Automatic Identification System And Its Integration On The Great Lakes And St. Lawrence Seaway

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Executive Summary

The Automatic Identification System (AIS) has been characterized as the greatest advance in navigation safety since the invention of radar. Currently every commercial vessel greater than 300 gross registered tones (GRT) transiting through the St. Lawrence Seaway must be equipped with AIS. A final report on the AIS, focusing on the positive and negative aspects of the system on the Great Lakes and St. Lawrence Seaway's shipping industry, has been thoroughly researched and compiled.

The AIS is a shipboard broadcasting transponder system, operating on the very high frequency (VHF) Maritime radio band. It is capable of sending and receiving vessel information, including: course over ground, speed over ground, latitude, longitude and distance to nearby vessels.

To fully understand the potential of the AIS, a background regarding the point of view of vessels, shipping companies, and shore based seaway operations is needed. Industry has been polled to get first hand views and opinions of how AIS has affected them in short and long-term objectives and day-to-day operations. The report also outlines and discusses the technical aspects of the Automatic Identification System, concerning its complete operation within the ship-to-ship and ship-to-shore based infrastructures.

This report proves that the AIS greatly benefits the shipping industry, for both shipboard and shore based trade, with positive aspects far outweighing any negative aspects arising from the implementation of the system. With the great success of AIS in the shipping industry on the Great Lakes and St. Lawrence Seaway so far, the recommendation is that the AIS be implemented on all commercial vessels transiting the Great Lakes and St. Lawrence Seaway. The primary role of this implementation is to utilize AIS as an aid to navigation safety, and secondary as a way to improve the efficiency of the shipping and related industries on the Great Lakes and St. Lawrence Seaway.

Table of Contents

List of Abbreviations:

AIS	Automatic Identification System
VHF	Very High Frequency
GRT	Gross Registered Tonnes
USCG	United States Coast Guard
VTCC	Vessel Traffic Control Center
ETA	Estimated Time of Arrival
SLSMC	St. Lawrence Seaway Management Corporation
SLSDC	St. Lawrence Seaway Development Corporation
ECDIS	Electronic Chart Display Information System
MMSI	Maritime Mobil Service Identity
TDMA	Time Division Multiple Access
DSC	Digital Selective Calling
GPS	Global Positioning System
DGPS	Differential Global Positioning System
VTS	Vessel Traffic Services
IMO	International Maritime Organization
UTC	Universal Time Coordinate
CPA	Closest Point of Approach
ECS	Electronic Chart System

1.0 Introduction

1.1 Purpose

The Automatic Identification System (AIS) is a shipboard broadcasting transponder system operating on VHF Maritime radio band. It is capable of sending and receiving vessel information, including; course over ground, speed over ground, latitude, longitude, distance to nearby vessels fitted with the automatic identification system, etcetera.

The purpose of this report is to illustrate the effects that the Automatic Identification System has on the shipping industry within the Great Lakes and St. Lawrence Seaway.

1.2 Background

Sollosi (United States Coast Guard, February 11, 2003) states "The Automatic Identification System has been characterized as the greatest advance in navigation safety since the invention of radar." Currently every commercial vessel over 300 GRT must be equipped with an AIS system in order to transit through the St. Lawrence Seaway.

1.3 Scope

To understand the AIS, the aspects and improvements dealing with respect to safety and improved efficiency to the shipping industry must be compiled and analyzed. The point of view of vessels, shipping companies, and shore based seaway operations will help us to better understand the benefits this system has throughout the Seaway. Technical aspects of the AIS concerning its operation with the ship and shore based infrastructure are discussed in detail.

1.4 Methodology

In order to find the necessary information to explain this system, a number of informational resources have been utilized. Internet websites and documents from various companies and management corporations related directly to the St. Lawrence Seaway have been collected. For example, the St. Lawrence Seaway Management Group, United States Coast Guard (USCG), Canadian Coast Guard, Seaway Management Transport, etcetera. A number of emails and surveys have been established with the companies, raw material and opinions have been gathered and processed.

1.5 Resource Requirements

For completion of the technical report, a number of resources have been used to develop such an in-depth paper. These resources include: classroom space for various group meetings, computer and Internet access for research and word-processing of the report. Also, human resources have been used such as interviews and e-mails conducted with experts involved in the St. Lawrence Seaway shipping industry.

