

NATIONAL REPORT NORWAY

Administrative information:

Total budget for 2004 was NOK 139.1 Mill.
Annual sales for 2004 was NOK 21.7 Mill.

Status of multibeam surveying

Internal surveying:

EM 1002

In co-operation with NDRE, 2431 km² along the West Coast of Svalbard was surveyed. In addition, 7800 km² were surveyed by NDRE along the coast of Norway and submitted to NHS.

EM 3000D

Two survey launches equipped with EM 3000 has been operating on a 12-hour daily operation throughout 2003. The efficiency has been very good and a total of 1178,3 km² has been surveyed along the Norwegian coast, mostly in areas with water-depths less than 20 meters. All the areas covering the charts in connection with Melkøya have been surveyed in 2004. A total of 532 km² have been covered in 2004.

Plans 2005:

NHS has commissioned a new surveying launch, and during 2005 three launches will be operational. 2 will be equipped with EM3000D, and 1 with EM1002. The internal survey will continue in the northern part of Norway and the plan is to survey 900 km² in shallow areas.

External sea surveying:

Status:

OSAE has continued surveying in 2004 using more or less the same survey spread as in 2003. They have surveyed a total of 622 km² in shallow waters. Blom has carried out boat surveys covering a total of 150 km².

Plans 2005:

NHS plans to carry out Laser surveys in 4 different areas in 2005, covering a total of 750 – 1000 km². In addition Blom will do some infill with boats.

External ENC and paper chart production:

Status:

In 2004 a total of 10 charts (23, 24, 120, 109, 110, 57, 116, 489, 101 and 98) have been produced and 2 charts (45 and 46) have been reconstructed. 58 ENC's covering the same geographical areas have also been produced. Production of chart 55 continued in 2004, and charts 54 and 56 were started, and most of the ENC's has been issued. Prior to the production of the charts, old data (in areas that has not been covered with new surveys) has to be merged with modern primary data. Such work has been carried out on a total of 41 cells. The gap in the ENC coverage in Skagerak/Kattegat has been closed. (5 ENC's). Production of ENC's in the general usage band within the Norwegian economic zone, up to 64 degrees north (13 ENC's), have also been produced.

All data surveyed in the Melkøya area has been stored in our primary database and data covering all 7 charts in the area have been sent to the contractor for chart production. The first 3 charts have been issued as ENC's and the harbour chart has also been issued in paper format.

Plans 2005:

In 2004 the external production of ENC's and paper charts will continue with the same magnitude as last year. The coast of Nordland, from the island of Vega and northwards will be given high priority. 1 or 2 charts are planned to be produced in the Svalbard area. Further it is planned to produce ENC's in the general usage band within the Norwegian economic zone, up to 68 degrees north.

All the remaining charts in the Melkøya area are under production and will be issued before June.

Update on lessons learned from outsourcing:

It can again be stated that the result from the outsourcing has been accordance with the expectations. 2004 has proven that the good relation and co-operation with the industry has been further improved, leading to an even higher efficiency and quality on the work in the Enhanced ENC-production Project than previous years. Frequently meetings have been held both on administrative and technical matters. Technical personnel from NHS are following up the sea surveying by frequently visiting the surveying parties. Personnel from the external companies have made frequent visits to NHS to exchange technical experiences. This has led to continuous improvements of the technical specifications. Improvements in routines and processes have also led to a revision in the price regime.

ENC and paper chart production in NHS (Internal)

ENC production:

The internal ENC and paper chart production was in 2004 continued in accordance with the NHS Long Term Plan. The ENC production has mainly been concentrated to areas in the northern part of Norway (Nordland and Finnmark). In addition some minor gaps in the coverage in other area have been completed. As mentioned in previous reports ENCs are now compiled from source data (Primary Data) in a cell based and integrated production process.

Updating via ER profiles has been carried out in accordance with “Etterretninger for sjøfarende” (“Notice to Mariners”), and distributed through PRIMAR Stavanger. New Editions have been issued as required.

The conversion of data from S57v3.0 to S57v3.1 was completed in 2004 and New Editions released accordingly.

Further more the internal production environment has supported the industry in quality controls and final approval of ENC's and paper charts.

The total number of ENC's released and distributed through Primar Stavanger are shown in table below. (December 31st 2004.)

