CHRIS/11/14A rev.5

11th CHRIS MEETING
IHB, Monaco, 17-19 November 1999

WORLDWIDE PRODUCTION OF ELECTRONIC CHART DATA

I. ENC Development

AUSTRALIA
(October 1999)

ENC Production

1. Nearly two thirds of Australian Hydrographic Office (AHO) cartographic staff are engaged in ENC production.

2. Australia's ENC production programme remains in the first instance targeted to providing ENC coverage for those vessels and areas most likely to benefit from the early uptake of ECDIS. In Australia this is SOLAS class vessels transiting Torres Strait and The Great Barrier Reef and those entering Australia's major ports.

3. Production priorities are therefore:
   - Major routes and restricted pilotage waters
   - Approaches and Ports
   - Coastal
   - Remainder

4. The AHO compilation strategy is to work "from the whole to the part". In other words firstly to create "small scale" wide area ENCs with "larger scale" priority areas set within them. Progressively, each ENC will contain more and more detailed data through revision and the completion of more and more priority areas. The first Australian ENC (AUS-ENC1) covers NE Australia. The "base" for AUS-ENC1 has been taken from existing 1:1,500,000 charting. More detailed coverage along the Great Barrier Reef (GBR) compulsory pilotage route, its approaches and linking passages has been compiled in most instances from source survey and contains bathymetry at one metre contour intervals in the 5-20m depth band.

5. AUS-ENC1 has been evaluated at sea as a beta version during 1999, together with ENCs covering some of Australia's ports.

6. ENCs of a number of major Australian ports are also available as beta evaluation versions to selected ships, organisations and manufacturers.

7. Commercial release of AUS-ENCs will begin in 2000.

8. There will be a very small numbers of ECDIS users in Australia in the first instance. furthermore, the limited ENC coverage will mean that ECDIS navigation in Australia will require both ENC and RNC. For these reasons ENC updates will initially be provided through total file replacements which will probably be bundled with the RNC update service which is already in place.

9. ENC data protection/integrity, pricing and distribution are all under consideration. A universal system of data protection common to all HO's is preferred.

10. Comprehensive ENC coverage of the whole of the Australian charting area suitable to support continuous ECDIS navigation is unlikely to be achieved before at least 2005.

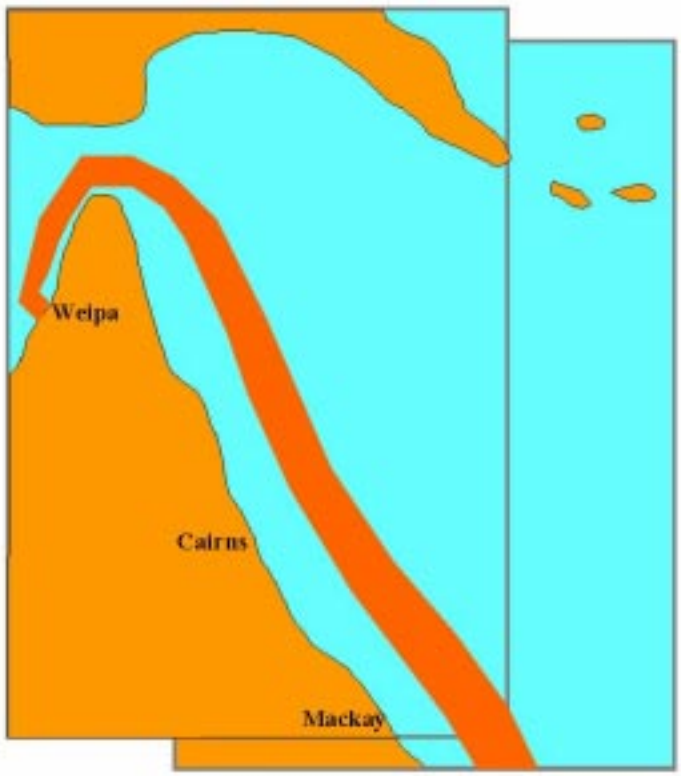
ECDIS Implementation

11. The Australian Maritime Safety Authority (AMSA), Australia's maritime colleges and the Australian Hydrographic Office are working closely together to develop mechanisms for the earliest possible introduction of ECDIS with the appropriate infrastructure and regulatory arrangements. The AUS-ENC1 beta testing programme is being used by AMSA to develop specific mechanisms to regulate the use of ECDIS/RCDS in waters under their jurisdiction. Work is proceeding to provide guidance on what will be acceptable AMSA as "*adequate back up arrangements*" and what is "*an appropriate folio of paper charts*".

12. Meanwhile, under the STCW code requirements, AMSA and the Australian Maritime colleges are ensuring that appropriate and relevant ECDIS training is available.

Progress Diagrams

PROGRESS OF DATA-RICH (1M CONTOUR INTERVAL) ENC OF GREAT BARRIER REEF INNER ROUTE

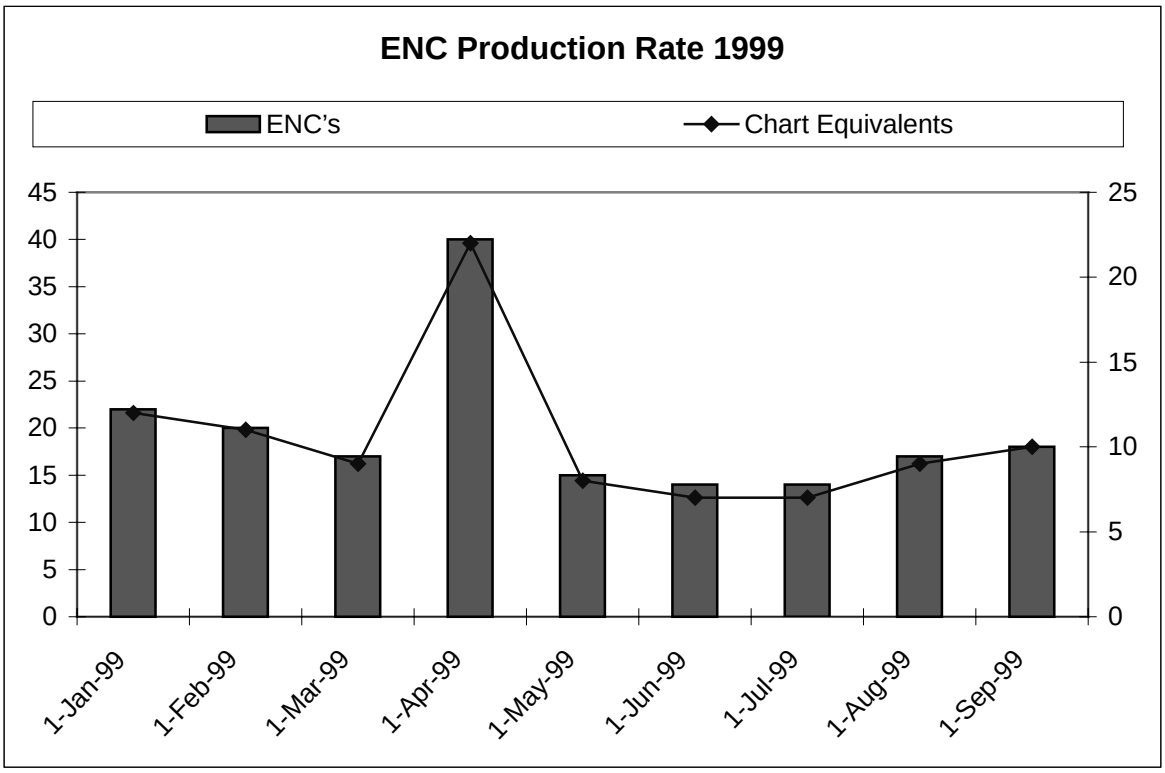


Port ENCs completed

CANADA
(October 1999)

ENC Production in Canada

1) CHS has 185 paper charts converted to the S57 format. A further 150 are in the production stream. CHS currently has the capacity to convert about 100 charts per year. The majority of the initial conversion work is done under contract with 4 different contractors. A substantial portion of the S57 production time is devoted to in-house quality control after receipt from the contractors.



2) Up to date information about the status of ENCs commercially available can be seen at the NDI web site http://www.ndi.nf.ca/cats/

3) ENC's are produced using USL's CARIS Object Manager (OBMAN).

4) QA is done using a variety of packages including USL's ECVIEW and READS57 and dKart Inspector. Update messages are also verified by several viewers like TRANSAS Navi-Sailor and Q-MAR's Sailsafe.

CHILE
(October 1999)

TASK	STATUS AT 31 DECEMBER 1998	STATUS AT 31 DECEMBER 1999
N° of ENC's finished (S-57 files)	33 ENC's at different scales, covering several geographic zones (not necessarily continuous). All of them with their QC already done.	18 ENC at different scales that compose two main continuous routes
Electronic Routes finished	Just the Magellan Strait as a whole continuous route.	Two whole continuous routes: 1) Magellan Strait 2) Arica to Magellan Strait (scale 1:500 000)
ENC's Routes released	None	One: magellan Strait
QC Process	Improving the Proceedings Manual	Production and QC Proceedings Manual in Spanish ready for release in digital format.
Hardware	N° of Vectorisation stations : 2 N° of Attribution stations : 2 N° of Updating stations : 0 N° of QC stations : 1	N° of Vectorisation stations: 2 N° of Attribution stations : 3 N° of Updating stations : 1 N° of QC stations: 2
Software	CARIS: GIS = 5NT + 1 Unix OBMAN: 1 NT + 3 Unix	CARIS: GIS = 5 NT + 1 Unix OBMAN: 5 NT + Sevencs programs (Alanyzer; Optimizer)
ENC Tested at sea	Magellan Strait ENC	Valparaiso ENC sea trials in Exponaval
ENC Updating service	No	Yes. By e-mail
DGPS service	No	Not yet. The first two antennas in Magellan Strait will be in service during the first semester of year 2000.
Training	No	Two additional drawers were trained to increase the vectorisation capability; and an additional person was trained for the attribution task.
Personal involved in the production process	Vectorisation : 2 Attribution : 2 QC and Administrator : 1	Vectorisation : 2 Attribution : 5 Cartographic QC : 1(*) Files structure QC + Adm : 1 Updating : 1 (*) (*) They also attribute

CHINA
(October 1998)

Report on ENC Development in Maritime Safety Administration

1. Maritime Safety Administration has been engaged in Research and Development of electronic chart and ECDIS for many years. MSA produced more than 20 ENCs in the national format and put them into sea trial. The feedback was good.
2. After the release of the S-57 edition 3, we turn to standard ENC development. MSA has developed an ENC production capability by designing software based on our CARIS system. The software can produce both Chinese and English version.