2.0 Implementation Overview

Since March 25, 2003 the shipping industry on the St. Lawrence Seaway has been greatly altered with the mandatory implementation of an Automatic Identification System (AIS) on every commercial vessel over 300 GRT (USCG, 2002). Through integration with Vessel Traffic Control Centers (VTCC) throughout the St. Lawrence Seaway, it has greatly enhanced safety within the seaway to avoid collisions, groundings, changes in navigational aids and up to date weather conditions at strategic locations. It has not only enhanced safety, but also the efficiency of the seaway by allowing users to foresee navigational risks such as meeting points with other ships, turning points and lock orders. This is not to say that the AIS system is without faults and imperfections. Throughout the report we will weigh the positive and negative aspects of the system, and give our educated opinion on whether the implementation should be mandatory for the rest of the Great Lakes.

2.1 Background of AIS

Over the past decade, there has been a growing demand for an effective and reliable vessel identification system for the St. Lawrence Seaway, as well as world vessel management. Governments, for the most part, have led in shaping the technology and its applications.

In the past, the Seaway has relied solely on visual, cameras at the locks for instance, and predictive vessel movement information. Vessel arrival times were received at various locks and call-in points and entered into the VTCC. This would then drive the graphic displays, vessel models over the river, using a dead reckoning method. Vessels would move on a predetermined track based on their estimated time arrival (ETA) for the next location. This has been the process used for over 20 years throughout the Seaway (A. Godard, personal communication, May 5, 2004).

On February 5th, 2000, the Saint Lawrence Seaway Management Corporation (SLSMC) and its counterpart, the Saint Lawrence Seaway Development Corporation (SLSDC), informed the world as to its intention to implement the AIS technology into its operations. These corporations completed various performance tests throughout the shipping season to ensure its proper operation throughout its system of vessels, locks, and manually operated lift-bridges. Each of the major companies that transit the St. Lawrence Seaway frequently (Upper Lakes Shipping, Algoma Marine Central, Canada Steamship Lines), received an AIS integrated system onboard-selected vessels to enhance the testing of the new system (J. P. Asquariello, 2002). The selected vessels received evaluation forms to be completed and then analyzed by the SLSMC and SLSDC to see how well the system would affect the whole seaway (Refer to Appendix A).

The next step was to develop the specific AIS message that would be broadcasted in the Seaway system, and was finalized on September 5th, 2002; this will be highlighted later in the paper. Also during this time the regulations of AIS on the Seaway were completed (See Appendix B). The AIS broadcasting and receiving antennas were installed, and conducted the AIS signal coverage testing during December of 2001. All of the network control software for the system was completed on May and the installation of the AIS shore stations equipment and network testing was concluded in July of 2002 (J. P. Asquariello, 2002). A total of nine base stations were added along the seaway, covering approximately 425 miles of canal and lakes and all integrated through a wide area network (Refer to Appendix C). Each base stations covers a 20 to 30 nautical miles radius in river waters, and 50 to 70 nautical miles on the lakes (A. Godard, personal communication, May 5, 2004).

The AIS systems onboard the carrier vessels finished and evaluated the AIS/Electronic Chart Display Information System (ECDIS) during August to November 2002. Various meetings between these major companies were held to receive their input on the system and any problems that they were noticing in the test system (J. P. Asquariello, 2002).

As with all new technologies, there are always some problems associated with it, some minor, others major. A. Godard (personal communication, May 5, 2004) discusses some problems:

> The Masters onboard the various AIS trial run vessels received evaluation forms for the system to help indicate some of the problems. Problems that arisen in the system included wrong Maritime Mobile Service Identity (MMSI) numbers for some of the vessels, heading and speeds incorrect, misplaced positions of the vessels, and incorrect information from the VTCC concerning water levels and Seaway alerts. After, specialized AIS technicians and programmers tried to work the problems out of the system, and then it was then ready for implementation on the St. Lawrence Seaway.

