HISTORICAL PHOTO ANALYSIS

ARMY GEOSPATIAL CENTER

JOY POCHATILA, ENVIRONMENTAL ANALYSIS TEAM LEAD
703-428-6261,
JOY.POCHATILA@US.ARMY.MIL

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Army Geospatial Center

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ORGANIZATION

- Conducting photogrammetric research and development since the 1920s
- Army Geospatial Center (AGC) created in 2009
  - ✓ Major Subordinate Command (Center) under the US Army Corps of Engineers
  - ✓ Co-located with ERDC's Geospatial Research Laboratory (formerly Topographic Engineering Center)
  - ✓ Provides geospatial information, domain expertise, training, and reach back capabilities
  - ✓ Engages in system development, acquisition, and geospatial technology integration
  - ✓ Designs and implements the Army Geospatial Enterprise (AGE)

FUNCTIONAL AREAS

- Enterprise Development and Acquisition Support
- Warfighter Geospatial Support and Production
- Systems Acquisition and Program Management
- Research, Development, Technology and Evaluation

FACILITIES

- Time Critical Users Site
- SECRET and TS/SCI (60k sq ft SCIF)

STAFF

- 350 Scientists and Engineers
- Professionally Certified/Licensed in:
  - ✓ Acquisition
  - ✓ Contracting
  - ✓ Engineering
  - ✓ GIS, Surveying, Geology
  - ✓ Program Management

FOOTPRINT

- Office of the Chief of Engineers; Pentagon, VA
- Transatlantic Division; Winchester, VA
- National Reconnaissance Office; Chantilly, VA
- US Army Intelligence Center of Excellence; Ft. Huachuca, AZ
- TRADOC Capability Manager – Geospatial; Ft. Leonard Wood, MO
- NGA Campus East; Springfield, VA (OCE/GGB Staff)
- High Res/3D Collection Lead (Afghanistan)

AGC has a VITAL MISSION to provide geospatial engineering in direct support to DoD.

AGC PROGRAM AREAS

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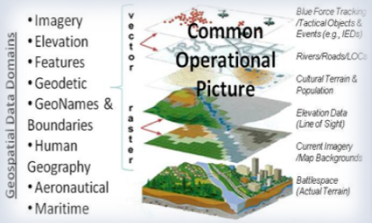
CAPABILITIES

Research, Development, Technology and Evaluation

- Geospatial Research and Engineering
- Geospatial Enterprise Technologies
- Advanced & Joint Concepts Technology Demonstrations (A/JCTDs)
- Fluorescence
- Remote Sensing/Image Analysis
- Surveying/GPS/Navigation Terrain Reasoning & Awareness
- Data Provisioning
- Geospatial Net-Centric Experimentation
- Modeling and Mapping Complex Social Systems
- Spatio-Temporal Reasoning and Numerical Analysis

Enterprise Development and Support

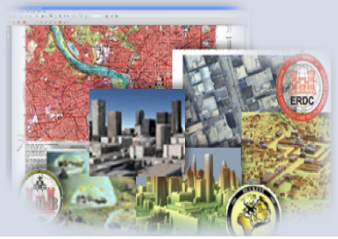


- Systems of Systems Engineering and Architecture Development
- Materiel Requirements Development
- Standards/ Architecture Integration
- Geospatial Technology Integration
- Trade Studies
- Acquisition Certification
- Pilot Engineering
- Enterprise Data Modeling
- Technical Support

Systems Acquisition and Program Management

- Develop and Field Materiel Capabilities
- Application Development
- Advanced & Joint Concepts Technology Demonstrations (A/JCTDs)
- Full Lifecycle Acquisition Support
- Geospatial Engineering and Intelligence Expertise
- Systems Engineering and Requirements Integration
- Emergency Response Systems
- Program Management
- Technical Support

Warfighter Geospatial Support and Production



- Geospatial Support and Production
- High-Resolution Terrain/EO Generation
- Urban Information
- GeoPDF
- GPS Databases
- Environmental Analysis
- Transportation Analysis
- Water Prediction/Analysis
- Commercial & National Imagery Management & Dissemination
- Common Map Background
- AGE GeoGlobe
- Reach-back Support / Training

FOUNDATION DATA ★ REACH BACK SUPPORT ★ SYSTEMS INTEGRATION ★ ENABLE HORIZONTAL / VERTICAL EXCHANGE

AGC'S HISTORICAL PHOTO ANALYSIS

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- **Why is HPA important?** GIS-based historical photo analysis (HPA) can focus restoration and remediation efforts, leading to overall **cost savings**!
- Identify potential areas of environmental concern on U.S. Military installations:
  - Hazardous, Toxic and Radioactive Waste (HTRW)
  - Unexploded Ordnance (UXO) under the Military Munitions Response Program (MMRP)
  - Landfill Locations, Groundwater Contaminate Pathways, and Shoreline Changes