<i>Usage Band</i>	<i>ENC Cells Produced</i>	<i>% Total ENC Coverage</i>	<i>Equivalent Paper Charts</i>
Berthing	0	0	0
Harbour	81	78% (Approx)	33 (Approx.)
Approach	525	67% (Approx)	91 (Approx)
Coastal	13	See note 1	3 (Approx)
General	17	See note 2	4 (Approx)

Notes:

1. Covering areas of the Svalbard west coast (Chart 523 and 524)
2. Covering areas within the Norwegian economic zone from Skagerrak and up to 65 degrees north

Technology:

The technology used for ENC and paper chart production is now stable, and very few problems reported. The existing technology has, however, reached a limit with respect to further development and improvements. Particularly is the updating mechanisms complicated and time consuming. A project has therefore been initiated to evaluate and implement the next generation production tools. Ref. The MINTEC project.

In order to achieve a further improvement of the co-operation with the industry a “divided” production model, where a greater part of the ENC's are produced by the industry while the paper charts for the same area are produced in-house, will be tested out in 2005.

Paper chart production:

In 2004 a total of 4 new charts have been published (No. 112, 142, 461 and 473). In addition has 1 chart been reconstructed.

New charts published 2004. (External and internal):

Chart No.	Title	Scale
23	Bergen - Fedje	1: 50 000
24	Fensfjorden - Sognesjøen	1: 50 000
57	Vefsn- og Leirfjorden	1: 50000
109	Nordkinn - Tanahorn	1: 50 000
110	Tanafjorden	1: 50 000
112	Båtsfjord - Hamningberg	1: 50 000
116	Bugøynes – Grense Jakobselv	1: 50 000
120	Hjeltefjorden	1: 50 000

	Stureterminalen –Mongstad	
142	Narvik – Skjomen - Rombake	1: 50 000
461	Narvik havn	1: 10 000
473	Langesund - Herøya	1: 20 000
489	Hammerfset med innseilinger <u>Includes plan:</u> <i>- Melkøya, scale 1: 10 000</i>	1:20 000

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Reconstructions¹ (published as new Editions) 2004 – (External and internal):

Chart No.	Title, limits and other remarks	Scale
45	Roan - Grunnan	1: 50 000
46	Folda	1: 50 000
83	Dyrøya - Gibostad	1: 50 000
127	Storfjorden Indre del Sjøholt - Geiranger	1: 50 000

1. Reconstruction: Reconstruct a chart from Primary Data

Remarks:

- All charts are referred to WGS84
- The charts are printed in 4 colours (CMYK)

Revised Reprints published in 2004:

87 charts have been revised and reprinted.

Improvements in the Survey Launch fleet.

A new survey launch, named "Sjøfalk", was commissioned in July 2004 for survey works along the Norwegian coast. The survey launch is a new concept built on a standard 37 feet leisure boat hull. It is semi-autonomous and has facilities to operate away from the mother ship for 4- 6 days, accommodating a crew of 4 persons. The service speed is up to about 25 knots.

Survey equipment:

Echo sounder:	Kongsberg EM3000D Multibeam echo sounder
Positioning system:	Javad GPS receiver with in-house post processing software (Abspos)
Motion sensor:	Kongsberg Seatex Seapath 200
Data acquisition system:	In-house "Havlogg" (to be substituted with Kongsberg Seafloor Information System during 2005)

The 32 feet long survey launch "Sjøtroll" has been equipped with an Em1002 multibeam system in addition to the former EM3000D. It is expected that the dual system will increase the efficiency in areas with complex topography with depth ranging from 0 meter to several hundred meters.

All the survey launches have got the new positioning system Abspos (see below).

Experience gained by new positioning system (ABSPOS)

Over the last decade the Norwegian Hydrographic Service (NHS) has utilized a mobile differential GPS system (Seapos) for hydrographic surveying. As the precise point positioning technique developed, the NHS caught interest in this approach as an alternative to DGPS. We started developing the new system ABSPOS in 2003 in co-operation with Agricultural University of Norway.

Abspos is short for “ABSolute POSitioning” (a rather ambitious name, but Abspos is at least more “absolute” than DGPS). ABSPOS is a GPS post processing software package, based on the precise point positioning technique.

