



**Update on FERNS  
- REPORT on  
The Fifteenth Session of the Council of the  
Far East Radionavigation Service (FERNS)**

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**1. Opening of the Session**

- 1.1 The fifteenth session of the Council (FERNS 15) was held in Yalong Bay Mangrove Tree Hotel, Sanya, People's Republic of China, during the period 13 – 17 November 2006. The Chairman, Mr. ZHENG Heping, Deputy Director General, China Maritime Safety Administration, opened the meeting and welcomed warmly all participants to China and to Hainan Island in particular.
- 1.2 In his opening address, the Chairman said that the venue for this meeting had been chosen carefully to enable participants to appreciate the environment of the island and to further develop the friendships that enable the discussions and research about Loran and other radionavigation systems to take place. FERNS is a very good platform for such discussions and this leads to the development of very good cooperation on regional matters concerning safety at sea and protection of the marine environment.
- 1.3 At the invitation of the Chairman each participant was introduced to the meeting. Representatives of the following Members and Observers participated in the session:

Members:

The People's Republic of China;  
Japan;  
The Republic of Korea;  
The Russian Federation.

Observers:

IALA;  
Norway.

Apologies:

Mr. John MERRILL, United States Coast Guard;  
Dr. Sally BASKER, General Lighthouse Authorities of the UK and Ireland

- 1.4 A full list of participants is given in Annex 1.

**2. Approval of the Agenda**

There were no comments on the draft agenda which was accepted for the conduct of the meeting. The agenda and the list of documents submitted for discussion are given at Annexes 2 and 3 respectively. There was agreement that the documents under the different agenda items should, where appropriate be taken in a sequence indicated by their subject matter and not necessarily in their numerical sequence.

### **3. Presentation of a Report by Each Country on the Loran-C/Chayka Programme.**

3.1 During the past year the operation and control of the chains operated by China (**CS 15/3/1**) have been further strengthened to ensure normal operation of the system. In particular:

- The system operation has been improved by the replacement of equipment that has failed due to the aging of some electronic components;
- The system management has been strengthened by improving the check, examination, maintenance and overhaul programme and raising the level of technical staff;
- With the new Loran-C monitor sub-system in operation, the automatic and intelligent management levels of Loran-C have been improved. Time-frequency and self powering systems were replaced in Stations of Chain E; TOE has been put into trial operation and a test of EUROFIX was conducted.
- Synchronised monitor sub-system have been replaced in chains E and F, some time-frequency sub-systems will be replaced by the end of 2005 and TOE synchronisation will be put on trial operation for increased control accuracy.

Information was also given on:

- The decision to extend the quarterly off-air period to eight hours to ensure more reliable operation.
- The signal availability of the chains in China for the period August 2005 to July 2006.

3.2 The operational status of the North West Pacific Chain during the past year was described by Japan (**CS 15/3/2**). Information was provided on the scheduled and unscheduled off-air periods, the signal availability of each station in the chain and of each baseline.

3.3 The status of Loran-C stations of the Korean Chain was given in **CS 15/3/3**. Information on signal availability of each station and baseline of the chain was also provided.

The continued non availability of the Ussurisk station was noted in the report and Korea indicated its wish that the station should commence normal operations in the near future.

3.4 Russia reported (**CS 14/3/4**) the results of an operational analysis of the Russian Stations in Chains B and C and the RAC. This availability was based on unscheduled off-air time only because the methodology adopted in the RAC did not include the maintenance time of the stations.

3.5 IALA reported on recent developments that had taken place within the Association and at IMO. The main areas are AIS and e-Navigation, both of which are related to decisions made recently at IMO concerning long range tracking of vessels.

The specifications for shipborne and shore based AIS equipment are virtually finalised and emphasis is now being placed on the need for AIS networks in adjacent countries to be integrated and harmonised.

IALA has established a committee to study e-Navigation which held its first meeting in September. The meeting was attended by 70 delegates which included representatives of sister organisations including IMO, IHO, ICS and IMPA. Four working groups were established to study, respectively: the applications of AIS; e-Navigation on board; e-Navigation ashore; and, a technical catalogue.