3. With the developed software, we produced an ENC cell under the S-57 standard at the mouth of Yangtz River (the approach of Shangai port). It is under sea trial now. We plan to produce ENCs of three internal shipping routes by the end of the year.

4. It is expected that we will accelerate the ENC production next year and the priority will be harbour and approach, then coastal charts.

5. We are very interested in the SHARED project. We are going to select our main ports to join the project.

DENMARK
(October 1999)

Status of the Danish ENC Production

This report provides a status for the Danish ENC production and is presented for information purposes.

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Danish waters:

The area, covered by 60 traditional standard charts (28 INT charts), including the largest commercial harbours, and 347 harbour plans including small craft harbours, has been converted from analogue form into a digital vector format. The conversion of these charts and plans has exclusively been done by means of our CARIS software that is also used for updating. This task was initiated in 1992 and completed by the end of 1997 with the aim of keeping the paper chart folio up-to-date.

The cell scheme is based on a regular grid much like the cell structure in S-57, version 2. Within the Danish area you will find cell sizes from 1 degree, 30 minutes, 15 minutes to 7½

minutes respectively, each covering the areas where chart data in the corresponding scales are available.

The final number of cells of the different sizes already mentioned is expected to reach a total of 298. To this may be added a number of cells corresponding to the coverage of our harbour plans. At this moment, 162 cells are available as test data.

Verification:

For verification the DKHO are using the programs dKart Inspector and ENC Analyzer. These programs, together with manual inspection of the cell contents, present adequate information for quality assurance.

Greenland and Faeroe Islands:

There are no immediate plans for the areas.
However, during 1999 and 2000 methods and associated costs for changing to digital production will be examined.

The Plans for the Remaining ENC Production

Danish waters:

Due to technical difficulties in our CARIS software, we have only been able to release 136 ENC-cells up to now.

We expect to be able to deliver ENC-data for RENC in Stavanger by the 31-12-1999, corresponding to 176 cells ready to be released for navigation.

By the 31-12-2000 we expect to have ENC data corresponding to 298 cells.

Afterwards the production of cells covering our harbour plans remains to be done. However, we are not able to assess the time consumption for this work at present.

The production system

During 1999 the DKHO has moved production of ENCs from UNIX to WINDOWS NT. The clients chosen are Dell 400 MHz Pentium II and the servers are supplied by Intergraph. Only minor problems has occurred, for instance the unique ID for objects needs a counter which can only reside on either UNIX or NT, not both. The installation is in production now on NT, and has shown considerable increase in performance.

The full staff in the production line, paper and ENCs, are 17. 3 additional staff do local support and further development of the production system.

Distribution of Danish ENC-cells for the rest of the year

Chart Source Natl no.	INT no.	Number of cells	Delivered week no.	Expected delivery week no.	Ready for release	Remarks
92	1300	6	42			
93	1044	14	44			
94	1411	6	43			
95	1451	3	42			
101	1301	8	43			
102	1302	9		43	X	
105	1450	10		48		
106	1382	6		44	X	
107	1383	3		45	X	
108	1448	7		45	X	
109	1449	7		46		
111	1381	4		47		
112	1380	7		45	X	
114	1377	6		44	X	
128	1379	7	43			
131	1331	4	43			
132	1332	5	43			
133	1333	2		46	X	
134	1334	2		50		
141	1370	4	44			
142	1368	4	44			
143	1369	2	44			
145	1371	1		47	X	
151	1375	5	44			
152	1373	8	44			
158	1376	6	42			
159	1374	6		45	X	
188		10		48		
189	1336	4		48		
195		3		45	X	
196		6		45	X	

Total 31 (51%) 175 (58%) 14 (23%) 11 (18%)

ESTONIA
(November 1999)

In a time being 9 charts in scale 1:100 000 prepared for the official release in S57ed3. The release is being planned in the beginning of the year 2000. 78 charts are converted into S57

version 2 format and will be converted gradually in the next two years. Meanwhile those data are available to the end users in internal format compliant with S57 and used for commercial distribution, test-beds and sea trials. For example, all Estonian hydrographic and coast guards ships and one coast guard helicopter are using those data on practice in ECDIS prototype systems on board. Updating service is being gradually implemented mostly within in-house production but also for customers in internal format too.

During 1999 effective data exchange for the purpose of new chart production was being established with Latvian HO in S57 format. At the same time Estonian National Maritime Board have published 8 new paper charts using corresponding S57 data sets by means of simple conversion from ENC to the printing originals.

In 1999 EMNB have been completing ENC data production and information system. this. For the next year the major objectives are digital Notice to Mariners and List of Lights publishing system.

FINLAND
(October 1999)

ENC Development

The Finnish Hydrographic Office has established a new Hydrographic Information System (HIS). HIS is based mainly on ESRI ArcView, ArcInfo and Oracle/SDE tools. The delivery of the System has been accepted in June 1999. The ENC Production line is based on this system and on S-57 Edition 3. EN profiles can be produced and the capability to produce ER profiles is under evaluation.

Currently there is going on data loading from existing digital sources into HIS database. This includes data from the current paper chart production system (Fingis), navaids database (Oracle) and fairway database (Oracle/SDO). Main emphasis will be on the quality of the data. The quality, integrity and validity of the data will be checked and possible errors corrected before accepting it. The HIS system runs extensive validation checks before committing data into the database.

ENC cells can be produced out of the validated database. ENC cells will be verified with dKart Inspector (3.0 Version 2.5) and ASPO ANTS software (ECDIS). In addition, there are under evaluation Seven C's ENC Analyzer and Kongsberg Scanner nChart software.

ENC Production

There are now 4 people involved directly to ENC production.

First trial ENC cells (coastal) were produced by ECC in 1997 for the ECHO Project sea trials. These cells are now under validation as official ENCs by FMA and are expected to be available in 1999.

First official ENC cells on the Southern coast of Finland are scheduled to be released by the end of 1999. For more details see the attached table.

The distribution of the ENC cells will be carried out by PRIMAR. For the time being the updating of these cells will be done by PRIMAR.

Country: Finland
Date: 10/18/99

Cellname	Cell Edition	Update Status	Production Status	Expected Delivery	Priority	Chart Source Natl no.	Chart Source INT no.	Chart Edition	Scale	Chart Title & Area	Price Band L/M/S
FI4EIIQR	1	0	Production	12/15/99	1	18	1251	30.4.1999	50.000	Helsingin edusta (approach to Helsinki)	S
FI4EIIQS	1	0	Production	12/15/99	1	18	1251	30.4.1999	50.000	Helsingin edusta (approach to Helsinki)	S
FI4GIJUS	1	0	Production	12/15/99	1	18	1251	30.4.1999	50.000	Helsingin edusta (approach to Helsinki)	S
FI4EIIQT	1	0	Production	12/15/99	1	17	1252	20.2.1999	50.000	Tallörn - Glosholm	S
FI4EIIQU	1	0	Production	12/15/99	1	17	1252	20.2.1999	50.000	Tallörn - Glosholm	S
FI4EIJUU	1	0	Production	12/15/99	1	17	1252	20.2.1999	50.000	Tallörn - Glosholm	S
FI4FIJUT	1	0	Production	12/15/99	1	17	1252	20.2.1999	50.000	Tallörn - Glosholm	S
FI4GIJUT	1	0	Production	12/15/99	1	17	1252	20.2.1999	50.000	Tallörn - Glosholm	S
FI4EIJUZ	1	0	Production	12/30/99	1	14	1254	20.2.1999	50.000	Kotka - Hamina	S
FI4EIJV0	1	0	Production	12/30/99	1	14	1254	20.2.1999	50.000	Kotka - Hamina	S
FI4EIJV1	1	0	Production	12/30/99	1	14	1254	20.2.1999	50.000	Kotka - Hamina	S
FI4FIKZ0	1	0	Production	12/30/99	1	14	1254	20.2.1999	50.000	Kotka - Hamina	S
FI4GIKZ0	1	0	Production	12/30/99	1	14	1254	20.2.1999	50.000	Kotka - Hamina	S
FI4FIKZ1	1	0	Production	12/30/99	1	14	1254	20.2.1999	50.000	Kotka - Hamina	S

FRANCE
(October 1999)

ENC Production

1. The French hydrographic office (SHOM) is very concerned with the paper charts and ENCs dual production. Nearly 20% of SHOM cartographic staff is directly engaged in ENC production. However, it is not realistic to grow up the ENC production staff more due to the paper charts production service to maintain, the current heavy training load and the lack of feedback.

2. French ENC production plan is targeted, as soon as possible, to providing ENC coverage for SOLAS class vessels transiting “La Manche” and “Le Pas-De-Calais” and those entering French major harbours. Priorities are defined taking into account the traffic range and the navigation complexity of the areas. An harbour coverage is defined from coastal to harbour or berthing navigational purpose.

3. PRIMAR is distributing the 26 French official ENCs. Consequently, the coverage of La Manche by coastal ENCs is available within French waters while ENCs covering Le Pas-de-Calais are expected officially by end 1999. 38 ENCs are in production, 16 of which concern main harbours in La Manche and are expected by mid 2000. The others concern main harbours and routes onn French coast in Méditerranée.

4. SHOM is not able to produce the ER files yet. Considering the NE RENC co-operating arrangement (COA), PRIMAR will produce them on behalf of France.

5. A release of the French paper charts and ENC production system which will be based on the present system and on the CARIS software is in progress and should be available and fully efficient by mid 2000. Productivity improvement, training load decrease and ability to produce the ER files are expected.

6. SHOM is concerned with the suitable contents of the ENC. Nevertheless, France is waiting at mariners’ and manufacturers’ feedbacks before reconsidering the contents of the ENCs. The current SHOM strategy is to encode the ENC cells based on a regular grid from paper charts and hydrographic databases.

GERMANY
(October 1999)

1. ENC Production

The current status and planning for ENC production of the German waters of the Baltic Sea are shown in the annexed table. Some of the cells have been, or will be re-issued as new editions (up to the 5th edition).