ENVIRONMENTAL PROJECTS

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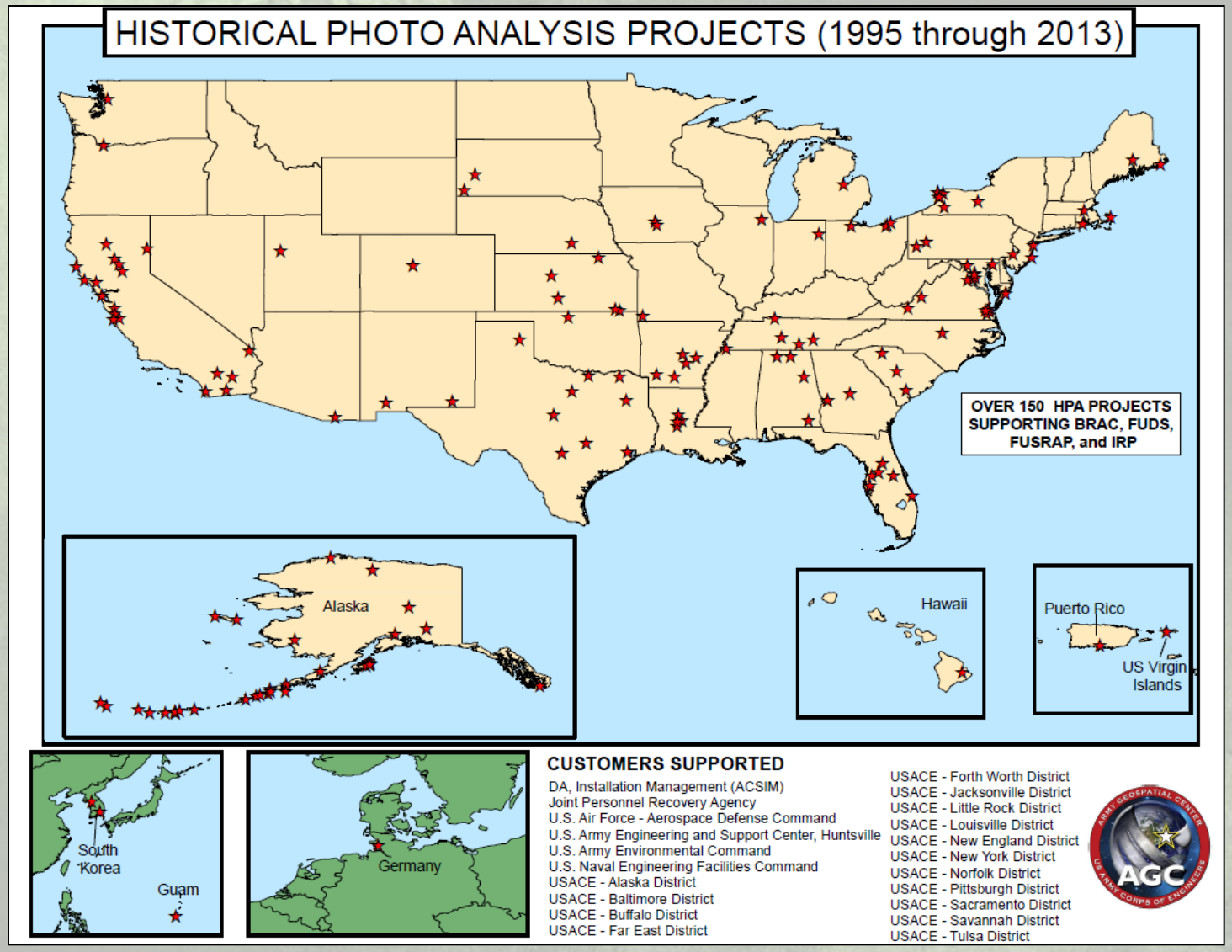

CUSTOMIZED HPA SUPPORT

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Research
What were the previous military activities onsite?
When and where did the activities take place?

Photography/Imagery Acquisition
Convert hardcopy photos and
film negatives into digital formats.

Imagery Geo-Rectification
Adding geographic reference to digital photos.

Analysis
What information can be learned from the photography?
Determine changes in activities over time and geographic extent.

GIS Data Production
Results of analysis delivered in SDSFIE-compliant GIS package.
GIS data are used in the field to ground truth analysis.

Hardcopy Report Production
All research, photos, and analysis are presented in a report that can be used in-house and for public meetings.

RESEARCH

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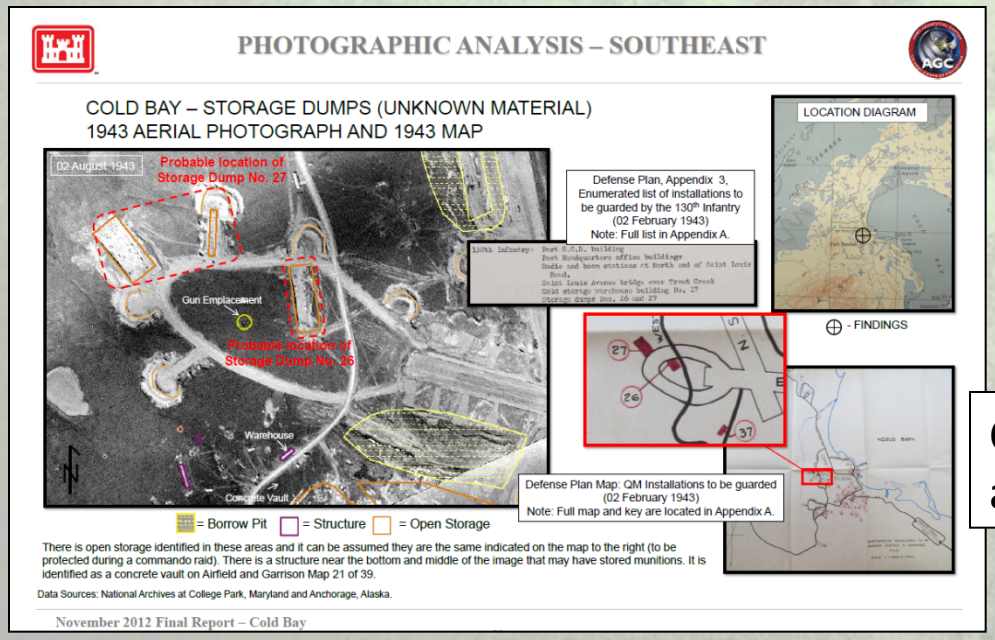
- Review materials provided by customer.
- Literature review.
- Find and order film cans for viewing and scanning (National Archives, USGS, NOAA).
- Visit National Capital Area and local repositories to collect data (maps, documents, textural records, ground photos, etc).