During the meeting three possible obstacles to the implementation of e-Navigation were identified. They are:

- Electronic Navigation Charts (ENC) need to be based on one common international standard;
- Accurate positional information needs to be available from more than one source;
- Suitable communication channels, probably using broad band technology, need to be available.

The next meeting of the Committee will be held during the period 19-23 March in Southampton, England.

- 3.6 The position of Norway on the Future role of Loran-C was presented (**CS 15.3/6**). The importance of Radionavigation on the provision of navigation, positioning and timing services to Norwegian users was stressed. Emphasis was also given to the need for a comprehensive and viable infrastructure that takes into account the present and foreseen radionavigation systems as well as other systems that rely on the availability of accurate navigation, positioning and timing information. Particular reference was made to the view of Norway that co-operation between Russian and Norway on safety at sea services', including radionavigation systems, covering waters in the vicinity of both countries is very important.

With particular reference to Loran-C it was explained that the current situation in Europe is that Norway has four stations in operation, France has three and the UK has one. The future status of the station at Sylt is not decided. This situation is likely to continue to 2009. The future after 2009 is dependent substantially on the results of current discussions on the European Radionavigation Plan (ERNP) and on the discussions about back-up systems for satellite radionavigation systems.

- 3.7 In the absence of Dr. Sally Basker the Loran programme of the General Lighthouse Authorities of the United Kingdom and Ireland (GLAs) was introduced by Norway (**CS 15/3/5**). Information was given on studies currently being made by the GLAs and the results that have been determined. These studies have taken into consideration the advantages and vulnerabilities of satellite radionavigation systems as well as the needs for the development of a future e-Navigation system.

The GLAs have concluded that e-Navigation:

- will need a dissimilar, complementary, multi-modal and independent source of position, navigation and timing information; and,
- e-Loran is the only option that will meet all those requirements.

An e-Loran definition document is currently being developed and it is anticipated that the first version of the document will be available by 8<sup>th</sup> December 2006. In response to a question, Mrs Selvig said that the GLAs will be asked to make copies of first version of the document available to FERNS members as soon as it is available.

In response to further questions from Russia, Mrs Selvig replied that:

1. International organisations that have responsibilities associated with the services to be provided by e-Loran will be contacted and the proposals discussed with them after the impact on those responsibilities have been assessed.
  2. With regard to the ERNP it was considered important that all national and international radionavigation plans, including those relating to e-Loran, should be harmonised. It is not known when the ERNP will be ready for publication because delays have occurred caused by problems of a financial nature and of ensuring the system meets the operational requirements of all mobile services.
  3. The NELS Steering Group initiated the development of a Loran receiver of a size compatible with the needs of many users, that is, similar to the dimensions of a cellular telephone. Several equipment manufacturing companies were approached and a development contract was awarded to a Company in the Netherlands. The company subsequently developed a receiver and the appropriate information will be passed to the Russian Delegation.
- 3.8 The Council noted the Report on the ILA 35<sup>th</sup> Annual Convention and Technical Symposium (CS 15/3/7) that was made by Prof. GUG Seung-Gi, Chairman of the FERNS Technical Working Group.

#### **4 Operational matters for FERNS co-operating chains.**

##### 4.1 Scheduled Off-air for 2006

4.1.1 Information concerning the proposed Off-Air schedule for 2007 was provided in the following documents:

- CS 15/4/1 by China;
- CS 15/4/3 by Japan;
- CS 15/4/4 by Korea;
- CS 15/4/8 by Russia.

Japan was invited to collate the off-air schedules of all the FERNS chains and provide the completed list to all Members by no later than 1 December 2006.

##### 4.2 Revision of FERNS Operating Guidelines

4.2.1 Korea explained (CS15/4/5) that the Control Station of Korea Loran-C chain had been relocated from Pohang station to Daejeon DGPS central office in January 2006 and therefore proposed amendments to pages 23 and 25 of the FERNS Operating Guidelines that would reflect the new telephone and fax numbers

4.2.2 Russia informed the Council of changes that had taken place to the Moscow telephone codes (CS 15/4/7) and proposed amendments to pages 18, 21 and 23 of the FERNS Operating Guidelines to reflect the new telephone codes.

