ms 3773 Crown King - 7.5 Min T10 N R1W Sec 2 S2 San Luis Mts. physiographic area Arivaca metallic min

Acknowledgements

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