During the first operational season, the SLSDC reported the system conversion and operation went smoothly, and the benefits have been almost immediate. The implementation of the AIS came into effect on the start of the shipping season on March 31st, 2003. These new laws and regulations for the carriage of the AIS onboard transiting vessels have been consistent, since the majority of the ocean going vessels have already been equipped with foreign-installed units. A new law of speed enforcement on the Seaway began November 1st, 2003, as AIS provided the exact velocities of the vessels where these speed regulations are in place. For any vessels that do not have an AIS installed, there is the option of renting or purchasing a system in Montreal or Quebec before they can enter the St. Lawrence Seaway ("Sault AIS installation nears competition," 2003).

2.2 Operation of AIS

To first be able to give an educated opinion on the positive and negative aspects of the AIS, the basics of; what AIS is, how it works, the ship based and shore based infrastructure required to use AIS to its full potential, and how it has effected the St. Lawrence seaway since its implementation must be understood.

The AIS is a complex operational system, as explained by the USCG:

> To send and receive information each AIS uses one VHF transmitter, two VHF Time Division Multiple Access (TDMA) receivers, and one VHF Digital Selective Calling (DSC) receiver. A standard marine electronic communication link (IEC 61162/NMEA 0183) to its shipboard display and sensor systems is also installed in the AIS. (USCG, 2002)

The input for position and timing into the AIS is normally done through the Global Positioning System (GPS) receiver, which may be integrally built into to system or and external GPS connected to the AIS. The Differential Global Positioning System (DGPS) is used for precise positions in costal or inland waters, such as on the Great Lakes and St. Lawrence Seaway.

The AIS is a transponder, as well as a receiver. The transponder normally works in an autonomous and continuous mode, always updating its last transmission. The transmission will be broadcasted continuously, regardless of whether it is operating in the open seas or costal or inland areas. "All of the transmissions are broadcasted over 25 or 12.5 KHz channels using 9.6 Kb GMSK FM modulation and HDLC packet protocols" (USCG, 2002). The AIS only requires one channel to operate, but is more precise with multiple channels. To avoid any interference problems over the channels, the AIS uses a station for transmissions and a station for receiving information. As the vessels will be on route to their required destinations, they will come into and out of the different stations. The AIS automatically corrects itself so the channels can be shifted without any communication loss between the station, itself, and other vessels. The system will continuously give precise information even in highly overloaded situations (The complete guide to AIS, 2001).

The AIS range of coverage is similar to that of VHF radio. It depends mainly on the height of the systems antenna. Longer wavelengths cause the system to have better propagation than radar. The normal range is approximately 20 nautical miles, however, atmospheric and weather conditions can greatly affect this value to a much lesser or greater extent (USCG, 2002).

2.3 AIS Display Information

There are several categories of information displayed by an AIS, depending if it is integrated with an ECDIS, or if the ship is in a Vessel Traffic Services (VTS) zone, which also incorporates an AIS setup such as the one on the St. Lawrence Seaway. The information may include all or part of the following:

- Static data
  - The ships International Maritime Organization (IMO) Number
  - MMSI number
  - Call sign and name of the vessel
  - Length and beam
  - Type of ship
  - Location of position fixing antenna on the ship

- Dynamic data
  - Ship's position with accuracy indication to 1/1000 of a minute and integrity status
  - Time in Universal Time Coordinated (UTC)
  - Course over ground to 1/10 of a degree
  - Speed over ground to 1/10 of a knot
  - Heading from gyro input
  - Navigational status (underway, anchor, etc)

- Rate of turn

➢ Voyage related data
  - Ship's draft
  - Hazardous cargo and type of cargo
  - Destination and Estimated Time of Arrival (ETA)

➢ Safety messages
  - Sent as required

Static data is programmed into the unit when the system is commissioned onboard the ship. The information is transmitted every six minutes or when requested from a VTS operator. The dynamic data is derived from other navigational equipment onboard, such as GPS, gyrocompass, rate of turn indicator, speed log, and can also be entered manually. The update rates vary from every two seconds to every three minutes depending navigational status and speed. This voyage related data is entered manually by the master or officer of the watch through a password protected procedure and the information is transmitted every six minutes or when requested. The safety messages are entered manually and sent out as required. The AIS is also capable of sending brief text messages from ship-to-ship, ship-to-shore and shore-to-ship. These messages can include notice to mariners, navigational warning, weather forecasts, tides and currents, search and rescue communications, and instructions from VTS. Some examples of how this text messages are utilized on the St. Lawrence seaway are; obtaining lock orders, water levels in the river, current traffic, seaway alerts, ice conditions in the seaway, wind speed and heading on lock walls and any other relevant information for transiting the seaway (The complete guide to AIS, 2001).