4.2.3 It was agreed that amendments would be made to the Guidelines to introduce these changes.

##### 4.3 Transfer of Korean Loran-C Chain control.

Korea informed the Council of the transfer of its stations in the Korea Loran-C chain control to Daejeon DGPS Central Office (CS15/4/6). Information was also given on some aspects of the responsibilities of Daejeon DGPS Central Office and one of the operating benefits resulting from the transfer.

#### 4.4 Improvement Plan of private communication link between Chiba and Daejeon Control Stations.

An updated interim report on the Improvement Plan was made by Japan (CS 15/4/2). Although some progress had been made as a consequence of Japan accepting the proposal of Korea made in September 2005 in principle, a number of issues had emerged that has made it necessary for Japan to continue working on the plan and to discuss certain matters with Korea.

Information was given on the new issues that need to be resolved and on the proposed future work items that should enable the private communication link to be set up between the two control stations.

### 5. **Technical matters for FERNS co-operating chains.**

#### 5.1 China (CS 15/5/1) reported on a test evaluation of TOE synchronisation control carried out at an operational Loran-C station in the China East Sea Chain during March 2006.

A block diagram of the testing equipment was described and information given on the:

- Principle of synchronisation measurement;
- Basic data on which the evaluation was made;
- Graphical results of the evaluation of the stability of both external and internal time references; and,
- Conclusions of the evaluation.

#### 5.2 Japan (CS 15/5/2) reported that during the year transmissions in the Russian Chain by the Tokatibuto station for adjustment purposes was suspended. This was followed by transmissions being made during two periods, at the request of Russia, for adjustment purposes.

During these two periods the transmissions from the Russian Chayka stations were monitored and a change in the signal shape detected. However, it was not possible to identify a stable accuracy of the signals and it was considered that more extensive monitoring is necessary to ascertain the stable accuracy of the signals and to assess the effect of the change in signal shape on the precision of the accuracy of position determination with further work being carried to improve the accuracy.

In order to solve technical problems in Chain B the Council expressed the view that a joint Russian-Japanese working group be established to resolve the problems.

#### 5.3 Details of an analysis of test transmissions made by the Ussuriisk station were reported by Korea (CS 15/5/3). The analysis indicated that the Loran-C transmissions from Ussuriisk were measured normally at two monitoring stations and that the TD of the transmissions was stable during the period of measurement.

The conclusion of the analysis was that if the Ussuriisk station was operating in the Korea Chain continuously with transmissions similar to those that were tested, the range of the chain would be expanded and its accuracy would be improved.

#### 5.4 Russia provided information on the current status and future plans for the modernisation of the Chayka system (CS 15/5/4). The objectives of the modernisation programme are to:

- Integrate Chayka with satellite navigation systems;
- Extend Chayka functionally; and,

- Improve the reliability of Chayka equipment.

Details were given of the aim of each of the three elements of the programme and the planning schedule for implementation of improvements to the Chayka transmitting stations. Information was also provided on the assessment made into the most appropriate coding system to be used for transmitting DGNSS signals by the Chayka data communication link.

The conclusions in the document described the operational results expected from the modernisation programme and indicate how these will be consistent with the objectives.

- 5.5 A report on the work carried out during 2006 to improve operating efficiency of the Russian stations and to comply with the FERNS Operating Requirements was made by Russia (**CS 15/5/5**). Detailed information was given of the status and work carried out during the year on Chayka stations that are incorporated in FERNS. In addition the results of tests on stations to check compliance with FERNS requirements were described.

The report also contained information on the work that is still outstanding and on plans to complete the upgrade of all stations during 2007.

The need to estimate actual coverage boundaries of Chains B and C over land and sea surfaces was identified in the report and the desirability of assistance from hydrographic vessels from Japan and Korea to undertake appropriate measurements was mentioned. Japan and Korea agreed to discuss this request with Russia and to consider the development of a coordinated programme of measurements. It would also be helpful to Russia if the Tokatibuto station would be on air during the test and Japan also agreed to discuss this with Russia.

## **6 Co-ordination of other radionavigation services in the Far East.**

### **6.1 AIS Service**

- 6.1.1 Information was provided by China (**CS 15/6/1**) on the development of system of 50 AIS stations and associated regional AIS management and services during the last two years. Further development of the system by the end of this year was also described.

