



Preservation of MGS Aerial Photograph and Drill Cuttings Collections (2018-2019)

by

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ABSTRACT: The Maryland Geological Survey (MGS) shares the concerns of other agencies and organizations engaged in geological research – that geoscience collections and data are valuable in their own right, beyond the lifetime of the projects during which they are collected or acquired, and that special efforts are required to preserve them and ensure their accessibility. In this, its eleventh year as a recipient of a U.S. Geological Survey National Geological and Geophysical Data Preservation Program grant, MGS completed two separate projects aimed at furthering the preservation of its 1) Aerial Photograph Collection; and 2) Drill Cuttings Collection.

During the first project, MGS fulfilled its grant objectives by 1) updating digital infrastructure via a comprehensive quality assurance/quality control review of ~8,900 database records which correspond to Components 2-11A in the MGS Aerial Photograph Collection; 2) rescuing data at risk by re-housing the corresponding ~8,900 paper aerial photographs and index maps into archival-quality boxes and folders; 3) updating the National Digital Catalog with newly updated/created metadata records for Components 2-10 (metadata was not submitted for Components 11 and 11A due to their copyright status); and 4) transferring the ~8,900 paper photographs and index maps (along with their associated digital scans) to a Maryland State Archives facility for permanent storage. During this project, MGS identified and created three new components of the MGS Aerial Photograph Collection: Component 5A (Quadrangle-Based Photo-Mosaic Index Maps), Component 11 (Copyrighted Air Photographics, Inc. Aerial Photographs), and Component 11A (Copyrighted Air Photographics, Inc. Index Maps).

During the second project, MGS fulfilled its grant objectives by 1) performing a detailed inventory of ~700 boxes of drill cuttings (containing ~13,100 envelopes of cuttings); 2) populating the internal MGS drill cuttings database with detailed metadata records for the inventoried cuttings; 3) submitting metadata to the National Digital Catalog describing the collection items; and 4) reinforcing cuttings boxes/envelopes as needed. MGS inventoried ~150 more cuttings boxes than originally proposed.

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INTRODUCTION

Eleven years ago, in response to financial incentives offered by the U.S. Geological Survey (USGS) National Geological and Geophysical Data Preservation Program (NGGDPP), Maryland Geological Survey (MGS) began to address the long-term preservation of its data and collections in a formalized, systematic way. Thanks to NGGDPP funding, MGS has made great strides in preserving its geoscience collections – including creating a long-range data preservation plan, digitizing paper collections, creating detailed metadata for collection items, and collaborating with data preservation partners to post digital collections online and provide long-term archival storage of collections. MGS FY2018 NGGDPP grant activities included two projects focused on the preservation of two geoscience collections: 1) Aerial Photographs; and 2) Drill Cuttings.

GRANT GOALS AND ACCOMPLISHMENTS

The goals and accomplishments for each FY2018 NGGDPP grant project are described below.

Project 1 – Aerial Photograph Collection

GOAL: *Perform a comprehensive quality assurance/quality control review of ~8,950 internal database records which correspond to Components 2-10 in the MGS Aerial Photograph Collection.*

RESULT: During the FY2018 NGGDPP grant period, MGS performed a thorough quality assurance/quality control review of 8,907 database records. Originally, these records correlated to Components 2-10 in the MGS Aerial Photograph Collection. During the review process, however, MGS identified and decided to separate three additional components: Component 5A (Quadrangle-Based Photo-Mosaic Index Maps), Component 11 (Copyrighted Air Photographics, Inc. Aerial Photographs), and Component 11A (Copyrighted Air Photographics, Inc. Index Maps). Discrepancies encountered and fixed during the quality assurance/quality control review included missing digital scans, digital scans that were not logged in the database, data entry typos, inconsistent naming/spelling, etc. These reviewed and updated database records correlate to the 8,892 paper aerial photographs and index maps that were transferred to Maryland State Archives (MSA) for permanent storage during this grant cycle. The number of records reviewed is 43 records less than proposed due to errors discovered in the database table (duplicate entries, records for items that we no longer have in the collection, etc.).