2.4 Associated Costs of AIS

The implementation of this new navigational technology has been costly on all aspects. Over the first three years, the overall project cost was approximately $2,400,000 Canadian. This cost has been shared equally between commercial carrier users and the two seaway management corporations. During the transits on four legs of the seaway, upbound / downbound the Welland Canal and upbound / downbound Montreal-Lake Ontario, each shipowner is required to pay a fee of $0.06 Canadian for every GRT of the vessel. This annually totals $5000 per vessel and this levy was mandatory since May 1, 2001 ("Shipboard automatic identification system displays: meeting the needs of mariners," 2003).

The cost of AIS transponders varies with the manufacturers and the options available. The basic price ranges from $15,000 to $25,000 Canadian. The estimated AIS unit cost for 2007 in expected to drop significantly, between $12,000 to $15,000 Canadian per unit. Since the approval of the universal standards, more and more manufactures worldwide are making the product available in the market place ("Shipboard automatic identification system displays: meeting the needs of mariners," 2003).

2.5 AIS: Pros and Cons

As with any new development in technology, the Automatic Identification System has been examined from many different aspects. Some people focus on the advantages that would result from the implementation of the system, while others are concerned with the disadvantages that could occur. To fully understand the application of this new technology as a whole, both the pros and cons of the system must be taken into consideration. To do this, the point of view of the navigator, as well as shore based seaway operations, will help us to better understand the effects that this system has throughout the Seaway.

When the AIS is implemented onboard a vessel, it has a number of potential benefits for the navigator. The officer on watch becomes more aware of the situation they are faced with, because the AIS can be used as an additional navigational aid. It displays the actual movements of other vessels, unlike radar, which will allow the officer to more effectively predict the movements of the other vessel. The system provides instant identification of ships that are fitted with AIS in the area, therefore radar targets can be easily identified. This is very important in avoiding "target swapping" on the radar when two vessels pass close together, because the ships can be identified from the AIS ("The complete guide to automatic identification system", 2001). Instant identification is also valuable when contact is being made with other vessels in the vicinity, especially for collision avoidance. It allows the officer to call the appropriate vessel by VHF to make collision avoidance plans, eliminating the problem of making plans with the wrong vessel ("Shipboard automatic identification system displays: meeting the needs of mariners", 2003). Another benefit of having the system onboard is the capability of knowing whether or not a ship is around a bend, behind an obstacle or suppressed in the radar shadow of another vessel or heavy rain/sea clutter, where the radar would not be able to detect the other vessel. This can be very useful in collision avoidance, especially in areas of high traffic density. The opinion of Captain Peter Schultz of the M/V Peter R. Cresswell during the initial trails of the AIS confirms these benefits. Captain Schultz (personal communication, August 4, 2002) writes:

> We had 'first contact' with the Canadian Prospector this morning. We picked them up at 18+ miles and had them still at 35+ miles. This was during a particularly heavy and violent thunderstorm so in better conditions the ranges may be substantially higher. We were able to maintain plot on them despite the rain/lightening, we lost track on all other ARPA targets and all the differential stations. The rain clutter was such that we couldn't see much of anything. We both felt that this was a benefit

> but that the real bonus would be in the Seaway when we could 'see' round corners and past locks to the true position of opposing traffic.

The AIS can also be used for collision avoidance when other vessels are in the vicinity by determining the predicted time and place of Closest Point of Approach (CPA) with the other vessels. If a vessel changes course, the AIS can almost immediately determine the heading change, unlike ARPA, which requires time for calculations. AIS gives ship movement information in real time, for example, if the vessel is accelerating, decelerating and the rate of turn ("The complete guide to automatic identification system," 2001). The system allows the exchange of information between ships, including vessel's destination, ETA, loading condition, etc, and between ship and shore. Eventually, with the automatic exchange of information, voice traffic on VHF radio will be reduced ("Shipboard automatic identification system displays: meeting the needs of mariners," 2003).