Collection of aerial photos, maps, and textural records

IMAGERY ACQUISITION
NATIONAL ARCHIVES & RECORDS ADMINISTRATION

- AGC has capability to obtain digital scans of film negatives at the National Archives & Records Administration in College Park, MD.
- **No other federal agency or private company has this capability.**
- AGC Advantage: Digital scans can be obtained rapidly in order to meet customers' mission requirements.

PHOTOGRAPHY/IMAGERY RECTIFICATION

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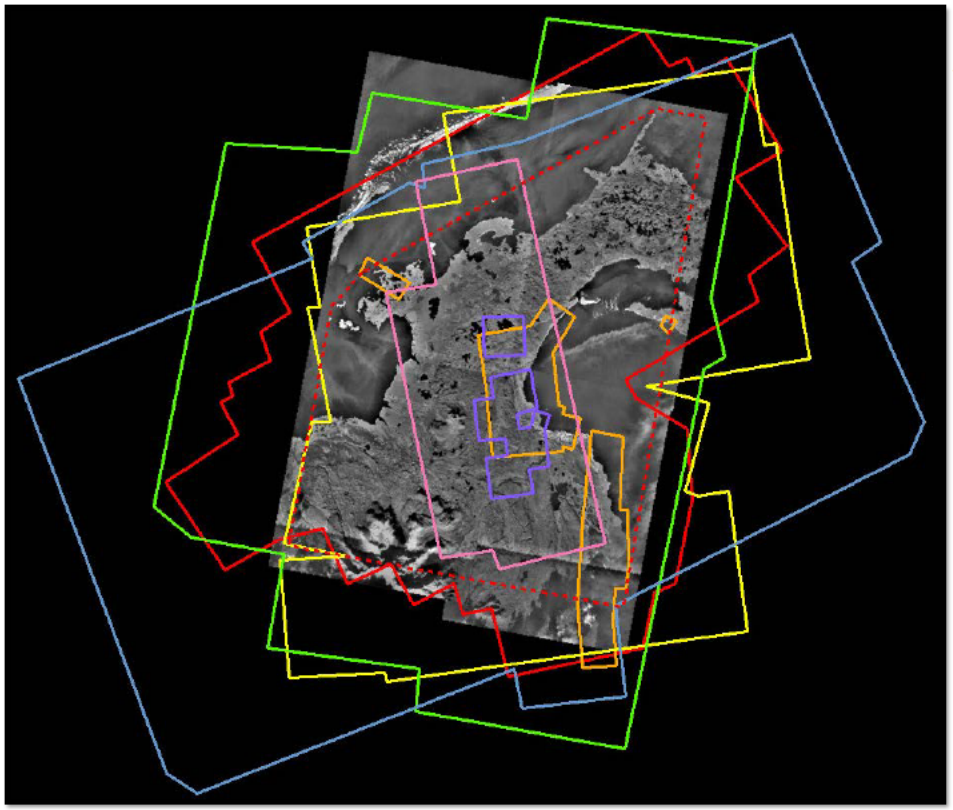

Aerial Photograph Coverage over Cold Bay AOI

- 1940's (1942-1944)
- 1950's (1953, 1955-1958)
- 1960's (1962, 1966)
- 1970's (1973, 1975-1976)
- 1980's (1983, 1987)
- 1990's (1995)
- 2000's (2001)

Cold Bay HPA Project Boundary

ANALYSIS

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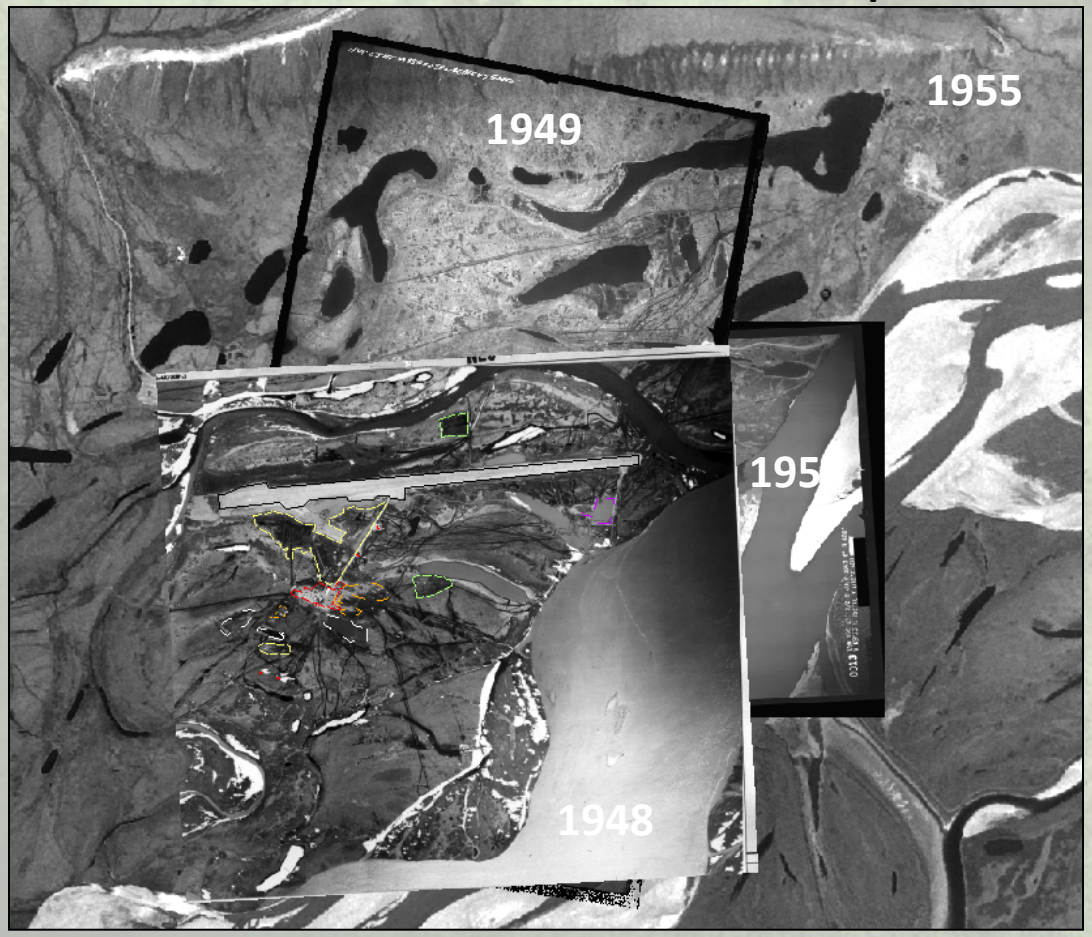
Traditional PHOTO INTERPRETATION Techniques :