All cells are continuously being updated on the basis of weekly NtMs. Updates conforming to S-57 edition 3 ER profile are regularly submitted to PRIMAR. All cells and updates published have the status "official".

The cells falling on the route between Travemünde to Trelleborg and Warnemünde to Trelleborg, respectively, are in regular use on board ro-ro ferries as well as in the VTS Warnemünde since early 98 in conjunction with the bilateral German-Swedish "Baltic Sea Ferry Guidance and Information System" (BAFEGIS). This project which involves additional information services to the participating ferries will terminate by the end of 1999.

The production plan for ENCs of the German waters of the North Sea is currently under development and not yet released. It is expected to come up with reasonable coverage of this area by the end of 2000.

2. **Inland Waterway Electronic Chart Project for River Rhine**

The project of the Water and Shipping Administration, Germany, described in the document CHRIS/10/14A has successfully been put into the test phase. The database has been developed according to S-57, edition 3, with few modifications considered necessary to accommodate requirements of inland navigation. Copies of this standard have been submitted to IHB for consideration.

Country: Germany

Date: 99 10 21

Cellname	Cell Edition	Update Status	Production Status	Expected Delivery	Priority	Chart Source Natl no.	Chart Source INT no.	Chart Edition	Scale	Chart Title & Area
DE516200	1		in production	Dec 99	1	33		Aug-96	12,500	Approach Kieler Förde
					1	34		June 93	12,500	Harbour of Kiel
DE516300	2	7/99	Completed			51		Nov-97	12,500	Travemünde Port
DE 516400	2	19/99	Completed			1641 B		Sep-96	10,000	Wismar Port
DE516500	4	17/99	Completed			1672	1355	May 97	12,500	Warnemünde Port
DE516500	5		in production	March 00	1	1672	1355	Dec 98	12,500	Rostock Port
DE516700	1	26/99	Completed		1	1516 A		Jan-99	10,000	Sassnitz City Port
						1516 B		Jan-99	10,000	Sassnitz Ferry Port
DE416010	1		Planned	Dec 00	2	26		NE 2000	50,000	Flensburger Förde
DE416020	1		Planned	June 00	2	32		Jan-95	50,000	Falshöft bis Holtenau
DE416030	1		in production	Dec 99	1	43		Aug-98	50,000	Gabelsflach-Fehmarnsund
						31		Nov-98	50,000	Gewässer um Fehmarn
DE416040	2	16/99	Completed			37	1356	Feb-97	50,000	Dahmeshöved bis Wismar
						1641		Sep-96	25,000	Wismar Approach

DE416050	4	22/99	Completed			1671	1354	May 97	50,000	Rostock Approach
DE416075	1		in production	End of 99	2	1516		Jan-99	25,000	Prorer Wiek

DE316001	1	22/99	Completed			30		Feb-99	100,000	Kieler Bight
DE316002	1		in production	Jan-00	1	36		Nov-97	100,000	Travemünde-Gedser Odde
DE316003	1	21/99	Completed			162		July 97	100,000	Waters between Rügen and Mön
						163		Nov-97	100,000	Mecklenburger Bight E-Part
DE316004	1	22/99	Completed			151		Oct-97	150,000	Arkona to Kolberg
						162		July97	100,000	Waters between Rügen and Mön

Cells of the North Sea in production, expected delivery of the first two Cells in April 00

GREECE
(October 1999)

ENC Development

As it was stated in the last WEND meeting in Sydney, the Hellenic Navy Hydrographic Service (HNHS) participates in the TEN-T-ENC project undertaking the obligation to produce ENCs to cover the Greek coastal areas. The production of the ENCs and the Updating service will be carried out in co-operation with a private company.

The actions taken since the last CHRIS meeting were:

(1) Finalisation of Technical Specifications to be used in an international biding for the selection of the appropriate partner among the several companies that have the necessary expertise.
(**Completed**)

(2) Invitation for bids relating to a Public Lowest Bid International Tender for the Production of Electronic Navigational Charts (ENCs).
(**Completed**)

(3) Submission of proposals by candidate companies.
(**Completed**)

(4) Presentation of proposals and Pilot ENCs to the Technical Evaluation committee and experts of HNHS.
(**Completed**)

(5) Evaluation of the technical proposals by HNHS's Technical Committee.
(**In progress**)

Expected to complete its report before the end of October 1999

(6) Evaluation of the financial proposals and acceptance of the tender.
(**Pending)**

Expected to be completed before the end of November 1999. According to our expectations the production of the ENCs will commence before the end of the year. The duration of the project, which will cover the production of all necessary ENCs, is estimated to be 3 years. Within the framework of this project, an Updating service will be established, to gradually cover all produced ENCs

(7) Re-surveying of selected areas in order to improve the quality of the available Hydrographic data.
(**In progress**)

(8) Informative Seminar on ECDIS, S-57 and the use of the Object catalogue, for HNHS staff that will be involved with the Quality Control of the ENCs.
(**Completed)**

(9) Creation of a Greek ENC product specification.
(**1st Draft completed**)

(10) Procurement of Hardware and Software that will be used to support the Hydrographic data collection and processing.
(**Completed**)

(11) Finalisation of Technical Specifications to be used in an international biding for the procurement of a multibeam swath system.
(**Completed**)

The invitation to tender is expected to be announced before the end of the year.

(12) Finalisation of Technical Specifications to be used for the upgrading of Computing facilities that will be dedicated for the processing of Hydrographic data, Organisation of a Cartographic Data Base that will support ENCs and Updating.
(**Completed**)

The invitation to tender is expected to be announced before the end of the year.

It is worth mentioning that the first S-57 Ed 3.0 data have been created through the Pilot projects that were submitted by the participating companies in the tender referenced in action (4). In particular Every company have produced 2 xxxxxx.000 files for Siros Harbour and Approaches, at scales 1:15000 and 1:7500.

INDIA
(October 1998)

Report on ENC Development in National Hydrographic Office

As outlined by IHO, the Department has accorded priority to the production of ENCs for our area of responsibility. The Department has off-loaded the task of digitizing the updated navigational charts to a private firm working in collaboration with CARIS to accelerate the production of ENCs in S-57 Ed. 3 format by the Department. In the first phase, the Department has taken up the production of ENCs of coastal charts, approach charts and harbour charts simultaneously. At present, 25 ENC data sets submitted by the firm are ready for validation by the Department. The first ENC for Bombay Harbour is presently undergoing sea trials. It is expected that about 20 ENCs will be ready for sea trials by end 1998/early 1999, which are being organized and on receipt of the sea trial reports, ENCs would be made available to the marine community."

ITALY
(October 1999)

ENC Development

1. Introduction

The Italian Hydrographic Institute has established its Electronic chart Division on 1st January 1997.

The first phase of the activity was almost all concentrated to study and to familiarize with the S-57 standard.

2. Present status

From March 97 we have got the first release of fifty-six charts in S 57 version 3 committed for digitization from paper charts to the C-Map.
These charts are related as follows:

Source paper chart	S 57 cell – Navig. Purpose	Coverage
1:1.000.000	General	all national waters
1:250.000	Coastal	all national waters
Litoral chart (various scale 30÷50.000)	Approach	major ports
Port chart (various scale 5.000÷10.000)	Harbour and berth	major ports

Since the first release we have worked to optimize the process of coding and the use of the object catalogue giving the cartographers feed-back to the digitizing operators. This in order to archive the best data contents and reduces the work inside the HO, so to concentrate the activity in quality control procedures.

We are now working to optimize the software tools in order to speed up the verification process for the spatial and feature objects strictly linked with alarms, warnings and the batimetry in the dangerous areas. Within this work we are also going to substitute the content spatial objects with those derived from the survey data.

3. Test-beds

A test-bed for the ENCs is in progress. These 56 ENCs have been distributed to 19 ships of the navy, included the three hydrographic ships, for testing. This in order to provide a feed-back to the HO from the users. The ships have been fitted with an ECDIS compliant software to install in a common Personal computer connected with a GPS/DGPS. The aim of the project is to test the reability of the ENCs and principally the horizontal datum shift.

The initial feedbacks we have received so far are positive.

4. Work in progress

The HO is now working on the inclusion of all chart series of 1:100 000 within the existing “coastal purpose” cells, which have been derived from the charts series at scale of 1:250 000.

JAPAN
(November 1999)

1. ENC production

JHD publishes about 600 paper charts to cover Japanese waters. The paper charts are classified as shown in Table 1. Small scale ENC data are created from paper charts at the scale less than 1:80,000. ENC data for harbor and approach are created from harbor plans and approach charts. Small scale ENC data in S-57 Version 2 will be revised into Ed3 by summer of 2000. ENC data will cover main open ports and route for international shipping by the end of 2000. By the end of FY 2002 or end of March 2003, JHD intend to complete ENC data for harbors for national trade. Local harbors and fishery ports will be remained to create ENC data at that time. At the end of November 1999, about 70 % of planned small scale ENC data and about 30 % of planned large scale ENC data have been published in Edition 3.

Table 1. Paper Charts in Domestic Waters

Harbor Plan	419	
Coast Chart	122	
General Chart of Coast	28	} 168
Sailing Chart		18
Total	587	

Table 2. ENC published by JHD

Chart No.	Date	S-57	Referred paper charts
(Small scale ENC)			
E3001	March 95	Ed.3	33*
E3002	Nov. 99	-	45*
E3003	Nov. 99	-	46*
E7004	Feb. 97	Ver.2	50
(Harbor and approach)			
E3011	March 98	Ed.3	16
E3012	Jan. 99	-	13
E3013	March 99	-	22
E3014	Aug. 99	-	17

*including overlaps; Total number of paper chart
small scale in Ed3: 106 charts large scale : 68 charts

2. Data Maintenance

"Notices to Mariners (in print)" includes small corrections for paper chart and ENC, and is issued every Friday. "Electronic Notices to Mariners (ENtMs)" is issued on the last Friday in every month. ENtMs include ER data to maintain ENC. ER data are created from small corrections and new editions of paper chart. Digital surveying data called "electronic smooth sheets" are used for compilation.

JHD issues EntMs since September 1998. Numbers of cells modified by ER data from April to September 1999 are shown in table 3. Cells for "approach" are modified most frequently every month. For expand of ENC publication, the value of ER data will increase in ten times in September 2000 at the highest estimate.