The implementation of the Automatic Identification System also has a number of benefits for the VTS center controller. It provides instant identification of radar targets, providing information about the ship and cargo, and helps to prevent the danger of "target swapping". When interfaced with an ECDIS, it will display the exact position of the ship on the map. This will help in the quick response to safety and marine pollution incidents ("Shipboard automatic identification system displays: meeting the needs of mariners," 2003). It will also allow controllers to schedule vessels through the system more efficiently, because they have a better idea of where ships are in relation to others, allowing vessels to reduce their transit times, and also save on fuel costs. The total vessel savings from this is estimated to be $400,000 Canadian per year ("St. Lawrence Seaway fields first AIS technology on inland waterway in the world," 2002). In the event of bad weather or interference when the radar picture is impaired, the AIS will provide constant coverage, identifying the location of a ship even when the radar does not. The system is also useful in identifying the location of a ship when it is behind an island or obstacle. One benefit that is of great importance to the VTS controller is the capability of the system to automatically log all data ("The complete guide to automatic identification system," 2001). This is extremely important in situations where collisions or incidents of any type have taken place, because it provides evidence of what occurred during the situation. The incident can be recalled for any time, date, area and vessel. This capability has also been extremely useful for the Transportation Safety Board. The AIS is also beneficial because of its ability to send information automatically to all ships in the vicinity, including port data, weather forecasts and safety messages. Certain information, including water elevations, wind speed and direction, visibility and lockage schedules can also be sent to vessels with the proper add on to ECDIS or Electronic Chart Systems (ECS) ("Shipboard automatic identification system displays: meeting the needs of mariners," 2003). The ability to send and receive information between shore-to-ship may reduce the amount of radio communications by almost half (Sollosi, 2003). Using AIS to send messages can also help reduce misunderstood messages between ship-to-shore. The VTS controller can monitor the speed of the vessel at any time using AIS technology, and this can be of importance in regions where speed limits exist. The traffic controller will be automatically informed when the vessel is over the allowable speed, therefore they can quickly ask the vessel to reduce speed. Speed monitoring can also help in determining meeting areas, because the system will detect when the vessel speeds up or slows down. The AIS system also provides security benefits, because a vessels exact position in the seaway or on the lake can be determined at all times ("Shipboard automatic identification system displays: meeting the needs of mariners," 2003).

There is bound to be a number of problems arising from the implementation of any new development in technology. This is also true for the AIS. There are a number of problems associated with shipboard use of the system. One of the main concerns is the over-reliance in this new technology. Officers may put too much trust in the system, and not cross check information with other navigational aids. This could eventually lead to a poor navigational watch, where officers rely on the information presented to them on a screen, rather than looking out the window for visual observations. Not all vessels carry an AIS unit, especially small pleasure craft. These vessels will not be represented on the AIS display, therefore a proper watch must be maintained. Training is another important issue on board. Officers may think that the AIS is basic, but they may not be aware of all the capabilities, limitations and operations provided by the system. Many officers do not receive proper training informing them of these aspects, which could present problems in AIS use. The need for input of information by the ship's crew may pose a problem, especially on busy vessels where there is only one person in the wheelhouse. The AIS unit should not interfere with the safe operation of the vessel, by occupying the officer for information input ("Shipboard automatic identification system displays: meeting the needs of mariners," 2003).

There are also a number of problems experienced by the VTCC. One of the more common problems experienced at the VTS stations is receiving outdated voyage related ship data, such as draught, destination and ETA. Certain features can be misused, for example, the 'safety related messages' feature. It was found that some difficulties were encountered on ships receiving safety related broadcast messages and binary broadcast messages. In some instances dynamic data, such as the ship's heading, had a large error. Static data may also be faulty, caused by incorrect input of information including ship's name and MMSI number. Input of information from the ships sensors may be incorrect as well (Norris, 2004).