GOAL: *Re-house ~8,950 paper aerial photographs into appropriate archival boxes/folders.*

RESULT: In the spring and summer of 2019, MGS NGGDPP grant staff worked for approximately four weeks to sort the remaining 8,892 paper aerial photographs and index maps of the MGS Aerial Photograph Collection into groups based on Component number, county or quadrangle name, full date of photograph (MM/DD/YYYY), flight series, and frame number. The aerial photographs and index maps were then re-housed into 884 folders within 91 archival boxes. The boxes and folders were composed of acid-free, lignin-free materials per MSA recommendation. MGS labeled the folders and boxes per MSA standards; conducted the secondary quality assurance/quality control review of the database records pertaining to these photographs/index maps; and prepared the MSA

records transmittal forms. The total number of items re-housed is 58 less than proposed due to “in-stock” designation and quantity errors discovered and corrected in the database.

GOAL: *Update the National Digital Catalog with newly updated metadata records.*

RESULT: MGS submitted metadata for Components 2-10 of the MGS Aerial Photograph Collection to the National Digital Catalog in October and November of 2019. These submissions replaced existing records in the National Digital Catalog for Components 2-10, and were newly created for Component 5A. These updated/new metadata sets more thoroughly and accurately describe the items in the MGS Aerial Photograph Collection and will facilitate search/discovery by more users. Metadata for Components 11 and 11A were not submitted to the National Digital Catalog due to their copyright status (only MGS staff may utilize these components). National Digital Catalog metadata for Components 2-10 may be viewed online via the MGS National Digital Catalog page (<https://www.sciencebase.gov/catalog/item/4f4e4761e4b07f02db47dfca>) or from the hyperlinks below:

[Component 2: MD Barrier Island Aerial Photographs \(Enlargements\)](#)

[Component 3: Montgomery County Aerial Photographs \(Enlargements\)](#)

[Component 4: County-Based Aerial Photograph Index Maps](#)

[Component 5: Quad-Based Aerial Photographs](#)

[Component 5A: Quad-Based Photo-Mosaic Index Maps](#)

[Component 6: High-Altitude Black-and-White Aerial Photographs](#)

[Component 7: High-Altitude Infrared Aerial Photographs](#)

[Component 8: Quad-Based Infrared Aerial Photographs](#)

[Component 9: Washington, DC & Vicinity Aerial Photographs](#)

[Component 10: USGS NWIS Well-Related Aerial Photographs](#)

GOAL: *Transfer the boxed photographs and index maps to an MSA facility for permanent storage.*

RESULT: On September 19, 2019, MGS delivered 91 boxes of photographs and index maps to the MSA storage facility in Windsor Mill, MD. These boxes contained 8,892 paper aerial photographs and index maps (8,830 unique frames plus 62 duplicates) from Components 2-11 of the MGS Aerial Photograph Collection. Duplicate paper copies were included in the transfer because sometimes one print had a different print quality than another and/or one print was partially damaged or modified by superficial notation. The eight boxes of copyrighted Air Photographics, Inc. aerial photographs (Component 11) were transferred to MSA for permanent storage due to limited space at MGS and will be available for MGS staff use only. The single box containing Component 11A (Copyrighted Air Photographics, Inc. Index Maps) is being stored permanently in-house at MGS for staff use only.

MGS provided MSA with the required transfer documentation for each component: Transfer Inventory Spreadsheets (one spreadsheet per component, to describe the paper photographs/index maps); and Digital Records Transfer Inventory forms (two forms per component if needed, to describe the digital database and digital images separately). MGS also provided MSA with Microsoft Access 2016 databases for each component which contain tables of information describing each paper photograph/index map that was transferred.

MGS also delivered a portable hard drive containing 8,333 digital images of the transferred paper aerial photographs and index maps. Most of the images were tagged image file (TIF) and/or Joint Photographic Experts Group (JPEG or JPG) format. Some items were also scanned to JPEG 2000

format (a successor to JPG; file extensions are typically .jpf or .jp2). MGS did not scan the items in Components 5, 6, 8, and 10 because these aerial photographs are USGS in origin and that agency is canning its own historical aerial imagery.

