NOAA Open House on Nautical Cartography
07 July 2017

Denise LaDue
US Army Geospatial Center
BACKGROUND
A TRAGIC BEGINNING
BIG BAYOU CANOT
ELECTRONIC CHART DATA FOR SAFE AND EFFICIENT NAVIGATION

September 22, 1993

- A towboat pushing six barges, lost in the fog, struck the Big Bayou Canot bridge near Mobile, AL causing the track to misalign by approximately 3 feet.

- Eight minutes later, AMTRAK Sunset Limited derailed on the railroad bridge and plunged into the waterway, killing 47 and injuring 103.

An electronic chart system on the towboat may have prevented the accident.
BIG BAYOU CANOT

Allision Site

Intended route of travel of M/V Mauvilla
CHRONOLOGY OF USACE IENC DEVELOPMENT

S-57 Standard, Edition 3.1 (For Maritime ENCs)
- 2001 – US Congress tasked USACE to produce IENCs
- 2001 – present – USACE produced & maintains 107 IENC cells, covering 21 waterways

IENC Standard, Edition 2.1-2.4 (For Inland ENCs)
- 2010 – Decision made to produce new waterways to Inland ENC standards (3 rivers produced to IENC 2.1)
- 2011 - Conversion of charts from S-57 & IENC 2.1 to Inland ENC 2.2 started
- 2012 – Migration of all charts to IENC 2.2 Completed
- 2014 – Conversion of IENC cells to IENC 2.3 standard
- 2017/2018 – Conversion of IENC cells to IENC 2.4 standard
INLAND ENC COVERAGE IN USA

- 107 IENC cells covering over 7,200 miles
- 21 Rivers
- Charts are produced to the IENC 2.3 Standard
- All charts are reviewed monthly and updated, as necessary.
INTERNATIONAL IENC STANDARDS AND DEVELOPMENT

- International Working Group
- Organized to develop and to maintain a standard for IENCs suitable for inland navigation
- Standard based on the existing standards of International Hydrographic Organization for ‘maritime’ ENCs (S-57)
- Standard will be suitable for all known data requirements for safe and efficient navigation in European, North American, Russian Federation, South American and Asian inland waterways
- It is further intended that IENC standards meet the basic needs for Inland ENC applications, worldwide
WHAT IS MEANT BY AN "INLAND" STANDARD?

Examples of unique features found in waterways which are not found in maritime waters:

- Casino / Gaming Boats
- Fleeting Areas
- Ice Breakers
- Lock Guide Walls
- Exceptional Navigation Structures (Lift bridges/viaducts)
PRODUCTION PROCESS
15 USACE Districts & US Army Geospatial Center
OTHER SOURCES

USCG Navigation Center: https://www.navcen.uscg.gov/
Welcome to the IENC Chart Discrepancy Reporting System

The IENC Chart Discrepancy Reporting System provides registered users the opportunity to report inaccuracies in and problems with IENC charts.

Do You Need An Account?
If you are not a registered user, click the button below.

Register For An Account

Registered Users:
If you are a registered user, log in here.
Login To My Account
## US Army Corps of Engineers

**IENC History File**

<table>
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<tr>
<th>IENC File Name</th>
<th>Edition No.</th>
<th>Update No.</th>
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**Source Application**

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- Added text: ELE 1803.2 - ELE 1803.1 - GOVERNMENT RESURCES - ELE 1803
- Revisited: ELE 1803.2 - ELE 1803.1 - GOVERNMENT RESURCES - ELE 1803
- Revised: ELE 1803.2 - ELE 1803.1 - GOVERNMENT RESURCES - ELE 1803
- Corrected: ELE 1803.2 - ELE 1803.1 - GOVERNMENT RESURCES - ELE 1803
- Updated: ELE 1803.2 - ELE 1803.1 - GOVERNMENT RESURCES - ELE 1803
### 1. PROJECT SCHEDULE UPDATE

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- Monthly change log
- Current edition
- Which cells changed
- Descriptive summary of changes
- Summary of all History files in a small package
Contains QA comments
- "PASSED" if all is okay
- Otherwise, a statement describing the problem with the edit to help the Producer resolve the issue

### Island Electronic Navigational Chart

**District QA Chart Documentation Sheet**

- **Delivery Cycle Date:** [Fill in]
- **Date QA Started:** [Fill in]
- **Date QA Completed:** [Fill in]
- **Chart Name:** [Fill in]
- **Edition and Update #:** [Fill in]
- **Date Produced:** [Fill in]
- **River Name:** [Fill in]
- **River Section Covered:** From mile [Fill in] To mile [Fill in]
- **USACE District:** [Fill in]
- **Producer:** [Fill in]

**Deliverables:**
- Chart Exchange File (*.000 file(s), catalog file(s), image file(s))
- Final Report
- Metadata File
- Error Report
- Final Chart Production File
- Other files requested in Scope/Task Order:

**S-57/ENC Compliance:**

**Performed by:** [Fill in]

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### Compiler / Reviewer Information

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### Discrepancy Reports

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<td>small DEPARE and DEPINT from 2614120 remains inside new DEPARE and DEPINT in Lock 52 pool, backchannel of Cumberland Island at Cumberland River mile 1.2</td>
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**US Army Corps of Engineers**

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*Image showing detailed content with tables and sections marked as QA comments.*
IENC CLOUD
IENC CLOUD BACKGROUND

- Federal Geographic Data Committee (FGDC) issued an RFP in Dec, 2011 to sponsor pilot project with 10 Federal agencies to distribute their public data free for one year on Amazon Web Services (cloud), ending March, 2013. Named the Geocloud Program.