Table 3. Cells modified by ER data in each month (April – September 1999)

Navigation Purpose	Cell	Chart	Number of cells modified by ER data						Average (cells)
			April	May	June	July	Aug.	Sept.	
Overview (1)	6	2	0	1	1	0	1	0	0.5(8%)
General (2)	11	12	1	2	2	1	8	4	3.0(27%)
Coast (3)	38	19	5	5	6	11	12	13	8.7(23%)
Approach (4)	15	13	7	5	5	9	4	4	5.7(38%)
Harbor (5)	36	38	16	7	17	5	10	14	11.5(32%)
Data Volumes (K byte)			132	76	356	890	395	296	358

3. Relevant matters to ENC

(1) On-line supply

ENC data will cover Japanese waters sufficiently to popularize ECDIS and ENC among large size vessels by FY 2002. At present time supplied ENC/ ER data are stored in CD-ROM. Improvement of ENC/ER data supply scheme will be required to meet the contemporary electronic technology. JHD and JHA(Japan Hydrographic Association) will start “Study on On-line Supply of ENC Data” in April 2000, and will complete the study in two years. Experts will be dispatched to RENCs and HOs to study the on-line supply including data encryption methods.

(2) ENC application to GIS

JHD established new organization, “Coastal Information Management Office”, for creating Environmental Sensitivity Index (ESI) maps and other information management. ESI maps are created on GIS, using ENC data as a basic layer. The first version of the coastal information management system for coastal environmental protection was developed in April 1999. This system can display the useful information for oil recovery operations. The database of the system includes the environmental protection information and oil spill recovery information. In addition to this, the system can overlay the drifting predictions.

KOREA (REP. OF)
(October 1998)

Plan and Views on Development of ENC

Since 1995, NORI conducted electronic chart and relative technical development in cooperation with institutes and private sectors. This project will be completed in 1999:

- Converting 220 charts to ENC and digital chart file;
- Digitizing 540 smooth sheets of hydrographic surveys;
- Technical development for user service of electronic and digital charts.

Annual Plan

Period	Main Contents	Remarks
1995-1996	Development of standard specification	Completed
	Test production of ENC and its development.	
1996-1997	ENC production of 60 charts.	Completed
	Digitization of 150 survey sheets.	
1997-1998	ENC production of 105 charts.	Completed
	Digitization of 70 survey sheets.	
1998-1999	ENC production of 55 charts.	Start in Nov. 1998
	Digitization of 240 survey sheets.	
	Development of ENC distribution system.	
1999-2000	Digitization of 80 survey sheets.	Plan
	Technical development connecting with oceanographic information system.	

NETHERLANDS
(November 1999)

1. As reported at previous CHRIS meetings, the Netherlands HO is undergoing a major restructuring of its production facilities. This project is called SHIP (System for Hydrographic Information Processes). The first phase of this project was finalised in 1998 and comprised the complete automation of the paper chart production using the CARIS suite of products as the main tool. The production of the paper charts is supported by databases developed in house. Three different databases are in use. One for navigational marks, lights, obstructions and mining information, one for bathymetry and one for topographic information. Apart from technical improvements, the organisation was changed from being product based to a more process-structured organisation. This has been done to prepare for the introduction of ENC production. It has always been the intention of the Netherlands HO to produce all of its products from the same source databases in a product independent way. The first phase of SHIP is a

temporary solution necessary to free resources in the office and to await technical developments that would make integrated production based on source data possible.

2. To avoid white spots in the ENC coverage of the NE-RENC area, the Netherlands HO decided to have its ENCs produced by the RENC. Two charts of the Europoort area were given to the UK HO for conversion into ENCs.

3. The second phase of the SHIP project is intended to introduce the integrated production system from which all products, including ENCs, can be produced. Due to budget problems and the fact that the new system also includes facilities for the production of military information for which requirements had to be developed, the start of the second phase was delayed considerably. It is the intention to produce a set of documents, which can be used in a tender procedure. The documents will define, in detail, the functional and technical requirements for the new system. It is expected that these documents are ready and approved for release to the market late summer 2000.

4. Because of the Y2K problem parts of the system build for the first phase of SHIP had to be replaced this year. All production now takes place based on CARIS for Windows NT. All production personnel went through an extensive training program in order to familiarise them with the new system.

5. Due to capacity problems within RENC, the Netherlands HO has decided to begin in-house production. Production and validation of the ENC has proven to be very difficult and did not lead to the expected results. The ENC's already produced by RENC are withdrawn and will be reproduced by the Netherlands HO. For the time being, the ENC's produced by the UK remain within the UK HO's ENC portfolio.

6. For in-house ENC production, the CARIS Object Manager is used. It is expected that 4 ENC's will be produced and delivered to PRIMAR in 2000. In 2001 6 more ENCs will follow.

Other ENC/ECDIS related developments

Together with the Belgium HO (Antwerp and Ostend) and the department of transport of the Netherlands, the NL HO is participating in a project to asses the possibilities for providing carry-on-board ECDIS systems to pilots operating on the Schelde river and Antwerp harbour. The ECDIS will use ENCs with high density bathymetry (1 meter contour interval). The ENCs will be based on the existing Product Specification making it possible to use today's ECDIS without additional software development.

The Schelde River is a fast changing area that is difficult to navigate due the many shallows and narrow channels. Surveys and dredging take place almost daily.

NEW ZEALAND
(October 1999)

ENC Development

New Zealand has captured three ENC cells. These are not updated. By 30th June 2000 nine more cells will have been captured. These cells will form the pilot project to determine the requirement for ENC's in New Zealand waters.

ENC Production

Chart Number	Chart Title	Scale	Date of Capture
NZ 6212	Port Underwood	1:35 000	30/6/99
NZ 6212	Kaikoura Peninsula	1:30 000	30/6/99
NZ 6212	Ingles Bay	1:10 000	30/6/99
NZ 4633	Wellington Harbour	1:25 000	30/6/00
NZ 4634	Entrance to Wellington Harbour	1:12 500	30/6/00
NZ 4634	Evans Bay	1:7 000	30/6/00
NZ 4634	Lambton Harbour	1:7 000	30/6/00
NZ 4634	Point Howard and Seaview Wharves	1:7 000	30/6/00
NZ 6153	Queen Charlotte Sound	1:36 000	30/6/00
NZ 6154	Tory Channel Entrance	1:11 000	30/6/00
NZ 6154	Picton Harbour	1:10 000	30/6/00
NZ 6154	Picton Wharves	1:3 000	30/6/00

NORWAY
(November 1999)

Status of ENC production in Norway

The NHS's efforts towards building a complete digital production line, from the collecting of survey data to the end products, are now beginning to give results and few technical problems are now reported. However, improvements are still being carried out as more experience is gained.

The ENC production is also an integrated part of the new production line.

1. The Status for Technology Development

The ENC production line has gradually been improved during the last year and now very few problems with equipment and software are reported. For the time being, we are using a combination of Intergraph and Sysdeco Dikas technology and software, but discussions have recently been carried out with the Intergraph Mapping and Information Systems (IMIS) in order to develop a complete harmonized paper chart/ENC production line entirely based on Intergraph technology.
For the time being, we are using a combination of DXaminer and dKart Inspector for the validation of the S-57 data. Also, the use of the 7C's ENC Analyzer for validation will be discussed.

2. The Status for ENC Production

In 1999, the NHS has also given high priority to ENC production and this effort is now beginning to give results. By end of this year, the goal is to complete the conversion to ENC's of about 30 charts in the scale 1:50,000 covering internal Norwegian waters (the approach user band). The NHS has based the cell scheme on a regular grid like the cell structure in S57v2.0. Therefore this work will include about 110 ENC data sets.

The production plan for the next year includes the conversion to ENC's of an additional 15 charts in the scale 1:50,000, and 27 harbour charts. (The conversion of a total number of 42 Norwegian harbour charts to ENC's will, according to our production scheme, be completed in the year 2001).

However, large areas of the Norwegian coast are still covered by charts based on older surveys. For safety reasons, the NHS has decided not to approve data from these charts as ENC's. (Data from these charts will only be available for use in an ECS).

Therefore the main goal for the NHS is, at the end of the year 2006, to have covered the coast of Norway with ENC's and paper charts based on modern surveys. This task includes about surveying 27,000 km², and the production of about 90 charts and ENC's.

However, an increase in the production of this magnitude will not be possible without extra funding - estimated to be about 400 million NOK. For the next year, 20 million NOK has been allocated.

An increase in production of the magnitude mentioned will also require considerably more capacity than the NHS has available today. Therefore a close co-operation with private industry will be necessary for the production of ENC's, as well as for paper charts. This production will start next year. To manage and follow up this task, an internal project group has been established.

3. The Production of ER Data

The establishment of a production line for ER data has been more time-consuming than expected, but the development of the technology has now been completed, and we are now running a test production.

For the time being, PRIMAR is producing ER files on behalf of the NHS, but we expect to start an operational service from January next year, for a limited number of cells. The number will gradually be increased as training is completed and experience is gained.

4. The Norwegian Maritime Geodata Demonstrator (NMGD) Project

As mentioned at the Singapore CHRIS meeting, the Norwegian Maritime Geodata Demonstrator is a project initiated by the NHS in order to establish an operational maritime geodata service for Norwegian waters. NMGD is organized as a project with representation from companies and organizations with interests within the development and production of electronic chart systems and related activities. It is also a goal of the project to harmonize and integrate into the Demonstrator, other relevant research projects

which are directed towards maritime activities. This is in order to utilize the resources in the most effective way.

The project is divided into three main phases:
- Phase 1 will include the establishment of an operational infrastructure for the administration and distribution of maritime geodata information.
- Phase 2 and 3 will be extended to include dynamic and statistical information.

Phase 1 of the project was terminated on the 30th September this year, and a workshop before the start of the next phase will be arranged. The final report for Phase 1 has not yet been received.

RUSSIA
(November 1999)

STATUS OF ENC PRODUCTION IN HDNO

Head Department of Navigation and Oceanography of MD RF (HDNO) is carrying out the works on creation of unified and continuously updated State ENC Data Base. HDNO is also engaged in development and introduction of navigation and information systems for different purposes, which include, as the components, ENC Data Bases, Pilot and Sailing Direction Data Bases.

Works are in a progress with regard to establishment the ENC System in Russia directed to raising the safety of navigation both for civilian and the Navy vessels and ships and they are carried out in three directions:

1. Development of the means and methods of digital cartography.
2. Creation of the ENC data sets and their updating.
3. Establishment of the ENC data sets distribution system .

