

**18<sup>th</sup> CHRIS MEETING**  
26-29 September 2006, Cairns, Australia

PRINTED ENC's  
(August 2006)

United States (NOAA)

1. Summary

<b><i>Executive summary:</i></b>	Hydrographic offices that make ENC's would like to use one production system for all of their products. Unfortunately, it is difficult to make traditional paper charts from S-57 databases without substantial additional attribution. Instead, it is proposed that a new paper chart be defined that can be made directly from an ENC.
<b><i>Actions to be taken:</i></b>	The CHRIS committee is invited to direct TSMAD, CSPCWG, and C&SMWG to take note of USA (NOAA) work on "printed ENC's", and to liaise as appropriate.
<b><i>Related documents:</i></b>	None

2. Introduction / Scope

Hydrographic offices that make ENC's would like to use one production system and database for all their products: paper charts, raster charts, ENC's, etc. Such a consolidated production system is desirable to keep cost and manpower requirements lower, and to keep all products synchronized.

Reaching this goal is difficult because it is hard to exactly reproduce a traditional paper chart from an S-57 database. Examples of problems include the placement of text; features that coincide; and items that are on paper charts but not in the S-57 database. Solutions emerging from companies making ENC production systems involve complicated additional software, and/or substantial extra attribution and its maintenance by the hydrographic offices.

To improve this situation, it is proposed that the paper chart be redesigned, or a new paper chart be created and standards written. This "printed ENC" would be designed to be manufactured directly from an ENC while still providing a regulation-compliant printed product.

3. Analysis/Discussion.

A contract was awarded from NOAA to LaserScan, whose production system NOAA uses to produce ENC's. The principal investigator provided the following preliminary findings.

Summary of what's been done:

The aim of the task was to identify all issues regarding producing a paper chart directly from an ENC. To this end, we have carried out the following:

1. We have looked in detail at an existing system capable of producing paper charts from ENC but requiring significant user input. This has indicated what additional information is required to produce a paper chart from an ENC.
2. We have examined relevant specifications, including S-57, S-52 and the ENC product specification to identify what elements of the specifications cause problems. This has also included a detailed analysis of each object in ENC to determine any issues in representation.
3. We have examined a number of printed paper charts and compared those to the captured ENC and the representation of the ENC when using a number of ENC viewers. Analysis of the charts and the equivalent ENC has highlighted a number of issues that relate specifically to the capture specifications used to produce ENC data and also indicated the limitations of S-52 for cartographic representation.
4. We have also reviewed a number of related documents and other studies looking at producing paper charts from ENC to identify common problems and issues.

All of the above have been carried out in a systematic and thorough manner to ensure that a complete picture has been obtained of issues involved in producing a paper chart from ENC.

Some Preliminary Conclusions:

From the analysis carried out it can be shown that most of the geographic information required for a paper chart is present in an ENC and can be represented in a suitable manner. However, ENCs do not contain information regarding the cartographic placement of objects or certain chart specific information that is required to produce a current paper chart. The main issue is one of text placement for text that relates to objects in the ENC. The actual text information that is currently displayed on a paper chart is mostly present in the data (sometimes in multiple objects or in a coded way) but its cartographic placement is not.

Additional chart specific information is also required that is not currently supported by ENC such as borders, graticules, compass roses, tide-tables and other non-geographic information.

Another issue is one of scale. ENC data is being collected using the largest scale data available (appropriate for the navigational purpose of the ENC) which would lead to 'holes' in paper charts produced from an ENC where there are larger scale charts available for parts of it. A single ENC can also contain data that has been captured from sources at different scales, e.g. data captured from an inset. This could cause inconsistencies in the density of the data which would cause problems in representation if the data was plotted directly. A means of resolving these issues would need to be implemented before a paper chart could be produced directly from an ENC.

A final report will be produced near the end of the calendar year 2006.

#### 4. Benefits.

The benefits of redesigning the paper charts so they could be made directly from ENCs are significant.

- A. Mariners would receive an improved level of service.
  1. Mariners could make their own products from updated ENCs: paper or raster charts; ECDIS backup; paper chart updates or patches; and printed voyage planning documents. This would improve the timeliness and the breadth of distribution.
  2. All of a mariner's chart products would be synchronized.

3. The increased value and (potentially) reduced cost for products mariners make themselves would provide incentive to increase the uptake of ENC's.
4. Working from S-57-compliant ENC's would provide this same level of service worldwide.
5. Clarity would be provided about what is an official product. It would be an official ENC or any product produced from one that met the new standards for that derived product.

B. The amount of work required of hydrographic offices would decrease.

1. Hydrographic offices could focus on gathering data and updating their ENC's.
2. Cartography, and the labor it uses, would be reduced. The redesigned paper chart would eliminate many cartographic decisions. The remaining depiction rules would be incorporated in the "printed ENC" software.
3. Maintenance for a hydrographic office's products would be reduced to ENC maintenance only.
4. The gathering and maintenance of additional data dealing with cartographic depiction would be reduced.
5. The goal of a single production system for all products would be achieved. This would be true regardless of which vendor's ENC production system a MS used.

C. ENC production system manufacturers would also benefit.

1. System complexity would be reduced. By making ENC's the source of all other products, manufacturers would not need to customize their software for each nation's cartographic practices.
2. Since ENC's would be the only chart product from hydrographic offices, demand for ENC production systems should be stronger.

#### 5. Working Groups.

USA (NOAA) volunteered at CHRIS 15 to initiate the study of "printed ENC's".

#### 6. Other relevant information.

An earlier paper was prepared by 4 NOAA cartographers on this subject. Copies were distributed at CHRIS 17. Additional copies are available on request from [Dave.Enabnit@NOAA.gov](mailto:Dave.Enabnit@NOAA.gov).

#### 7. Priority.

Medium. Hydrographic offices are actively making ENC's. Data collection decisions are being made that are incompatible with making a paper chart from an ENC. It is important to establish sufficient information about the "printed ENC" to minimize data recollection that might be needed.

#### 8. Target completion date.

Not established.

#### 9. Action Required.

The CHRIS committee is invited to direct TSMAD, CSPCWG, and C&SMWG to take note of this work, and to liaise as appropriate.