Research into applications of AIS that have taken place since the system became operational have indicated that in addition to ship reporting systems and VTS, other services could be improved by the use of AIS.

In response to questions, the meeting was informed that:

- The normal range of good AIS communication was in the order of 30 nautical miles. However, in practice this range is reduced in areas of dense traffic and although certain weather conditions will produce a greater range, the reliability of communications is reduced.
- Discussions have taken place with adjacent countries about AIS data exchange but no formal arrangements have been made.

- 6.1.2 Japan (**CS 15/6/2**) described how an Information Service using AIS is being developed. The service started in 2004 and is expected to cover the most congested Waters by 2007.

- 6.1.3 Details of a nationwide AIS Management System was provided by Korea (**CS 15/6/4**).

Information obtained by the system is used in a General Information Center on Maritime Safety and Security (GICOMS) to monitor ships in Korean coastal waters. Safety information and headline news is also provided to shipping by GICOMS.

6.1.4 It was noted that no report had been received from Russia on the development of an AIS service. The Council requested Russia to prepare and submit a report on this matter to the FERNS 16<sup>th</sup> session

6.1.5 In summary, the Council noted that studies are being undertaken by FERNS members on different applications of AIS and, recognising the advantages operationally and in spectrum usage of a co-ordinated approach, requested the Technical Working Group to collate all the various applications of AIS that are being studied consider the extent to which harmonisation of the applications could occur and make appropriate recommendations to the Council at a future meeting.

## 6.2 DGNSS and Radio beacon Services

6.2.1 The current status of DGNSS in Japan that uses the medium frequency (MF) band was given in **CS 15/6/3**. Information was given on the way that radio beacon and local meteorological services that used the MF band were terminated recently. This has enabled maritime DGPS to operate with an occupied bandwidth of 230 Hz. It is also considered that an effective DGPS service with a 500 Hz channel separation will be possible after negotiation with appropriate Authorities.

Details of current DGNSS stations in Japan and arrangements made for the collection of DGNSS data and locating vacant and usable MF frequencies for DGNSS purposes was provided in the report

Information was also given about a DGPS service in Japan provided from VHF-FM broadcasting stations.

Recognising that a study of the measures that should be taken to minimise mutual interference between DGNSS stations of FERNS members is one of the tasks being carried out by the Technical Working Group, the Council agreed that this document be referred to the Working Group for consideration during their study.

6.2.2 Korea introduced **CS 15/6/5** which contained information on the construction of a NDGPS service, the availability of the transmitting stations and the coverage of the Korean DGPS service

Details were also given on research and development projects related to DGPS, GNSS and GNSS augmentation.

6.2.3 **CS 15/6/6** contained data on marine radio beacons and DGNSS stations operational and planned in the Far East Maritime Area of the Russian Federation.

The Council agreed to refer this document to the Technical Working Group so that it could be taken into account during their studies on the provision of DGNSS services and the minimisation of mutual interference.

## 7. **Any other business.**

- 7.1 Russia reported (CS 15/7/1) the results of observing during then period 2003 – 2006 the effect on the propagation of radio waves of underground activities that indicate an earthquake may occur within days.

The effect of such activities on the ground and sky waves and the amplitude of signals were identified and some essential parameters for receiving equipment to have the capability to record and measure the phenomenon were described.

- 7.2 A report of the activities and future plans of the Technical Working Group was given by its Chairman, Prof Gug Seung Gi of Korea (CS 15/7/2).

The report addressed the actions so far taken and the future intentions on the following topics:

- Improvement programme for FERNS Co-operating chains. It was proposed that the matter be delayed, pending a decision by the US on the future of Loran-C in that country.

The Council considered that the study should continue and that experiments aimed at improving the service provided by FERNS should be co-ordinated.

Prof. Gug Seung-Gi thanked Russia for their efforts to modernise their Chayka chains. As this is directly related to the Improvement Programme for FERNS Cooperation Chains. He hopes and expects Japan and Korea to cooperate with, and to assist, Russia to obtain good results.

- Measures to mitigate mutual interference between DGNSS stations. It was proposed that further time be allowed to enable the study to be completed.