HDNO produces the ENC data sets according to its own plan. Within the limits of this plan it is supposed to convert the whole HDNO's nautical chart collection (including the charts covering a zone of national jurisdiction of Russian HO) into digital (vector) form complying with S-57 ENC PS. (Totally about 6500 Admiralty Numbers of charts).

For the moment some results in ENC production have been achieved. And we may say about those results as a noticeable success.

For example, we have finished the work, that was begun in November 1998, on creation the ENC worldwide collection of 1: 500 000 scale. This collection numbers 1228 Admiralty Numbers of nautical charts.

We also have been finishing the work on creation the chart collection on a zone of national responsibility of Russian HO (Totally about 800 Admiralty Numbers of charts), including main ports, approaches and routes between them. The charts cover Baltic, Barents, White, Kara, Black, Azov, Caspian, Japan and Okhotsk Seas. Scales are from 1:5000 to 1:250 000. By 1st of November 1999 about 700 charts of this collection have been digitized. We suppose to finish digitizing up to the end this year. In the result the total collection will number more than 2000 Adm. Numbers of charts.

Now HDNO is working on conversion of ENC data from internal format into S-57 edition 3 data format. For the moment half of the ENCs collection on a zone of our national responsibility have been conversed.

Further, the HDNO's ENC production capacities will be engaged in continuation of digitizing worldwide paper chart collection and re-edition and new edition of ENC data sets (about 600 AN of charts per year), as well as in updating, ENC DB management, multiplying and providing the users by ENC data.

It is complicated and rather a resource-consumed task to maintain ENC DB both in technical and in organizational sense. For the moment, we propose two ways for ENCs updating. There are:

1. ENC updating by means of ECDIS editing facilities with use of paper Notice to Mariners issued by HDNO

2. ENC updating by means of ECDIS editing facilities with use of NM textual files transmitted by user's request via automated navigation information system. The system is working in "post box" mode and uses traditional on-board communication systems. The system provides 'users' with NM, navigational warnings for charts, nautical publications and sailing routes.

In the near future we suppose to spread digital NM and to update ENC data in semi-automatic and partly in automatic form.

Distribution of official ENCs data produced by HDNO (as well as commercial deliveries) will be able when an appropriate data security scheme will be applied and ENC updating data will be produced on a systematic base. Today these matters are under development.

SINGAPORE
(October 1998)

Singapore ENC

The Singapore ENC, covering the Singapore port waters and its approaches, was officially released on 17th Mar 98. The Singapore ENC comprise 14 harbour category cells and they were compiled from 14 paper charts. All ENC data production and Quality Assurance (QA) were carried by the Singapore Hydrographic Department.

The CD-ROM containing the Singapore ENC costs S$80/- per licence, inclusive of one year's monthly updates. Subsequently the annual subscription costs $60/-.

Most of the Singapore ENCs users operate in local waters for ECDIS/ECS, dredging, vessel fleet management and computer simulation training.

The Maritime and Port Authority of Singapore (MPA) would be incorporating the Singapore ENC for the new POCC2 VTIS and a pilot fleet management system for harbour crafts using transponders (AIS).

ENC Data Production System (ENCDPS)

A new PC-based ENCDPS has been acquired for the production, maintenance and QA of ENCs. The ECDPS will be commissioned in Nov 98 and will comprise of 1 file server and 3 workstations.

ENC Training

MPA is offering a 2-3 week training course on ENC data production and QA. The course overview is attached.

SPAIN
(October 1999)

Developments

At the beginning of this year we completed the production of the first ENC in accordance with the Product Specifications. Also, we are capable of providing updates (ER).

We could do this by implementing CARIS-HOM in the production flow, trying to take advantage, when possible, of existing graphic files and data in existing GIS (MGE-ORACLE).

Once the production line was established, the need for improvement of in-house intermediate quality controls became evident, and for tools out of the production flow. So, both Analyzer and Inspector by 7C s were purchased.

Production Plan

We are implementing a production plan, which intends to produce ENCs purpose 4 (harbour) and 5 (approach) for the main ports of Spain, i.e. 56 ENCs overall. We have completed 4, and there are 2 under verification.

Also, there is a schedule for ENC purpose 3 (coastal) coverage, 16 ENCs overall, to begin next year.
Considerations

Production and validation processes take longer than expected, and the structure of the production flow has been re-designed several times, to prevent errors in the finished product.

Nevertheless, we expect an increase in the number of ENCs produced in the near future, with the increase of manpower and consolidation of all phases in the production flow.

ENC distribution is to be made through the RENC-NE / PRIMAR, once our membership is approved by national authorities.

SWEDEN
(November 1999

Swedish status report on chart digitising for ENC.

Sweden has around 105 charts of a quality worth digitising. All of those charts have previous been digitised in a phase 1 describing 'the skin of the earth'. They will successively be completed in a phase 2 with full nautical information. At moment 48 charts are fully digitised. The remaining charts are expected to be digitised within next year.

The efforts in the Swedish HO have all since the digitising started in a full scale 1994 been to have one common database from which as well printed charts as ENCs should be produced. This has performed well. All charts digitised are printed out from the database. ENCs, so far in test cells, are produced from the same base.

Sweden has earlier only produced ENCs for test purposes. A production line for the ENCs is under development and the first test cells from this line is recently sent to PRIMAR for evaluation. In the plans is a very low amounts of cells indicated during next year. In principle these are equivalent to the nautical charts in a scale of about 1: 250 000 covering the Swedish coastal waters. The background is that the Swedish HO is very much aware of the fact that the database has to be continuously updated for ENC production. As the routines for this are not fully developed, this low ENC production reflects as a minimum of what can be foreseen to be able to manage with ENCs and their subsequent updating.
For the verification Sweden is using the dKart Inspector and ENC Analyser. The cell scheme is based on the preparatory work of S-57 ed. 3, which is an amended version 2 scheme and which allows cell sizes between 8^{o} x 8^{o} down to 3.75' x 3.75'.

UKRAINE
(October 1998)

Report presented to the 7th Session of the "Baltic RECC"

The state Hydrographic Service of Ukraine was officially established on 6 June 1997. In 1998, the reorganization of the Hydrographic Service was completed, and from 3 March 1998, it is under the authority of the Ministry of Transport of Ukraine.

Ukraine is a maritime state. The length of the Ukrainian sea coast is 1750 km. Therefore, the development of hydrography and cartography is very important for Ukraine.

The Service consists of: hydrographic enterprises in Odessa, Nikolaev, Kerch' and Sevastopol, central Hydrographic Enterprise in Kiev, state enterprise "UKRMORCARTOGRAPHY" (Kiev), State Scientific and Research Center of Navigation, Hydrography and Oceanography in Sevastopol, and a plant of the navigational and hydrographic equipment "Etalon". In Odessa is operating a center for the collection, processing and transmission of navigational data.

By the end of 1997, almost all aids to navigation renewed their work, and the first hydrographic surveys were made in order to conduct cartographic works on the Ukrainian sea coast. In the beginning of 1998, the first Ukrainian navigational charts were issued. Also, the first buoys of the national construction and flashing apparatus were developed and made; an informational hydrographic data "bank" is being created now, thanks to the modern computer technologies. Ukrainian ship building plants started their work for the construction and development of small hydrographic ships for surveys.

After a considerably long break, due to the efforts of the State Hydrography, on 1 January 1998, the navigational warnings to the sea waters of Ukraine were transmitted through "Odessa-radio" and "Mariupol-radio" radiostations.

Today, we are trying to modernize and draft all the aids to navigation automatically. Software and technical complex for collecting and processing the navigational data were developed and, recently, its experimental exploitation started. Now, attempts are made to extend the electronic connection to all the Ukrainian ports.

Actions were taken to create inland coastal network of Control Correct Stations of the satellite navigational systems GLONASS (Russia) and NAVSTAR (USA) that work in the differential mode.

Up to this date, State Hydrography has issued 4 Admiralty's charts numbers for Kerch-Yenikalskiy channel; 6 other charts are at their final stage of discussion before being approved. 10 electronic charts were made, and specialists are working on 20 more charts. 2 issues of the "Notices to Mariners" were published. "Symbols and Abbreviations used on Navigational Charts", catalogues of the navigational charts, books, and guidance are available to the users. List of the armament of navigator and means of navigation are prepared for printing.

Ukrainian Hydrographic Service is very recent. We are trying to establish relationships with the Services of other countries, in order to share experience and knowledge. We established relationships with the coordinator of the NAVAREA III Region (Spain), to transmit navigational reports. Recently, a very important step was taken towards the achievement of this objective: in May 1998 Ukraine became the 56th Member State of the International Hydrographic Organization.

UNITED KINGDOM

(October 1999)

1. The UKHO has developed an ENC production capability based on software produced by the British company Laser-Scan. S-57ed3 data was first produced at the end of 1996 for the original SHARED demonstration. Since then, there has been a continuous development of the system in order to improve both the quality of the ENC data and to improve the efficiency of the production system itself. This is an ongoing process with various software upgrades at present being both implemented and undergoing testing prior to implementation. This process necessitated some rework of some of the early ENC cells. The update production system is also being refined in a similar way. ENCs are released when the quality of data is fully satisfactory and the associated updates can be provided on a regular and timely basis (ie weekly and in step with the issue of the equivalent paper chart Notices to Mariners).

2. By 1 October 1999, some 69 ENC cells had been completed and were being trialled in the Admiralty Digital Chart Service – Pilot. A significant number of these ENCs have been released to PRIMAR for trials purposes. UKHO produced ENCs currently carry a liability disclaimer which will be removed when the UKHO and its parent Ministry of Defence are satisfied fully about the risk and liability aspects of the new product. It is expected that the work necessary to achieve this will be completed by January 2000 at which time UKHO ENCs will become available in the commercial PRIMAR Service. It is intended that all UKHO produced ENCs will be distributed through PRIMAR. Approximately 120 ENCs are expected to be completed by March 2000.

3. The geographical cover of UKHO production is mainly in UK waters, together with some other areas where UK provides the original charting, for example in parts of the Red Sea and Gulf. Two ENCs in Netherlands waters, providing large scale cover of Europoort and approaches, have also been produced on behalf of the Netherlands HO. The content of UKHO ENCs is essentially similar to that of the equivalent paper chart.