Project 2 – Drill Cuttings Collection

GOAL: *Perform a detailed inventory of ~ 550 boxes of drill cuttings.*

RESULT: Between January and May 2019, MGS staff completed a detailed inventory of 702 boxes of drill cuttings (152 more boxes than outlined in the FY18 NGGDPP grant proposal). Cuttings boxes were cardboard and contained cutting samples in a variety of envelope types: paper, plastic, paper within plastic, or cloth bags within plastic. Many boxes had limited site location information on them, making it difficult to cross reference the cuttings to a borehole location and determine coordinates. Despite this challenge, MGS staff successfully correlated 608 boxes of drill cuttings to 224 unique borehole locations. Work is ongoing to identify borehole locations for the remaining 94 boxes. Thanks to successive NGGDPP grants in 2017 and 2018, MGS has inventoried over 1,200 boxes of drill cuttings containing over 24,000 envelopes to date (approximately 46% of the entire collection).

GOAL: *Populate the internal cuttings database with detailed metadata records describing the inventoried cuttings.*

RESULT: MGS updated its internal Microsoft Access 2016 drill cuttings database, originally developed during the FY2017 NGGDPP grant cycle, and renamed the database *Cuttings_Inventory_Database_121718*. This database is split into a front end (FE) database and back end (BE) database. The BE database (consisting of data tables) resides on an MGS server in a shared network location. The FE database (consisting of a data entry form) is saved locally on MGS NGGDPP grant staff computers. The split database format allows multiple users to perform inventory and enter data into the database concurrently.

In the *CuttingsInv_SIMPLE_Table_121718* database table, each cuttings box was entered as a separate record. If different site ID information was labeled on the box vs. the envelopes, a note was made in the *Env_ID_Notes* column and further investigation (including well record and publication research) was conducted to verify the correct site location and coordinates. During the inventory process, it was discovered that occasionally cuttings from multiple drilling sites were stored together in one box. Initially, multiple Site IDs were entered in the *Bx_SiteIDNum* field. Ultimately, for the few boxes with this situation, a unique record was created for each borehole so that coordinates could be provided for each set of cuttings contained and the *Bx_SiteIDNum* was modified to indicate which of the cuttings sets was featured for each record. In the future, consideration may be given to re-housing these cutting sets in separate boxes.

Linked tables within the database capture geographic location information stored primarily in a table titled *BoreholeCoordinates*. This table, which was updated as part of this project, contains geospatial coordinates for NGGDPP metadata and includes the original coordinates; their source, projection, and accuracy; and the method of coordinate conversion. The *BoreholeCoordinates* table links to the *CuttingsInv_SIMPLE_Table_121718* table via the *db_BholeID* field in a one-to-many relationship.

GOAL: *Submit NGGDPP-compliant metadata records to NDC.*

RESULT: Updated NGGDPP-compliant metadata for the Drill Cuttings Collection was submitted to the National Digital Catalog in November of 2019 and may be viewed online here:

<https://www.sciencebase.gov/catalog/item/4f4e4a94e4b07f02db658d7f> .

GOAL: *While performing the inventory, re-inforce boxes/envelopes or re-house materials if necessary.*

RESULT: The drill cuttings inventoried this year did not require complete re-housing, although many cuttings boxes were re-taped for reinforcement. MGS anticipates that the re-housing effort will begin in earnest during the current FY2019 NGGDPP grant cycle.

USER SUCCESS STORIES

Aerial Photograph Collection

Aerial photographs depict land use and land cover at particular points in time. A time-series of such photographs can reveal detectable, measurable changes and trends in those patterns. Such photography is irreplaceable – once the flight date has passed, ground conditions on that date cannot be replicated or reconstructed. The Aerial Photograph Collection will only grow in usefulness, as land use continues to change, and as researchers and managers attempt to reconstruct past usage from these snapshots in time. Aerial photographs appeal to a wide audience and have broad potential usefulness. In May 2018, MGS started tracking the number and type of information requests received from the public sector as well as from other state and federal agencies. To date, historical aerial imagery remains the number one requested item, followed by hydrology/hydrogeology, general geology, and coastal geology information requests.