The ABSPOS software requires high quality data as input, and new GPS receivers were purchased as AABSPOS was introduced.

The real-time positioning solution is based on a combination of Egnos corrections, DGPS corrections from IALA or uncorrected GPS positions. The solution mix depends on the availability of external correction sources. The real-time positioning accuracy requirement is in the order of 1-3 m, which is sufficient to ensure proper bottom coverage for the Multibeam Echosounder.

In real-time, dual frequency GPS code and phase observations are logged continuously. Once a day (typically) the final positions are calculated by post processing with ABSPOS. The first step of the processing is to download recent IGS orbits and clock corrections from the Internet. The IGS orbits come in three flavours: Ultra-rapid orbits, rapid orbits and final orbits.

The main purpose of introducing ABSPOS in the hydrographic surveying, was to improve the fieldwork efficiency. During the first half year of operation the surveyors have reported up to 20% increase in efficiency. By introducing ABSPOS, we have not only gained efficiency, but also the positioning accuracy has been improved. Experiences gained by testing over the last two years show that ABSPOS has an accuracy of about 0.12 m (95%) horizontally and about 0.25 m (95%) vertically.

Multibeam training course

During the first week of November 2004 Hydrometrica, in co-operation with the Norwegian Hydrographic Service, arranged a multibeam training course in Stavanger. Out of the 53 persons attending the course 35 were from the Nordic countries.

The main aim of this course was to create a deeper understanding of multibeam sonar systems for experienced hydrographers and for people involved in processing of data or technological support to surveyors. In particular the course was designed to provide an overview of

- the technology and problems associated with shallow water multibeam surveys,
- the processing and visualisation techniques designed to address the complexities of swath mapping,
- the constraints on using swath bathymetry to produce high quality data.

The four instructors at the course came from Canada and US.

The MINTEC Project

The Norwegian Hydrographic Service has started a project called MINTEC to obtain new software for production and management of digital and analog nautical charts.

The solution shall be integrated with the NHS' existing (Oracle Spatial/GeoMedia) primary database, and shall facilitate improved efficiency and quality assurance of the production and updating of all NHS product categories.

The production line comprises import of data/integration with the primary database, generalisation and management of hydrographic data, production and management of ENC data and export to S57, paper chart compilation and management of digital nautical charts, export to printing process, continuous updates of electronic and analogue charts (integrated with NtM) and administration of products and production processes. Emphasis will be on innovation to support future products such as web publication, print-on-demand, AML, etc.

In addition to software (off-the-shelf products), the acquisition will comprise adaptation and development of software, configuration of the production line, documentation and training. There will also be a need for transfer of data from the existing production line.

The procurement was announced in the TED database 15 May 2004, and four companies submitted tenders within the deadline. The NHS has evaluated the tenders, and negotiated with all four companies. The goal is to award contract to the preferred company early 2005, and to have the new system up and running by the end of the year.

NHS Quality System

Since ISO- Certification by the Norske Veritas in 2003, the NHS Quality System has undergone steady improvement and development. Quality audits have been found to provide a particularly valuable source for improvement to the management system and to the NHS processes.

Personnel awareness for the advantages of the quality system principles and requirements is greatly enhanced by the quality audit processes.

One annual external quality audit is performed by the Veritas as part of its Certification scheme.

In addition at least two internal audits are run on selected segments of the organisation.

In addition to focusing on the management aspect, particular importance is placed on auditing the interface between processes and internal customer/supplier interchange.

The next renewal of the quality system by Norske Veritas is scheduled to take place in April, 2006

Integrated Maritime Services

The INMAS project started up in 2004 with the main focus on the fairway management. The main goal in this phase of the project is to develop and demonstrate a fairway management service that utilises digital geographic information through the execution of its tasks and contributes with quality approved fairway data into a common geospatial infrastructure.

Main achievements:

- A simpler, faster and cheaper dataflow in both organisations
- Eliminate duplication of processes and data
- Improve products and services
- Contribution to improve safety at sea

The activities that was carried out in 2004 have included requirements regarding the basic geodata and the development of a data model covering the fairway information. Further activities for 2005 will include development and harmonisation of the two organisation's processes, technical infrastructure, quality assurance, and prototyping tests.