- Tone
- Texture
- Shadow
- Shape
- Size
- Pattern
- Color*
- Height/Depth*

EXAMPLES

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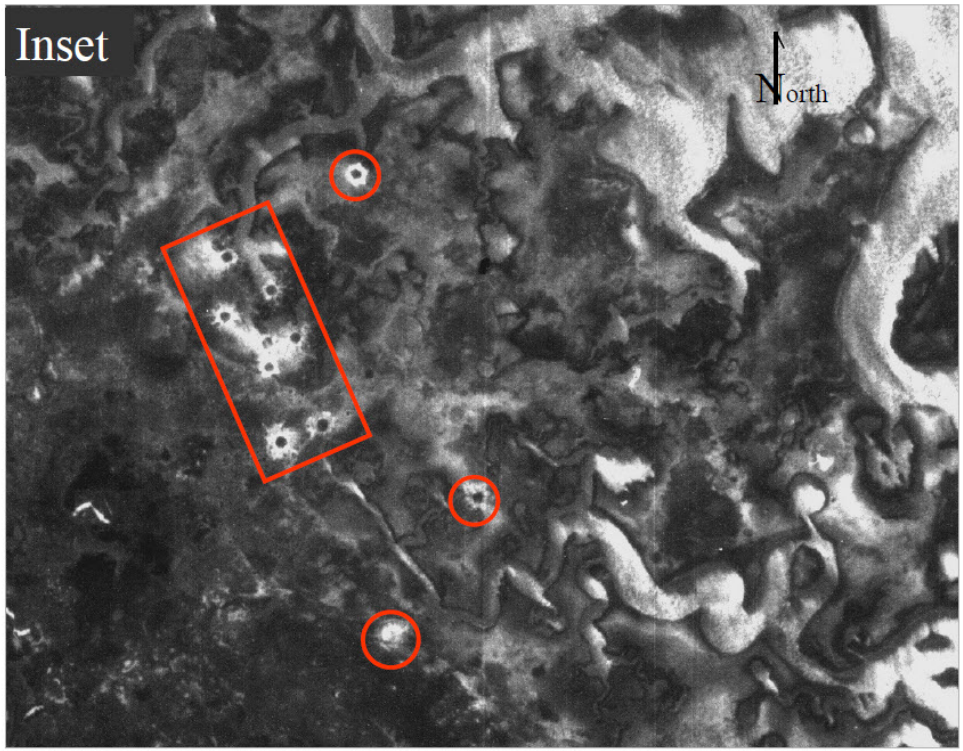
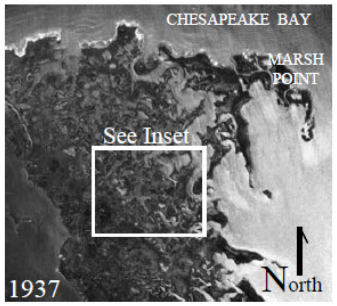
Plum Tree Island Bombing Range, VA

IMPACT CRATERS LOCATED INLAND – NORTHERN SECTION, 1937

TONE





LOCATION DIAGRAM

Source: National Archives and Records Administration (NARA), Record Group 145, flown 12 April 1937.

Impact Crater(s)

EXAMPLES

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Plum Tree Island Bombing Range, VA

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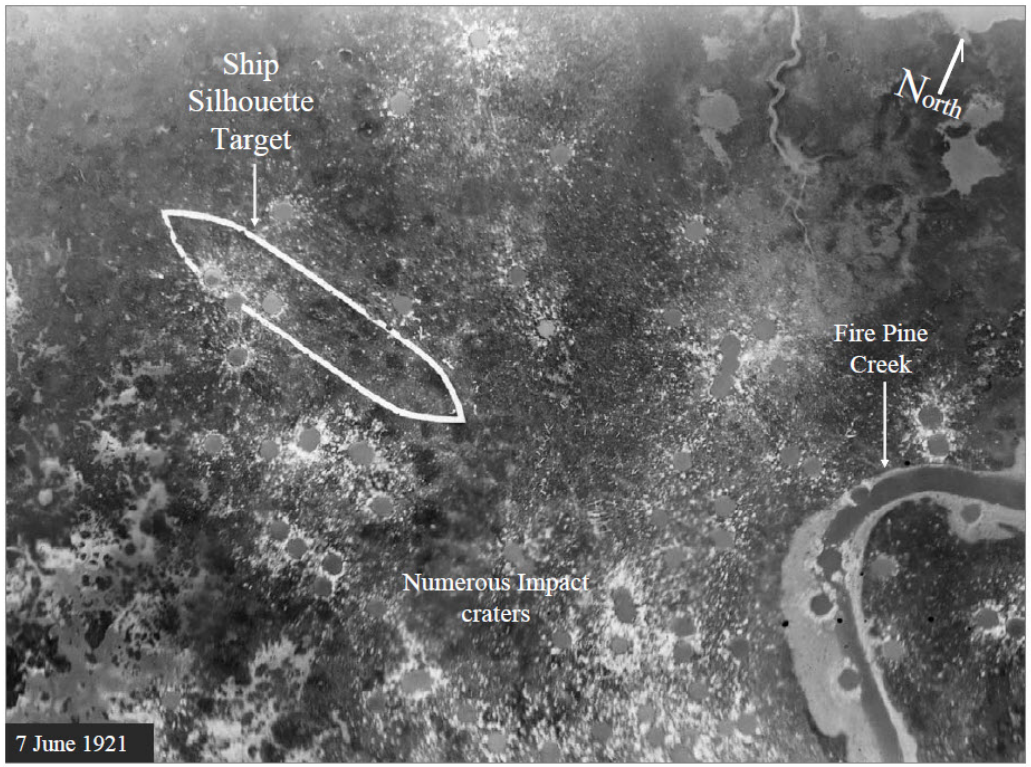
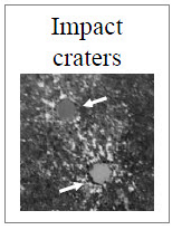
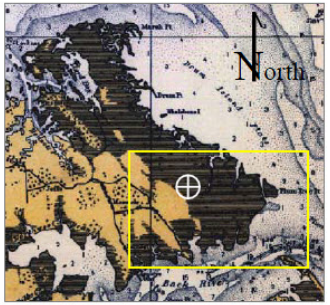
SHIP SILHOUETTE TARGET – SOUTHERN SECTION, 1921

