



## **Preservation of MGS Aerial Photograph and Drill Cuttings Collections (2017-2018)**

by

Katherine A. Knippler, Heather A. Quinn, Dale. W. Shelton, and Rebecca Kavage-Adams

katherine.knippler@maryland.gov | heather.quinn@maryland.gov | dale.shelton@maryland.gov  
rebecca.adams@maryland.gov

Department of Natural Resources | Aquatic Resources | Resource Assessment Service  
Maryland Geological Survey | 2300 Saint Paul Street | Baltimore, Md. | 21218  
Phone: 410-554-5500 | FAX: 410-554-5502 | [dnr.maryland.gov](http://dnr.maryland.gov)

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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 tenth year as a recipient of a U.S. Geological Survey (USGS) National Geological and Geophysical Data Preservation Program (NGGDPP) 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 finishing its comprehensive quality assurance/quality control (QA/QC) review (begun during the FY2015 NGGDPP grant cycle) and finalizing the remaining approximately 6,500 internal database records corresponding to the 1960s – 1990s county-based aerial photographs; 2) updating the National Digital Catalog (NDC) with these newly reviewed and amended metadata records; 3) rescuing data at risk by re-housing approximately 7,100 of the 1960s – 1990s county-based paper aerial photographs into appropriate archival boxes and folders; 4) rescuing data at risk by transferring approximately 6,100 of the re-housed photographs to a Maryland State Archives (MSA) facility for permanent storage; and 5) purchasing archival folders and boxes for the remaining approximately 7,200 photographs comprising the other components of the MGS Aerial Photograph Collection. MGS completed a review of approximately 1,500 more database records than originally proposed, and transferred approximately 1,100 more photographs to MSA than proposed.

*During the second project*, MGS fulfilled its grant objectives by 1) purchasing boxes and envelopes to re-house a portion of the Drill Cuttings Collection; 2) designing and creating an internal drill cuttings database consisting of data fields useful to collection users and required for inclusion to NDC; 2) completing a detailed inventory of 541 boxes of cuttings (containing approximately 10,958 envelopes of cuttings); 3) populating the internal database with detailed metadata records for the cuttings; 4) submitting these metadata records to NDC; and 5) reinforcing boxes/envelopes or re-housing the cuttings as appropriate.

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<b>Acronyms and Abbreviations Used in This Report</b>	
<i><b>Acronym/Abbreviation</b></i>	<i><b>Description</b></i>
API	Air Photographics, Inc.
DPAP	Data Preservation Advisory Panel
GIS	Geographic Information System
JHU	The Johns Hopkins University
MD DNR	Maryland Department of Natural Resources
MGS	Maryland Geological Survey
MSA	Maryland State Archives
NDC	National Digital Catalog
NGGDPP	National Geological and Geophysical Data Preservation Program
QA/QC	Quality Assurance/Quality Control
USGS	United States Geological Survey

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## INTRODUCTION

Ten 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 FY2017 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 FY2017 NGGDPP grant project are described below.

### Project 1 – Aerial Photograph Collection

**GOAL:** *Finish the comprehensive Quality Assurance/Quality Control (QA/QC) effort (begun during the FY2015 NGGDPP grant cycle) and finalize the remaining ~5,000 internal database records for MGS's collection of county-based aerial photographs dating from the 1970s – 1990s.*

**RESULT:** During the FY2017 NGGDPP grant period, MGS performed a thorough QA/QC review of the remaining approximately 6,500 records associated with the 1960s – 1990s county-based aerial photographs. Errors encountered and fixed included digital scans that were not logged in the database, data entry typos, inconsistent naming/spelling, etc. These reviewed and updated database records correlate to 1) approximately 6,100 county-based paper aerial photographs (including duplicate copies) that were transferred to Maryland State Archives (MSA) for permanent storage during this grant cycle; and 2) approximately 1,000 copyrighted, county-based paper aerial photographs (including duplicate and triplicate copies) purchased from Air Photographs, Inc. (API). MGS completed a review of approximately 1,500 more database records than originally proposed.