4. In early 2000, it is intended to contract out some of the initial data capture, with an initial production rate of 5 charts per month. The final stages of ENC production work, including quality control, will be undertaken in the UKHO, as will the ongoing database management and update generation.

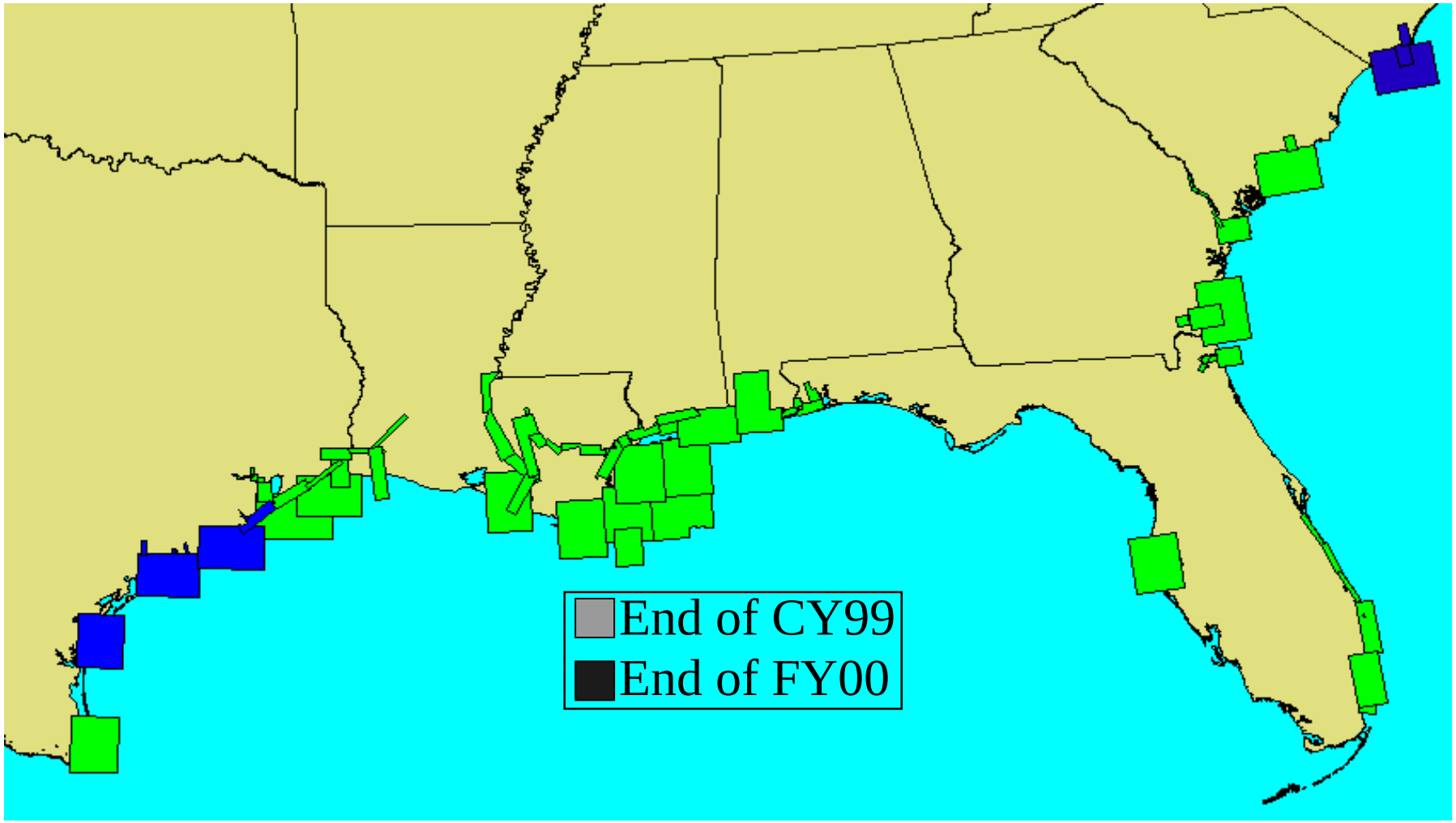
5. Some training for personnel from other HOs is being provided in ENC familiarization and production.

USA (NOAA)
(November 1999)

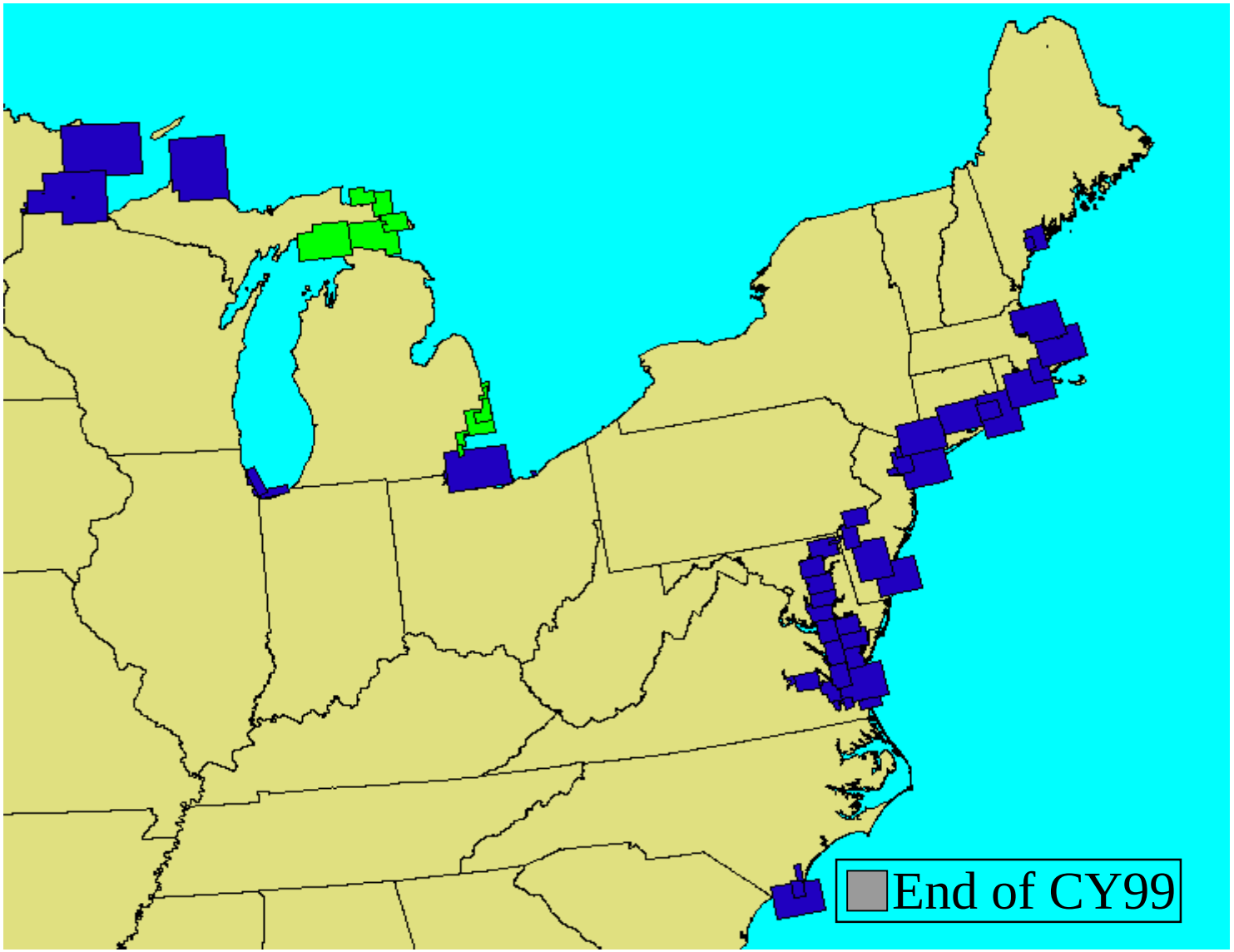
US (NOAA) ENC STATUS

- 64 ENC completed by December 1999
- 60 ENC completed by September 2000
  (124 total)
- In use for AIS testing in Tampa, Florida and Lower Mississippi River