PATTERN



Source: Colorado State Archives, Army Air Service Photo School, Major Milling's Photographic Collection, Photo C-21188.





LOCATION DIAGRAM

EXAMPLES

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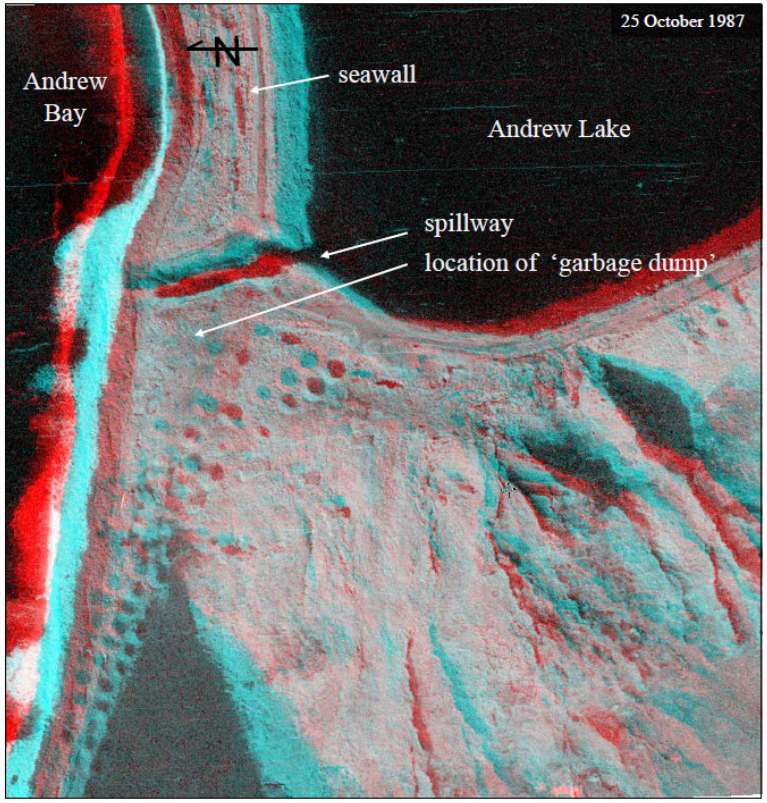
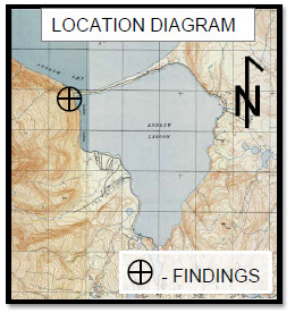
3-D AERIAL IMAGE : WEST SEAWALL & SHORELINE AREA

3-D IMAGE NO. 1



Western section of Andrew Lake Seawall and shoreline along Andrew Bay. Numerous craters are evident in this area (left side of image).

DEPTH



To obtain the 3-D effect, images must be viewed with red/blue lens stereo glasses.

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EXAMPLES

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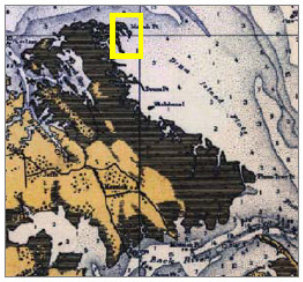
LOCATION DIAGRAM