**GOAL:** *Re-house the remaining ~5,000 county-based aerial photographs from the 1970s – 1990s into appropriate archival boxes.*

**RESULT:** In May and June of 2018, MGS NGGDPP grant staff worked for approximately three weeks to sort the remaining 1960s – 1990s county-based aerial photographs into groups based on county, full date of photograph (MM/DD/YYYY), flight series, and frame number; label the folders and boxes per MSA standards; conduct the secondary QA/QC of the database records pertaining to these photographs; and prepare the MSA records transmittal forms. Approximately 7,100 aerial photographs (approximately 2,100 more photographs than originally proposed) were re-housed into 63 archival boxes.

**GOAL:** *Update NDC with newly updated metadata records.*

**RESULT:** MGS submitted updated metadata for the County-Based Aerial Photograph

component of its MGS Aerial Photograph Collection to the NDC in August 2018. This submission replaced the existing records in NDC for the *Historical Aerial Photographs of Maryland, 1937-1990, County Collection*. This updated metadata set more thoroughly and accurately describes the items in the county-based component (due to the database QA/QC check conducted during the FY2015 – FY2017 NCGDPP grant cycles) and will facilitate search/discovery by more users. Updated information and metadata for this collection may be viewed online here: <https://www.sciencebase.gov/catalog/item/4f4e4a94e4b07f02db658dba>.

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

**RESULT:** On August 20, 2018, MGS delivered 55 boxes of photographs to the MSA storage facility in Windsor Mill, MD. These boxes contained approximately 6,100 of the non-copyrighted, county-based aerial photographs dating from the 1960s – 1990s flown over various Maryland counties. The remaining 8 boxes of copyrighted, county-based API photographs temporarily reside at MGS. These API boxes will be transferred to MSA once MSA determines an appropriate storage, access, and labeling strategy. MGS transferred approximately 1,100 more photographs to MSA than proposed (not including the upcoming additional API photograph delivery).

MGS provided MSA with the necessary transfer documentation – specifically, a Transfer Inventory Spreadsheet (which describes the paper photographs) and two Digital Records Transfer Inventory forms (which describe the digital database and digital images). MGS also provided MSA with two Access 2013 databases:

- 1) *MGS2MSADatabase2018\_CoPhotos.mdb* – containing detailed information about each non-copyrighted, county-based photograph that was transferred; and
- 2) *MGS2MSADatabase2018\_APIPhotos.mdb* – containing detailed information about each API photograph that will be transferred on a future date.

MGS also delivered a portable hard drive containing digital images of the transferred non-copyrighted, county-based photographs. Of the approximately 6,100 hard copies of photographs that were transferred, the digital imagery covers approximately 5,500 unique frames. Many frames had duplicate printed copies. These 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. MSA assigned the transferred aerial photographs the MSA Series identifier of T5053. Once the copyrighted API photographs are transferred to MSA, all of the paper photographs in the MGS County-Based Aerial Photograph component (approximately 18,400 photographs) will be permanently stored at the MSA Windsor Mill facility.

**GOAL:** *Purchase archival folders and boxes for the remaining ~8,200 photographs comprising the other components of the MGS aerial photography collection.*

**RESULT:** In August of 2018, MGS purchased 93 acid-free, lignin-free archival boxes from assorted vendors (Conservation Resources International, Talas, and University Products). An additional 866 acid-free, lignin-free folders were purchased from University Products. These supplies will house the remaining components of the MGS Aerial Photograph Collection (assorted aerial photographs and photo-mosaic index sheets) that still reside at MGS. Re-boxing of these photographs will occur during the current FY2018 NCGDPP grant period.

## Project 2 – Drill Cuttings Collection

**GOAL:** *Purchase boxes and envelopes to re-house a portion of this collection.*

**RESULT:** In August of 2018, MGS purchased 125 heavy corrugated cardboard sample envelope storage boxes and 200 Kraft paper drill cutting envelopes with metal clasps from SciOptic USA. MGS also purchased 18 rolls of packing tape from Rudolph Supply. These supplies will be used to re-house/re-package rock cuttings as necessary during the current FY2018 NNGDPP grant.

**GOAL:** *Create an internal MGS drill cuttings database consisting of data fields helpful to collection users and required for inclusion to NDC.*

**RESULT:** MGS designed an Access 2013 database called *Cuttings\_Inventory\_Table\_030518.accdb* and split the database into a front end (FE) database and back end (BE) database. The BE database (comprised 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 NNGDPP grant staff computers. The split database format allows multiple users to perform inventory and enter data into the database concurrently.