The Council agreed that further time is allowed to enable the study to be completed. The study should also take into consideration documents CS 15/6/3, CS 15/6/5 and 15/6/6.

- Information exchange on future planned DGNSS services to be provided by FERNS members. The study is ongoing and the outcome will be reported at FERNS 16.

- The proposal of Russia made FERNS 14 that the Working Group be invited to consider matters relating to the design of receiving equipment for radionavigation. It was proposed that further time be allowed to enable the study to be completed.

The Council agreed that further time is allowed to enable the study to be completed.

To assist in this study, members were requested to inform the Technical Working Group of the types of Loran-C/Chayka and other integrated user equipment used and manufactured in their country

- Practical use of AIS in the A to N field. It was proposed that Members be requested to provide information on this use of AIS to the Chairman by March 2007.

The Council agreed that this subject should be broadened to consider all possible applications of AIS, see para 6.1.4.

At the request of the Chairman of the Technical Working Group the Council agreed that a meeting of the Technical Working Group will be held between the Spring and Autumn of 2007. The agenda for the meeting will be made by the Chairman and the venue and date will be arranged by the Chairman in consultation with members.

Members were requested to ensure, as far as possible, experts with knowledge relevant to the matters on the agenda participate in the meeting. The Chairman was also authorised to invite experts from other countries and organisations that have knowledge and expertise on the subjects to be discussed.

7.3 Norway requested information from Russia on whether consideration was being given to the provision of a new Chayka station to link with other stations and provide coverage of the Northern Sea Route between Europe and the Far East. In reply Russia said that at present there was no plan to provide an additional station, but DGNSS will be further developed along the Northern Sea Route.

**8. Date and venue of the 16<sup>th</sup> session.**

8.1 At the invitation of the Japan (CS 15/8/1) it was agreed that the 16<sup>th</sup> session of the Council will be convened in Japan in the autumn of 2007. Japan Coast Guard will determine the venue and specific dates for the meeting and inform members of FERNS at least four months before the meeting.

**9. Closing of the session.**

9.1 The Council reviewed the draft report of the 15<sup>th</sup> session and adopted it with amendments. The final report is given in Document CS15/9/1.

9.2 The Council expressed its great appreciation to China Maritime Safety Administration for the excellent arrangements made for the meeting, the hospitality that had been shown to all participants and the very interesting visits that were undertaken.

9.3 The Chairman extended his appreciation to all the delegates for the hard work, mutual understanding and co-operation that has contributed to the success of FERNS in general and to the 15<sup>th</sup> session of the Council in particular.

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## Annex 1

### LIST OF PARTICIPANTS

#### Members

<b>China</b>	Mr. ZHENG Heping	Deputy Director General, China Maritime Safety Administration
	Mr. HAN Wei	Director, Department of AtoN and Hydrography, China Maritime Safety Administration
	Mr. YANG Yinben	Senior Engineer, China Maritime Safety Administration
	Mr. LIU Dezhen	Director, Department of Aids to Navigation, Hainan Maritime Safety Administration
	Mr. CHEN Jinde	Senior Engineer, China Maritime Safety Administration
	Mr. XU Yueping	Researcher, Xi'an Research Institute of Navigation Technology
<b>Japan</b>	Mr. Tadayoshi IMAI	Director, AtoN Engineering Division, Maritime Traffic Department, JCG
<b>Korea</b>	Mr. LEE Jang-Woo	Director, AtoN Division, Marine Safety Management Office, MOMAF
	Mr. LEE Seung-Jae	Assistant Director, AtoN Division, Marine Safety Management Office, MOMAF
	Mr. CHUNG Se Mo	Professor, Korea Maritime University.
	Mr. GUG Seung-Gi	Professor, Korea Maritime University.
<b>Russia</b>	Mr. Victor TSAREV	Director, Internavigation RTC of Advanced Navigation Technologies;
	Mr. Anatoly ARGUNOV	Deputy Director, Internavigation RTC of Advanced Navigation Technologies.
	Mrs. Elena TSIKALOVA	Chief of Unit, Internavigation RTC of Advanced Navigation Technologies
	Mr. Vadim ZHOLNEROV	Assistant Director General, Russian Institute of Radionavigation and Time