North

SHORELINE CHANGES – MARSH POINT

1937, 1968, & 2002 HISTORICAL COMPARISON OF VIEWS

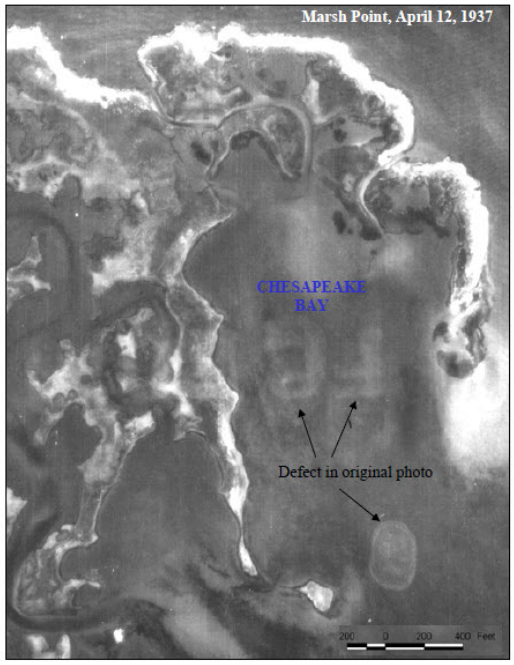
Page 64

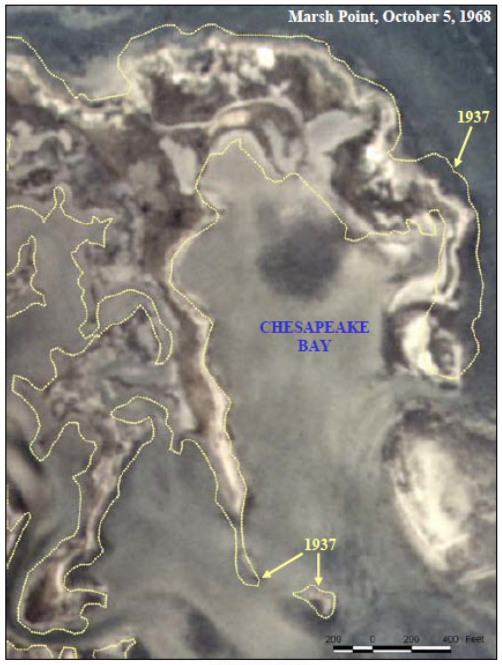
SHORELINE CHANGES

Marsh Point – *Note how the area has undergone significant erosion over time.*
[Influences of sea level rise, storms, low/high tide were not factored into the photographic shoreline delineation.]

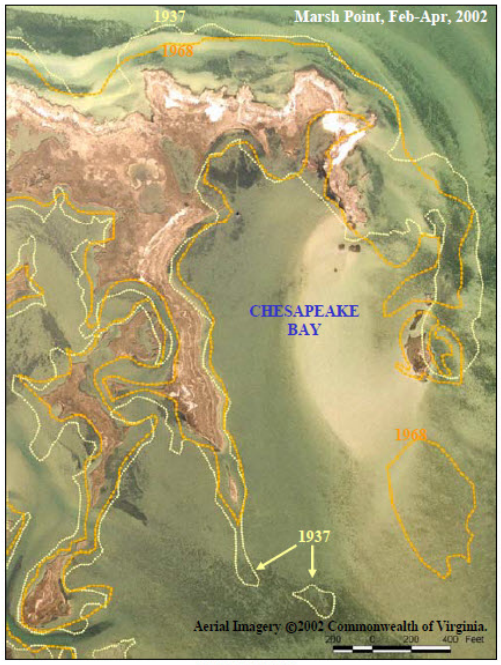
Shorelines : 1937 1968

SEE NEXT PAGE FOR LARGE SCALE VIEW





SEE PLATE 3



SEE PLATE 5

EXAMPLES

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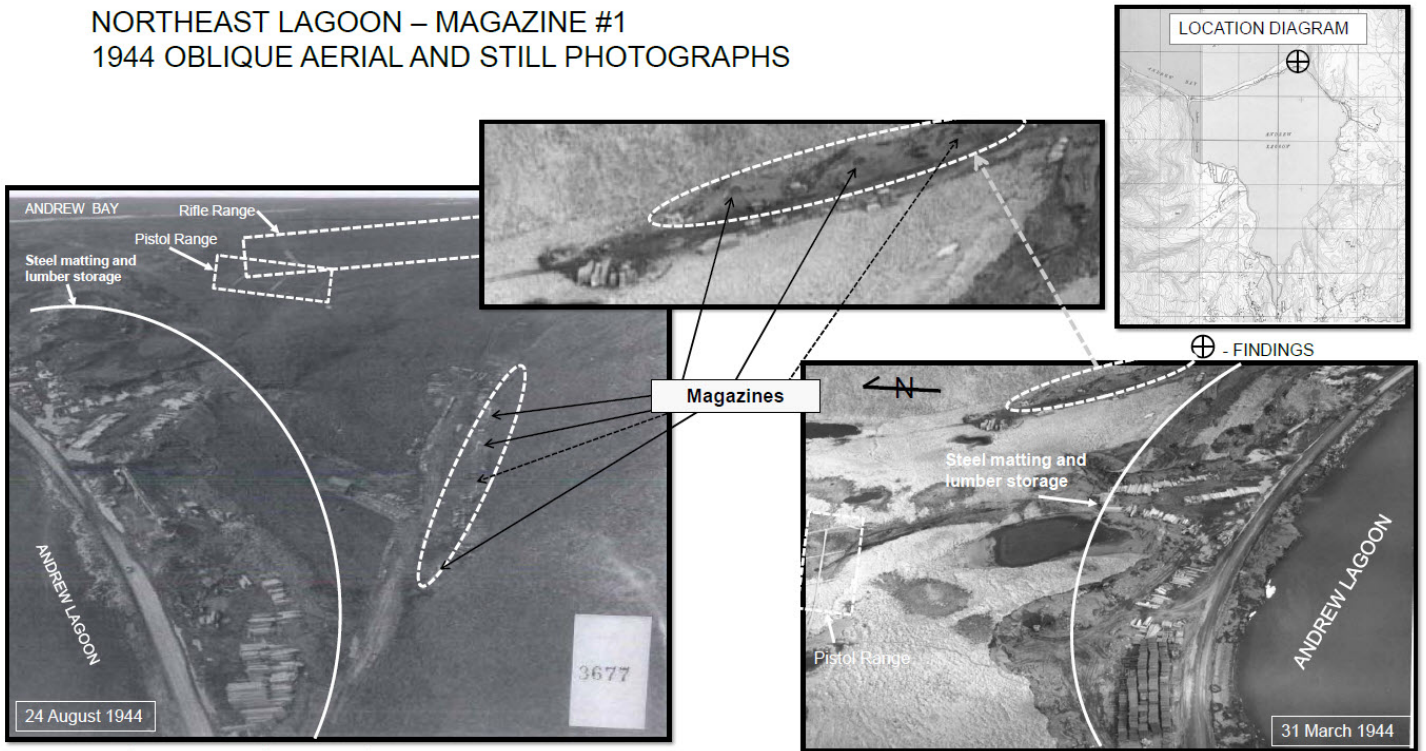
GROUND PHOTOS

PHOTOGRAPHIC ANALYSIS – NORTHEAST LAGOON

NORTHEAST LAGOON – MAGAZINE #1
1944 OBLIQUE AERIAL AND STILL PHOTOGRAPHS



Photography Source: National Archives at College Park.