Along with the information problems experienced, there are also a number of technical problems. There may be interference caused by the AIS and VHF antennas placed in the wrong positions. When the system is interfaced with other navigation equipment, it may be operated incorrectly (Norris, 2004). The information provided by AIS and other navigational aids, such as radar, may not be identical (for example, another vessel's position). Also, with implementation, the equipment may not always be compatible with new AIS models, causing problems with the broadcasted information. This is a problem, because seaway centers require a DGPS and Gyro signal ("Shipboard automatic identification system displays: meeting the needs of mariners," 2003). Shore based networks that receive and decode information have determined that many AIS units are improperly programmed. If the AIS unit is installed incorrectly, the system will not perform as well as other units (Norris, 2004). Certain problems, such as incorrect data input, may cause the unit to function improperly, or it can be disabled from the vessel intentionally, therefore the ship will not be visible to other ships in the area ("Shipboard automatic identification system displays: meeting the needs of mariners," 2003).

Security is also a large concern with the implementation of the system. Everyone who owns an AIS unit has access to the information it provides, and sometimes this information is used inappropriately. Terrorism is now a huge concern, and the AIS unit could be used to determine which vessels are best to attack. Also, the data entered in the unit can be easily altered, or the unit can be turned off, making it impossible for authorities to track a certain ship using the AIS (Ramsvik, 2004).

3.0 Conclusions/Recommendations

There are many results and factors that provide evidence that the AIS should be maintained on the Great Lakes – St. Lawrence Seaway water system and expanded to all commercial vessels, regardless of the tonnage. This is because of:

- Increased navigational safety
- Well-organized canal and river transits
- Improved national security of ports and states along the seaway
- Increased awareness of weather information
- Reduced congestion of unnecessary radio communications
- Enhanced awareness of VTCC during dense traffic periods
- Saved money through increased efficiency

All of the advantages greatly outweigh the disadvantages. This is why the system should be maintained and used to maximize these advantages. Also, research should be continued to provide a better operational system to fix any of the minor problems currently affecting AIS.

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Appendix A: AIS Evaluation Form

Appendix A: AIS Evaluation Form

Evaluation Form - Participating Vessel

Instructions: *This form is to be completed by each AIS-equipped vessel when transiting the Seaway during AIS-ECDIS trials. (Note: only one form is required per transit (i.e., upbound or downbound))*

Vessel (circle which one)

Algoma Central
M/V Algoville
M/V Algo Cape
M/V Peter R. Cresswell

Canada Steamship Lines
M/V Nanticoke
M/V Niagara
M/V Paul J. Martin

Upper Lakes
M/V Canadian Olympics
M/V Canadian Progress
M/V John D. Leitch
Montrealais
Quebecois

SLSDC
M/V Robinson Bay

Portable Piloting Systems
SLSDC #1 Vessel ______ Pilot ____________
SLSDC #2 Vessel ____________ Pilot ____________

Date	Traffic Control Sector		Entered (time)	Departed (time)
________	1	Lake St. Francis (Pt. Mouillee) to St. Lambert Locks	______	______
________	2	Bradford Island to Lake St. Francis (Pt. Mouillee)	______	______
________	3	Crossover Island to Bradford Island	______	______
________	4	Mid-Lake Ontario to Crossover Island	______	______
________	5	Port Weller – Mid-Lake Ontario	______	______
________	6	Welland Canal	______	______

AIS Communications

With Other AIS-equipped Vessel
Name of Vessel(s) ____________
Location/distance from vessel ________/_______
Time first acquired__________

With Seaway TMC
Time first acquired __
Ownship location in Seaway ______

Status of Comms
__ Continuous
__ Intermittent
Time when lost _______
Time regained _______
__ Not Operational

__ Continuous
__ Intermittent
Time when lost _______
Time regained _______
__ Not Operational

AIS Information Received from Other Vessels (check all that apply)

Vessel Name ________________
__ Speed
__ Course
__ Length
__ Draft
__ Beam
__ Status
__ ETA
__ Other _________

Vessel Name ________________
__ Speed
__ Course
__ Length
__ Draft
__ Beam
__ Status
__ ETA
__ Other _________

AIS Information Received from TMC (check all that apply)
__ Wind
__ Weather
__ Water level
__ Water flow
__ Lockage order
__ Lock times
__ Other ________________
__ Other ________

Version 4
9 August 2002

Most Useful AIS Features (check all that apply; number the top three)