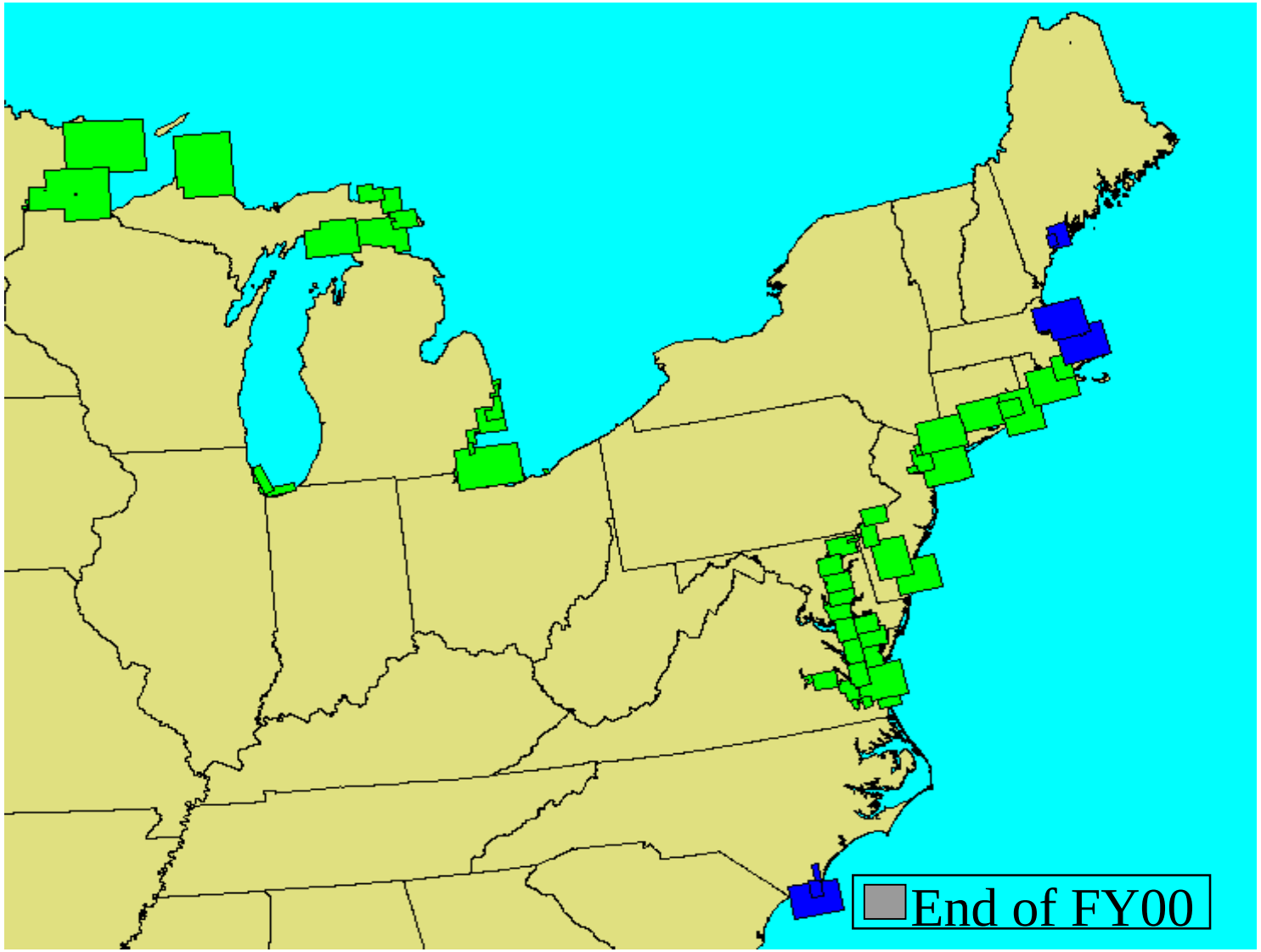
ENC Coverage



ENC Coverage



ENC Coverage



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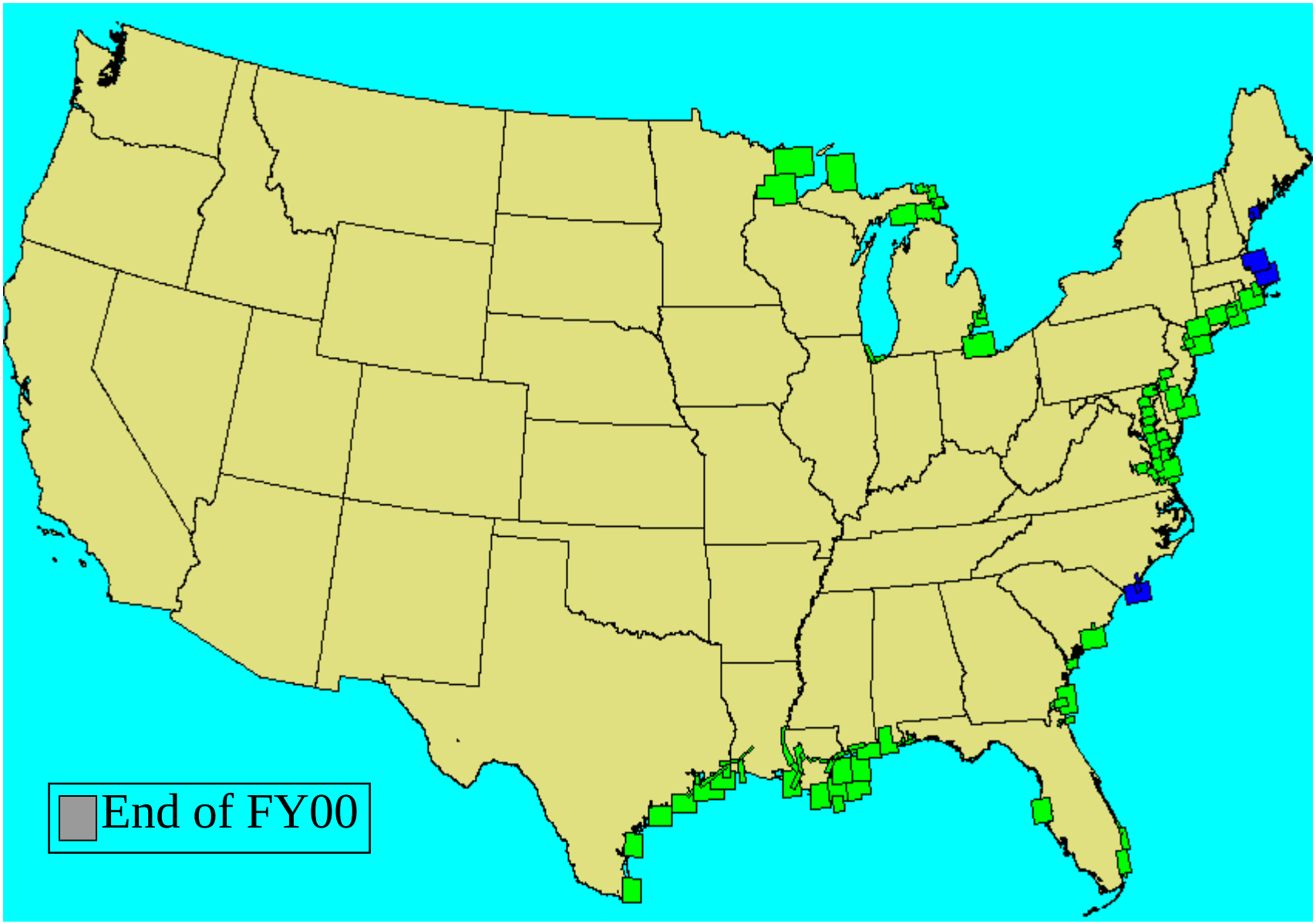

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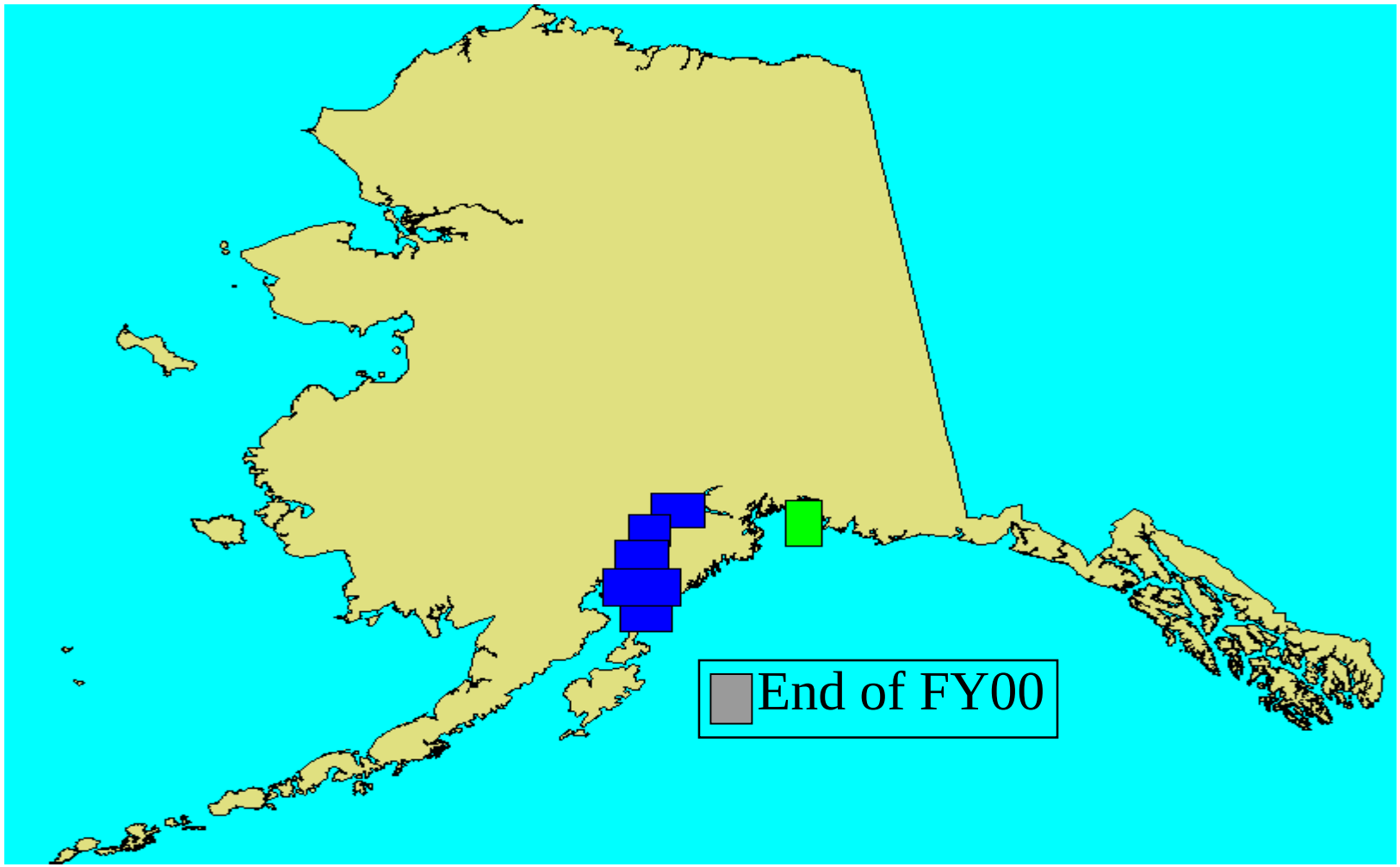

LATVIA
(Non-IHO Member State)
(October 1998)

National Report on intersessional activities,
presented to the 7th Session of the "Baltic RECC" - Cartography

Beginning with 1994 Latvian Hydrographic Service has put the main emphasis on implementation and application of new technologies and equipment for the surveying in the waters of our responsibility and further chart production from the surveyed data in ECDIS environment according to S-57 ver. 2.

In June 1998 Latvian Hydrographic Service purchased a new multibeam echosounder SEA BAT 8101. This multibeam echosounder meets all the requirements of IHO. Now it is used in the most important sea traffic areas for checking and correcting of existing charts and data collection for the new ones.

One more aspect of our work was digitizing the existing paper charts.

The year 1997 was the first year of success after a long period of the hard work done by our Service. Six new electronic charts were created from the surveyed data in ECDIS environment with further necessary preparations for publishing in printing.

At the end of 1997 the last problems were solved regarding publishing of our charts in printing house. In December we had presented our first issue (1251).