= Magazine Area

GIS DATA PRODUCTION

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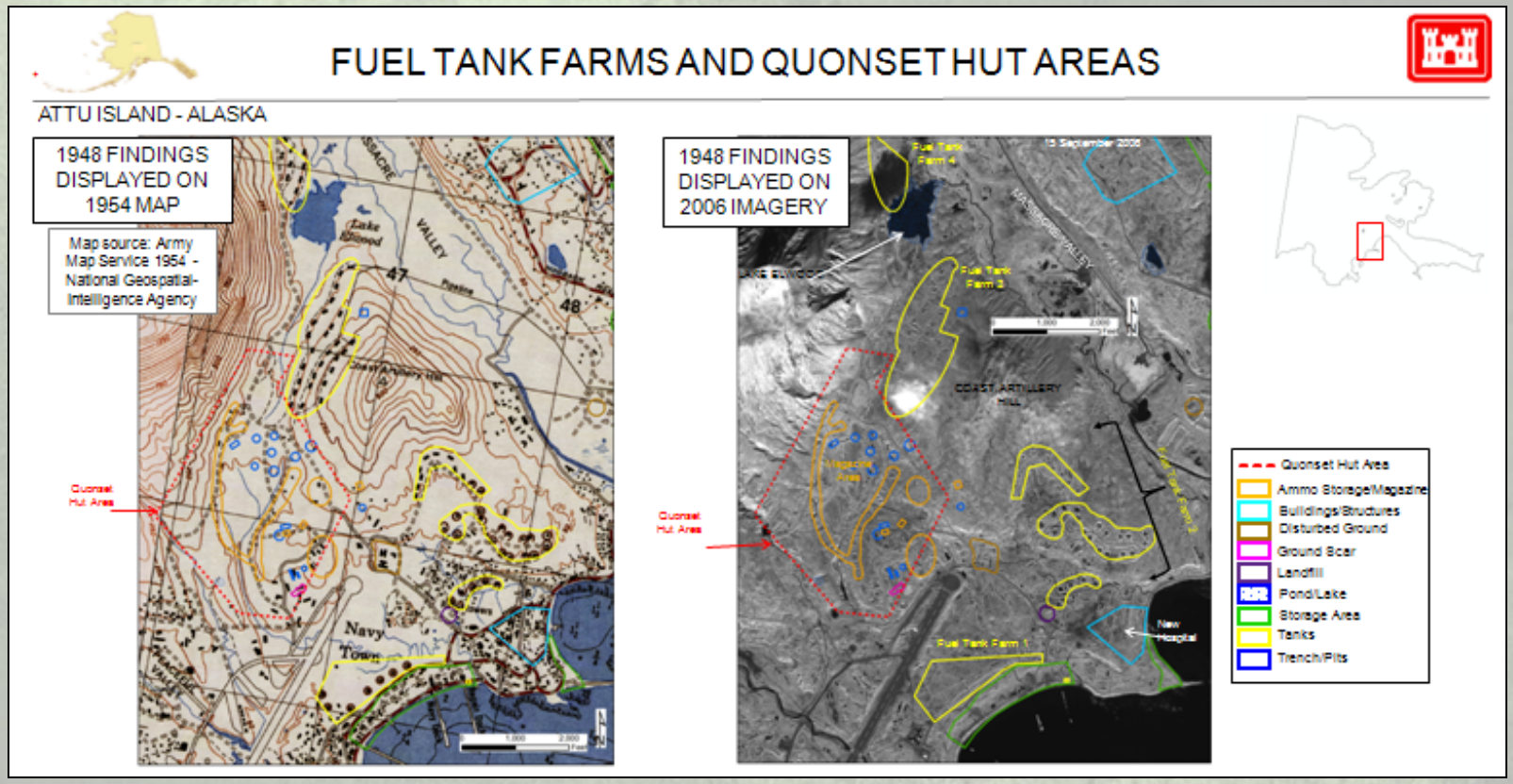