The primary table in the BE database, *CuttingsInv\_SIMPLE\_Table*, contains some fields of information required for National Digital Catalog (NDC) metadata submission as well as fields containing additional information useful for MGS staff and outside geoscientists. As of 2018, the *CuttingsInv\_SIMPLE\_Table* table includes the following fields: AutoNum, Inv\_Date, Inv\_By, db\_BHoleID, Original Well Permit ID, Data Type, Box ID, Box\_Dim\_In, Box\_Type, Box\_Cond, Stor\_Loc, Loc\_Notes, Row, Unit, Shelf, Bx\_St, Bx\_Co, Bx\_SiteIDNum, Bx\_SiteLoc, Bx\_TopDepFt, Bx\_BotDepFt, Bx\_BoxNum, Bx\_Prop, Bx\_Cmnts, AltBoxID, Num\_EnvInBox, Env\_Type, Env\_Cond, Continu\_Int, Miss\_Int, Int\_Notes, Env\_ID\_Notes.

In the *CuttingsInv\_SIMPLE\_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 NNGDPP 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* table via the db\_BholeID field in a one-to-many relationship.

**GOAL:** *Perform a detailed inventory of ~ 450 boxes of rock cuttings and populate the internal database with detailed metadata records.*

**RESULT:** Between March and June 2018, MGS staff completed a detailed inventory of 541 boxes of rock cuttings, 91 more boxes than outlined in the FY17 NNGDPP grant proposal. Cuttings boxes are cardboard and contain 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 was able to correlate 424 boxes of drill cuttings to unique site locations. Work is on-going to identify borehole locations for the other boxes.

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

**RESULT:** NNGDPP-compliant metadata for the Drill Cuttings Collection was submitted to the NDC in September of 2018 (revised in October of 2018). NDC metadata for the Drill Cuttings Collection can 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 FY2018 NNGDPP 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.

Aerial photographs provide important information on the historic built landscape – not only buildings, but 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. In fact, a Maryland citizen contacted MGS in 2018 for aerial images to research land use history and the location of historical Nike missile bases near her childhood home in Bethesda, MD.

The Aerial Photograph Collection has also been useful to a variety of non-government and government projects for environmental assessments as well as characterization of historic watershed conditions for stream restoration efforts. During 2017-2018, project scientists from



local environmental consulting firms frequently contact MGS for historical aerial photographs in their area of interest to research historic stream channel alignment and land use history that may have influenced the stream channel geomorphology. Scientists at The Nature Conservancy recently requested historical aerial photographs from MGS to research historical forest areas.

Maryland state agencies also continue to utilize the Aerial Photograph Collection. The Department of Public Works in Bowie, MD requested aerial images to study historical roads and intersections in their town. At MGS, a geologist was recently tasked with evaluating groundwater flow in a portion of the Piedmont Physiographic Province of Maryland. MGS's historic aerial imagery was utilized to assess population and urbanization over time, and to search for potential bedrock fractures that could affect groundwater flow in the subsurface. Stereo-paired photos were used to further examine local surface drainage areas and topography.

### **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.

Recently, 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 Carbon Sequestration Partnership (MRCSP) 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 provide access to them, MRCSP members could avoid the prohibitive time and cost to permit, contract, re-drill and sample the core.

### **CONCLUSIONS**

MGS fulfilled its FY2017 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 QA/QC review process; and transferring the paper aerial photographs to MSA, a state facility with space/climate control better suited for the photographs' long-term survival. For its Drill Cuttings Collection, MGS created an internal cuttings database and started a detailed collection inventory – hopefully the beginning of a multi-year effort to properly document, organize, and store the collection. 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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Resource Assessment Service

Tawes State Office Building

580 Taylor Avenue

Annapolis, Maryland 21401

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Out of State call: 1-410-260-8021

TTY users: Call via the Maryland Relay

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MARYLAND GEOLOGICAL SURVEY

2300 St. Paul Street

Baltimore, Maryland 21218

Telephone Contact Information: 410-554-5500

[Internet Address: www.mgs.md.gov](http://www.mgs.md.gov)

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