#### Observers

<b>IALA</b>	Mr. Torsten KRUUSE	Secretary General
	Mr. Peter KENT	Technical Representative
<b>Norway</b>	Mrs. Kirsten Ullbæk SELVIG	Director General , Royal Norwegian Ministry of Fisheries and Coastal Affairs
	Mrs. Inger-Lise SOGSTAD	Adviser, Royal Norwegian Ministry of Fisheries and Coastal Affairs

## **Annex 2**

### **Agenda**

1. Opening of the session.
2. Adoption of the agenda.
3. Presentation of reports by each country on the Loran-C/Chayka programme.
4. Operational matters for FERNS co-operating chains.
  - 4.1 Scheduled off-air for 2007.
  - 4.2 Revision of FERNS Operating Guidelines
  - 4.3 Improvement plan of private communication link between Chiba and Daejon Control Stations.
  - 4.4 Transfer of Korean Loran-C Chain control.
5. Technical matters for FERNS co-operating chains.
6. Co-ordination of other radionavigation services in the Far East.
  - 6.1 AIS Service.
  - 6.2 DGNSS and Radio beacon Services
7. Any other business.
8. Date and venue of the 16<sup>th</sup> session.
9. Closing of the session.

### Annex 3

#### List of Documents

Document No.	Description	Country
<b>CS15/3</b>	<b>Presentation of reports by each country on the LORAN-C/Chayka programme</b>	
1	○ Country Report	China
2	○ Operational Status of North West Pacific Chain	Japan
3	○ Presentation of Report by each country on the LORAN-C/Chayka Program	Korea
4	○ Results of Operational Analysis of the Russian Stations in Chains B and C and in RAC	Russia
5	○ The General Lighthouse Authorities' Loran Programme and Current Status in Europe	UK
6	○ The Future Role of Loran-C ---Position of Norway	Norway
7	○ Report on ILA 35th Annual Convention and Technical Symposium	Prof. GUG, Seung-Gi
<b>CS15/4</b>	<b>Operational matters for FERNS cooperating chains</b>	
1	○ Scheduled Off-air in 2007	China
2	○ Updated Interim Report on the Improvement Plan of Private Communication Line between Chiba Control Center and Daejeon Control Station	Japan
3	○ 2007 FERNS Scheduled Off-air	Japan
4	○ Plan for the Korea Chain Scheduled Off-air in 2007	Korea
5	○ Revision of FERNS Operating Guidelines	Korea
6	○ Transfer of Korea Loran-C Chain Control	Korea
7	○ Revision of FERNS Operating Guidelines	Russia
8	○ Scheduled Off-air in 2007	Russia
<b>CS15/5</b>	<b>Technical matters for FERNS cooperating chains</b>	
1	○ A Test Evaluation of TOE Synchronization Control	China
2	○ The Improvement of Precision of a Russian Chain	Japan
3	○ Analysis of Test Signal for Ussuriisk Chayka/Loran-C Station	Korea
4	○ Modernization of Chayka System in Russia—Current Status and Future Plans	Russia
5	○ On the Works Carried Out in 2006 to Provide Operating Efficiency of the Russian Stations and Compliance with the FERNS Operating Requirements	Russia
<b>CS15/6</b>	<b>Coordination of other radionavigation services in the Far East</b>	
1	○ Shore-based AIS Stations in China	China
2	○ Information Services through AIS in Japan	Japan
3	○ Current Status of DGNSS in Japan, Using Medium Wave Band	Japan
4	○ Universal Automatic Identification System	Korea
5	○ NDGPS Construction and Availability	Korea
6	○ Data About Marine Radiobeacons and DGNSS Stations in Far East Maritime Area of Russian Federation	Russia
<b>CS15/7</b>	<b>Other business</b>	
1	○ Observation Results of Short-Term Earthquake Presages in the Far East Region	Russia
2	○ Activities & Future Plan of Technical Working Group	Prof. GUG, Seung-Gi
<b>CS15/8</b>	<b>Date and venue of the 15<sup>th</sup> session</b>	
1	○ Date and Venue of the 16 <sup>th</sup> Session	Japan
<b>CS15/9</b>	<b>Session report</b>	