DELIVERABLES

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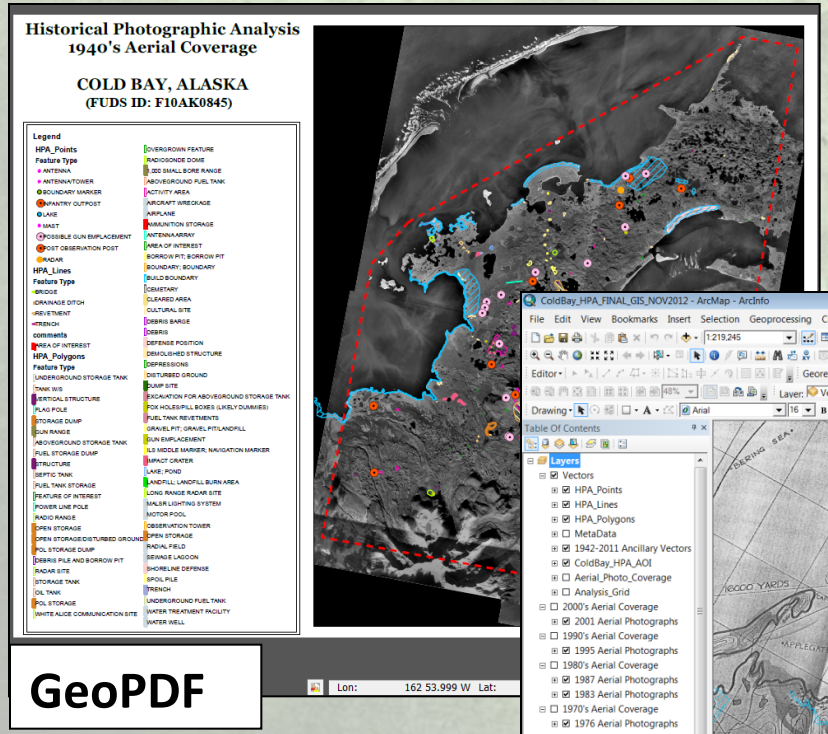
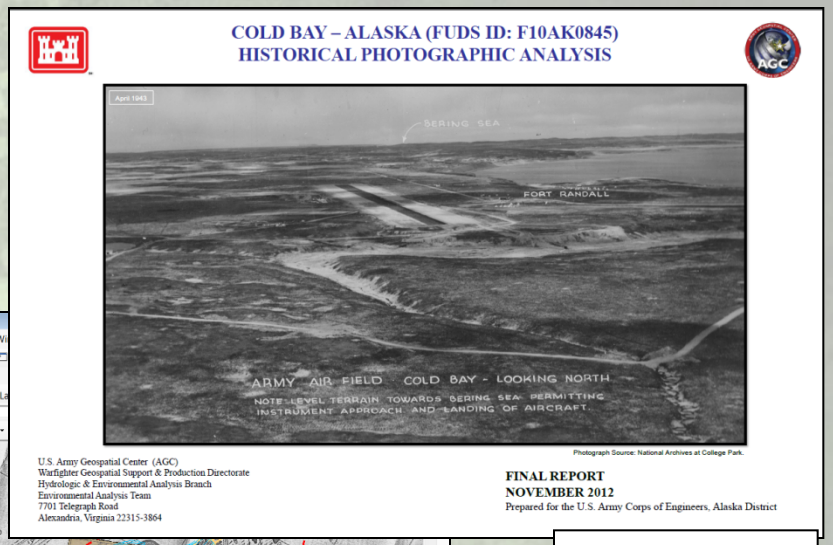
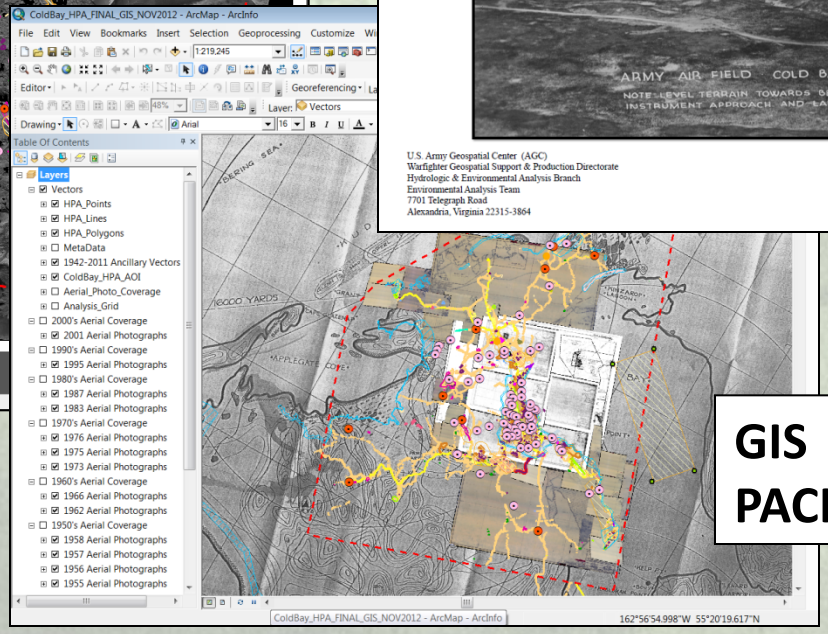
REPORT PRODUCTION and DELIVERABLE



GeoPDF



REPORT



GIS PACKAGE

EXAMPLES OF CUSTOMIZED COSTS

THE NUMBER ONE FACTOR IN DETERMING COST OF EACH TASK IS THE GEOGRAPHIC EXTENT OF THE SITE.

1. IMAGERY RESEARCH AND ACQUISITION - $5K TO $25K

2. SITE SPECIFIC RESEARCH (MAPS, GROUND PHOTOS, TEXTURAL RECORDS) - $5K TO $50K

3. GEORECTIFICATION OF IMAGERY - $10K TO $25K

4. FULL ANALYSIS WITH GIS PACKAGE AND REPORT - $25K TO $50K

***AGC ASSISTS THE CUSTOMER IN DETERMINING WHAT TASKS PROVIDE THE GREATEST BENEFIT BASED ON A SPECIFIC BUDGET.**

***TASKS ARE PAID VIA REIMBURSABLE FUNDING FROM CUSTOMER.**

***AGC CAN SET UP CROSS LABOR CHARGE CODES AS WELL AS ACCEPT PROJECT ORDERS FOR MULTIPLE YEARS OF FY FUNDING.**

ARMY GEOSPATIAL CENTER

- Historical Photo Analysis

Visit AGC Website:
AGC Portal: http://www.agc.army.mil/index.html

Dr. Joseph Fontanella
Director

Mr. Richard Herrmann
Deputy Director

Mr. Michael Harper
Directorate Chief
Collection, Exploitation & Production Dir.

Mr. Tom Spillman
Chief
Hydrologic & Environmental Analysis Branch
703-428-7869

Ms. Joy Pochatila
Lead
Environmental Analysis Team
703-428-6261

7701 Telegraph Road
Alexandria, Virginia
22315-3865

PKI (CAC-Enabled): https://cac.agc.army.mil
SIPRNET: http://www.agc.army.smil.mil
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