The year 1998 has been an extremely productive year. At the beginning of this year we have published two completely new paper charts never published before (3503 and 3280) and 6 new chart editions (2257, 2259, 3502, 1016, 1013, 3250) containing a lot of fresh information and changes, (see the enclosed Annex). Two of our largest and most important ports - the port of Liepaja and the port of Ventspils currently have got new approach charts. At present we are preparing charts for the port of Riga.

In April *C-Map* presented us their new CD-ROM with 11 our charts.

It is important to emphasize to be stressed once more that all our published navigational charts are available in S-57 ed. 3.

Chart No.	Title of Chart	Scale	Date of publication	New Edition
1011	Gulf of Riga. North-Eastern Part	1:100000		1999
1012	Roja Port to Port of Riga	1:100000	14.09.1994	1999
1013	Gulf of Riga. Irbe Strait	1:100000	15.12.1993	27.02.1998
1014	Irbe Strait to Port of Ventspils	1:100000	15.12.1993	1999
1015	Oviši Lighthouse to Pavilosta Harbour	1:100000	15.12.1993	1999
1016	From Pavilosta to Shventoji Harbour	1:100000	15.12.1993	23.01.1998

Chart No.	Title of Chart	Scale	Date of publication	New Edition
1017	Akmeņrags to Port of Liejapa	1:100000	18.08.1994	*
1018	Port of Liepaja to Shventoji Harbour	1:100000	30.05.1994	*
1022	Tahkuna Lighthouse to Oviši Lighthouse	1:200000	20.09.1994	*
1023	Oviši Lighthouse to Port of Klaipeda	1:200000	30.01.1994	*
1024	Pape Lighthouse to Gdansk Gulf	1:200000	30.01.1994	*
1051	Baltic sea and Western Part of Finnish Gulf	1:500000	15.09.1994	*
1052	Baltic sea. Southern Part	1:500000		2000
1251	Gulf of Riga	1:250000		06.10.1997
1252	Irbe Strait to Gotland Island	1:250000	30.01.1994	*
1253	Pavilosta to Klaipeda	1:250000	30.01.1994	*
2057	Eastern Part of Irbe Strait	1:50000	28.07.1994	*
2058	Western Part of Irbe Strait	1:50000	17.06.1994	*
2100	Port of Ventspils with Approaches	1:10000	14.09.1994	1999
2101	Pavilosta Harbour with Approaches	1:10000	12.09.1996	1998
2102	Port of Riga. Northern Part.	1:10000		1998
2103	Port of Riga. Southern Part.	1:10000		1998
2104	Mouth of Lielupe and Buļļupe	1:10000		2000
2253	Port of Riga with Approaches	1:25000	15.12.1993	1999
2257	Approaches to Port of Ventspils	1:25000	15.12.1993	1998
2259	Approaches to Port of Liepaja	1:25000	21.06.1994	01.12.1997
3210	Harbour of Skulte	1:2000		2000
3215	Port of Roja	1:2000	25.07.1995	03.02.1998
3220	Harbour of Daugavgriva	1:2000		2000
3230	Harbour of Lielupe	1:2000		2000
3240	Harbour of Engure	1:2000		2000
3250	Port of Mersrags	1:2000	19.01.1996	24.02.1998
3280	Port of Liepaja. Tirdzniecibas Channel	1:2000		15.01.1998
3500	Port of Ventspils	1:5000	18.04.1994	1999
3501	Approaches to Port of Roja	1:5000	22.02.1994	*
3502	Port of Liepaja	1:5000	01.09.1996	01.01.1998
3503	Port of Liepaja. Channel of Kara osta	1:5000		15.01.1998
3504	Port of Salacgriva	1:5000	1999	1999

* a special announcement will be given on the date of new edition

II. DNC Development

USA (NIMA)
(November 1999)

Digital Nautical Chart (DNC) Development

1. NIMA (National Imagery and Mapping Agency) will complete the digitization of the worldwide Digital Nautical Chart (DNC) folio of approximately 5,000 nautical charts (Vector Product Format) by March 2000. This is the initial folio of DNC charts requested for the U.S. Navy. During years 2000 and 2001, it is planned to expand the DNC folio in support of additional requirements, principally from the U.S. Coast Guard. All planned 29 CD-ROMs have been populated to varying levels of completion and are on issue to the U.S. Navy and U.S. Coast Guard with the restriction that ships continue up-to-date paper chart navigation as their primary means for navigation. DNC is currently under a distribution restriction that prevents public access.

2. NIMA has transitioned about 80% of its nautical chart workforce from paper chart production to DNC production. Work has begun to bring the DNC database up-to-date from the time of original data collection by commercial companies contracted to capture the digital data. It is expected that it will take about 2 to 3 years for all charts in the DNC database to come into routine maintenance. The first DNC CD-ROM (DNC 17, about 175 charts covering the East Coast of the U.S. from South Carolina to Massachusetts) has been brought up-to-date and currently is under continual maintenance.

3. FUND (Full Utility Navigation Demonstration) software has been modified such that it can be downloaded from the NIMA web site for use with a sample DNC data set within U.S. waters which also can be downloaded from the NIMA web site. FUND now utilizes IHO symbols and has been modified for planned DNC digital update testing using the VDU (VPF Database Update) file replacement method. NIMA has not yet effected digital updating for DNC. Update testing will include update by CD-ROM and secure Internet. Two tests will be conducted using broadcast updates through satellite transmission. One of these is a NIMA CRADA (Cooperative Research and Development Agreement) for Internet distribution of Notice-to-Mariners corrections by satellite link. NIMA intends that DNC updating be done through the file replacement method.

4. U.S. Navy policy for transition to digital chart navigation (Chief of Naval Operations letter of 17 March 1998) using DNC establishes that all Navy ships transition from paper to digital chart navigation by year 2007. Significant activity is in progress for Navy to effect this change.

5. NIMA is working with Navy to revise the DNC Test Data Set to follow the full scope of the IEC 61174 standard such that Navy certification of systems going aboard ships will conform to it. Navy has begun steps for training of personnel, certification of electronic chart systems and certification of navigation teams. The U.S. Naval

Academy began teaching electronic chart navigation using DNC in September 1999. NIMA is committed to work with Navy on testing of systems to be used by Navy or USCG, principally with regard to the aspect of whether or not the system properly displays NIMA DNC data.

6. Navy acceptance of DNC has been tremendous. All U.S. submarines will be equipped for ECDIS-N by the end of September 00. The surface fleet has about 150 vessels that are to be equipped with DNC integrated to the weapons systems on a schedule covering the next 5-years.

7. With the development of the WECDIS STANAG (Warship ECDIS Standardization Agreement) within NATO, commercial activity to read DNC has expanded and now includes Litton Marine (formerly Sperry), Raytheon, Kelvin-Hughes and Offshore Systems Ltd. A number of ECS manufacturers are also developing a DNC capability.

8. The Defense Mapping School at NIMA College has begun the first training courses in DNC production. NIMA employees filled the first course but a follow-on course is planned for late summer 2000 that will be open for non-NIMA personnel. Because NIMA production is done through a combination of Intergraph, Laser Scan and commercial contractors, the training may not be directly applicable to IHO Member States' needs, i.e., NIMA does not produce any S-57 data and uses a DNC software module not the S-57 module of chart production systems.

9. NIMA recently has begun its first negotiations with foreign countries with regard to access to DNC. These initial agreements (military annexes) are for government to government exchange of data without any public release of the exchanged data by either party. A second annex to offer DNC for public availability has been drafted for negotiations at some future date.

10. Action for DNC approval as meeting the chart carriage requirement under SOLAS will begin with the U.S. Coast Guard. NIMA does not plan to initiate any action with regard to DNC within IHO at this time.

11. NIMA chaired meetings of the DNC Improvement Working Group were suspended due to the unavailability of some key personnel this past year; however, it is planned to restart these discussions during next calendar year. These meetings involve NIMA, commercial firms that have involvement with DNC, Canada, UK (principally by correspondence) and NOAA. It is still intended to invite IHO comment on changes that might be made. This is a long-term effort and revision of DNC in Vector Product Format is not likely for a few years.

III. RNC Development

AUSTRALIA
(October 1999)

RNC Development

RNC Availability and Usage

1. The entire folio of 377 Australian charts is commercially available in HCRF form on one CD-ROM. In addition, GeoTIFF charts are available for use in GIS.

2. RNCs are being used by the Royal Australian Navy in submarines, ships, and aircraft. They are also be used by, amongst others, the Army, Customs, Water Police, Port Authorities, Government Authorities, Maritime training institutions, Maritime Museums, the Australian National Library, The Sydney Olympics Organising Committee and The Department of Environmental Protection.

Seafarer® Viewer Software

3. *Seafarer® Viewer* is a raster chart viewer for non-navigation and reference uses. This desktop software package has had the pleasing effect of increasing public and government service awareness of the availability and utility of official charts.

Chart Production Benefits

The use of raster as the basis for paper chart maintenance has continued to provide savings in manpower and materials. Repromat is now routinely produced from print ready negatives generated directly from raster files.

NEW ZEALAND
(October 1999)

RNC Development

New Zealand is currently investigating the production of RNC's. A dual fuel approach is being investigated for the main shipping routes around New Zealand.

USA (NOAA)
(October 1998)

Raster Nautical Chart Development in the USA

Raster Nautical Charts (RNC) of the United States have been commercially available since 1995. These RNCs have been produced by Maptech, Inc. under the authority of the National Oceanic and Atmospheric Administration (NOAA) which is the

national hydrographic office. The RNCs have become very popular with mariners. They now outsell the paper charts by 50 percent. Paper chart sales have not been affected by these sales of raster charts. Sea trials of a weekly update service for the RNCs will start in October 1998.

Approximately 80 companies have licensed the raster chart format used for NOAA charts. At least 24 software companies make navigation software that uses the U.S. raster charts. One major chart production system now provides raster chart output in the NOAA format as a standard feature. Licensing of the format to national hydrographic offices is provided free through NOAA.

Experience at sea with raster charts supports their use for SOLAS vessels. In 3 separate surveys, the U.S. has gathered information from mariners using RCDS at sea in real-world, everyday navigation situations. This work was done to assess the safety and operational effectiveness of RCDS. The trials provide important information that confirms the suitability of RCDS for SOLAS compliance. The results of the trials are available on the World Wide Web at http://chartmaker.ncd.noaa.gov/ocs/rnc/raster1.htm.