- IENC was chosen because of relatively small dataset and expertise with ArcGIS. Approval was given by CIO, USACE to distribute public navigation data on AWS

- https://www.ienccloud.us
– Advantages include
  – very high reliability of server performance
  – cost effective data hosting
  – scalable CPU availability
  – remote access for data updates

– ArcGIS Server 10.1
  – Over 6000 GIS layers uploaded
  – Clients
    – ArcMap, ArcGIS Explorer
    – ArcGIS JavaScript
    – Google Earth
    – ArcGIS.com

– Experienced over 9 million downloads
IENC CLOUD: DOWNLOADABLE FILES

- IENC
  - “S-57” Exchange Set
  - Shapefile
  - KML/KMZ
  - GeoPDF

- USCG Buoys
  - “S-57” Exchange Set
  - Shapefile
  - KML/KMZ
  - Updated every Tuesday
IENC CLOUD: SPECIAL DOWNLOADABLE FILES

- Southwest Pass
- Wilkenson to Smoke Bend
- Belmont
- Fairview

- S57 Exchange Set only
- Use with NOAA ENC
- Soundings and contours
- Southwest Pass is updated weekly
IENC CLOUD: IENC WEB SERVICES

- ArcMap Service
  - Online viewer
  - REST Service
- Web Map Service (WMS)
- Web Feature Service (WFS)
- KML Service
  - Google Earth

- Services by
  - IENC cell
  - IENC object
  - Entire dataset
IENC CLOUD: USCG BUOY WEB SERVICES

• ArcMap Service
  • Online viewer
  • REST Service

• KML Service
  • Google Earth

• Updated weekly
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Inland Chart Books

Current USACE chart books can be purchased from the Government Publishing Office (GPO) bookstore, by accessing the USACE Navigational Chart "store". Charts may be available at a lower cost directly from the Corps Districts, however, for consumer convenience, charts are now available for purchase through the GPO. Many hard copy chart books are available from the Corps districts. The cost, scale, features, and update cycles may be different from district to district.

Alabama River
Last published in 2014, the Alabama River Navigation Charts are available to download in pdf format (11 x 17 inches) from the Mobile District.

Allegheny River
Last published in 2004, the Allegheny River Navigation Charts are available to download in pdf format (14 x 8.5") from the Pittsburgh District or for hardcopy purchase from the GPO Bookstore.

Arkansas River
Last published in 2003, the McClellan-Kerr Navigation Charts are available for download in pdf format (16 x 8") and can be ordered as hard copy books from the Tulsa District.

Lower Mississippi River
Last published in 2015, the Lower Mississippi River Navigation Charts are available for download in pdf format (11 x 17") from the New Orleans District and are also available for hardcopy purchase from the GPO Bookstore.

Missouri River
Published in 2014, the Missouri River Navigation Charts (Miles 0-499) are available for download in PDF format (14 x 8.5") from the Kansas City District.

Published in 2014, the Missouri River Navigation Charts (Miles 499-735) are available for download here in PDF format (14 x 8.5") from the Omaha District.
A One-Stop-Shop for all USACE Paper Chart Books
- 20/22 Chart Books Available
  - 1 to be released in 2017
  - 1 to be released in 2018

Current production guidance
- EP 1130-2-520 NAVIGATION AND DREDGING OPERATIONS AND MAINTENANCE GUIDANCE AND PROCEDURES

https://bookstore.gpo.gov/agency/1784
PARTNERING: USCG

Buoy Placement Data Sharing

USACE → USCG: Survey data to aid in buoy placement

USCG → USCG: Buoy Coordinate locations

Buoy IENC Overlay updated and published weekly by USACE
IENC OVERLAY: MISSISSIPPI RIVER (SOUTHWEST PASS)

- USACE survey data for SW Pass → updated weekly
- Overlay file, 3UASW000 overlays on NOAA ENC (US4LA30M & US4LA33M)
- USACE Survey data for 3 other areas on the Lower MS River → updated monthly or as needed
IENC OVERLAYS: USCG BUOY PLACEMENT DURING LOW WATER EVENT 2012

- USACE Survey data → USCG for rock pinnacle area on Upper Miss River near Grand Chain
- USCG Cutters used surveys to place buoys
- USCG → Excel file with Buoy Locations
- USACE created Buoy Overlay for USCG & Towing
PARTNERING: NOAA COORDINATION AND DATA SHARING

More consistent and reliable channel data from Corps for NOAA charts

Coordination of adjoining charts for seamless use by chart systems
SAFE NAVIGATION
A CAUTIONARY TALE
EGGNERS FERRY BRIDGE

26 Jan 2012
Tennessee River Mile 41.7
Delta Mariner transited the wrong navigation span
EGGNERS FERRY BRIDGE ALLISION

- Boat was empty, therefore higher in the water
- Pilot turned off all safety depth information in Rose Point
- Display has no sailing line or river miles
TN River Mile 41.7
HWY68-80 Bridge completed in 2016
Tows can turn the lights off by going to a marine channel, and click 3 times rapidly.
EFFICIENT NAVIGATION
SAFE AND EFFICIENT NAVIGATION

- 25,000 miles of waterways
- 239 lock chambers lifting 6,100’
- 565.9 million tons of commodities
  - 29% petroleum
  - 22% coal / coke
  - 17% other raw materials
  - 16% food & farm products
  - 9% chemical
  - 7% manufactured products

Equivalent Units

22,500 Tons =
One 15 Barge Tow

225 Railroad Cars

900 Large Semi Trucks

Source: Navigation Data Center “TRANSPORTATION FACTS & INFORMATION”, 2016
QUESTIONS?

Denise.R.LaDue@usace.army.mil