Aerial photographs provide important information on the historic built landscape – not only buildings and bridges, but also other, smaller features that are not often mapped, including small roads and fence lines. These features can be extremely useful in reconstructing old plats, as many of these features are vestiges of property boundaries that can go back hundreds of years. During the FY2018 NGGDPP grant period, a number of citizens contacted MGS for historical aerial imagery of their family properties and one requested aerial images to research the building and demolition history of bridges in Howard County, MD.

The Aerial Photograph Collection has also been useful to a variety of non-government and government projects. These projects have included general environmental site assessments as well as characterization of historic watershed conditions for stream restoration efforts. During 2018-2019, project scientists from local environmental consulting firms frequently contacted MGS for historical aerial photographs in their area of interest to research historic stream channel alignment and land use history that may have influenced stream channel geomorphology. A physical scientist from the U.S. Army Corps of Engineers also requested historical aerial photographs of Baltimore City as part of his site assessment work.

Maryland state agencies also continue to utilize the Aerial Photograph Collection. One prominent example was a request from the Assistant Attorney General for the Maryland Department of Natural Resources, who needed historical aerial imagery of Washington County, MD to track historical land use changes between the 1930s-1990s.

Drill Cuttings Collection

The Drill Cuttings Collection consists of a variety of washed and unwashed cuttings from Maryland drilling sites. This collection should grow in usefulness and value as drilling costs continue to rise, land use continues to change, and potential users can leverage the savings from existing materials to more fully investigate geologic issues important to society. MGS geologists, as well as geoscientists from other government agencies, universities/research institutes, and private firms, access these cuttings for their research. By fully cataloging existing cuttings and providing metadata online, it is possible for all potential users to determine what is available in the collection.

Currently, this collection is of particular interest to researchers with a renewed focus on Triassic basins, basement structures, and deep Cretaceous strata as potential storage structures for carbon sequestration. For example, MGS and its Midwest Regional Carbon Sequestration Partnership partners recently conducted geochemical analyses on samples of rock core and cuttings from western Maryland to evaluate its potential for possible carbon sequestration. Because MGS had inventoried these samples in its repository and could easily locate and provide access to them, Midwest Regional Carbon Sequestration Partnership members could avoid the prohibitive time and cost to permit, contract, re-drill and sample the core.

CONCLUSIONS

MGS fulfilled its FY2018 NGGDPP grant objectives by completing two separate projects focused on furthering the preservation of its 1) Aerial Photograph Collection; and 2) Drill Cuttings Collection. For its Aerial Photograph Collection, MGS primarily focused on finalizing metadata records via a comprehensive quality assurance/quality control review process; and transferring the paper aerial photographs and index maps to the MSA Windsor Mill facility. Due to this facility's space and climate control, it is ideally suited for the collection's long-term survival. To date, and thanks to NGGDPP funding, MGS has identified 13 distinct components of its MGS Aerial Photograph Collection totaling over 26,300 paper aerial photographs, index maps, and photographic enlargements. MGS and its data preservation partners, MSA and the Johns Hopkins University, have together created over 38,500 digital images. Additionally, the entire MGS Aerial Photograph Collection (with the exception of 20 index maps in Component 11A) are permanently housed in the MSA Windsor Mill facility. For its Drill Cuttings Collection, MGS continued its detailed collection inventory by completing the second year of what MGS anticipates will be a four year effort to properly document, organize, and store the collection. MGS estimates that approximately 600 boxes of cuttings will need to be inventoried after the current FY2019 NGGDPP grant work is completed. Looking forward, MGS will continue to document its remaining collections, seek funding for data preservation, prepare collections for long-term preservation, and explore possible mechanisms to enhance public access to collections.



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