Comments:

__ __ Comparison to radar/ARPA target
__ __ Location in waterway
__ __ Vessel speed and course
__ __ Traffic scheduling
__ __ Reduced voice communications
__ __ Ability to make navigation decisions earlier
__ __ Other ____________________
__ __ Other ____________________

Contribution of AIS during: (for each, circle one)

Reduced visibility	Hindrance	No Effect	Helpful
Weather fronts (wind gusts)	Hindrance	No Effect	Helpful
Thunder storms/lightening	Hindrance	No Effect	Helpful
Heavy traffic	Hindrance	No Effect	Helpful
Other	Hindrance	No Effect	Helpful
Other ____________	Hindrance	No Effect	Helpful

AIS Criticisms (check all that apply, number the 3 most critical)

Comments

__ __ Difficult to understand/interpret AIS symbols
__ __ Lack of participation by all vessels
__ __ Screen clutter on electronic chart display
__ __ AIS system failures (specify type/nature: ____________________
__ __ Confusing when used with radar/ARPA
__ __ Too much useless information
__ __ Too little beneficial information
__ __ Other ____________________
__ __ Other ____________________

Operational Ratings of Electronic Chart - AIS Integration (circle number)

	Hindrance ←						→ Helpful				
Vessel navigation safety	-5	-4	-3	-2	-1	0	1	2	3	4	5
Bridge Resource Management (BRM)	-5	-4	-3	-2	-1	0	1	2	3	4	5
Reduced visibility navigation	-5	-4	-3	-2	-1	0	1	2	3	4	5
Improved economy (e.g., reduced transit time)	-5	-4	-3	-2	-1	0	1	2	3	4	5
Seaway traffic management	-5	-4	-3	-2	-1	0	1	2	3	4	5
Environmental information (weather, water levels)	-5	-4	-3	-2	-1	0	1	2	3	4	5
Scheduling, cargo operations	-5	-4	-3	-2	-1	0	1	2	3	4	5

Additional Comments:

Appendix B: Regulations of AIS on the St. Lawrence Seaway

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Automatic Identification System

(1) Each of the following vessels must use an Automatic Identification System (AIS) transponder to transit the Seaway:

(a) each commercial vessel that requires pre-clearance in accordance with section 22 and has a 300 gross tonnage or greater, has a Length Over All (LOA) over 20 meters, or carries more than 50 passengers for hire; and

(b) each dredge, floating plant or towing vessel over 8 meters in length, except only each lead unit of combined and multiple units (tugs and tows).

(2) Each vessel listed in paragraph (1) of this section must meet the following requirements to transit the Seaway:

(a) International Maritime Organization (IMO) Resolution MSC.74 (69), Annex 3, Recommendation on Performance Standards for a Universal Shipborne AIS, as amended;

(b) International Telecommunication Union, ITU-R Recommendation M.1371-1: 2000, Technical Characteristics For A Universal Shipborne AIS Using Time Division Multiple Access In The VHF Maritime Mobile Band, as amended;

(c) International Electrotechnical Commission, IEC 61993-2 Ed.1, Maritime Navigation and Radio Communication Equipment and Systems –AIS – Part 2: Class A Shipborne Equipment of the Universal AIS – Operational and Performance Requirements, Methods of Test and Required Test Results, as amended;

(d) International Maritime Organization (IMO) Guidelines for installation of shipborne Automatic Identification System (AIS), NAV 48/18, 6 January 2003, as amended, and, for ocean vessels only, with a pilot plug, as specified in Section 3.2 of those Guidelines, installed close to the primary conning position in the navigation bridge and a standard 120 Volt, AC, 3-prong power receptacle accessible for the pilot’s laptop computer; and

(e) Computation of AIS position reports using differential GPS corrections from the U.S. and Canadian Coast Guards’ maritime Differential Global Positioning System radio beacon services; or

(f) The use of a temporary unit meeting the requirements of subparagraphs (2)(a) through (e) of this section is permissible; or

(g) For each vessel with LOA less than 30 meters, the use of portable AIS compatible with the requirements of subparagraphs (2)(a) through (c) and subparagraph (e) of this section is permissible.

Requirements for U.S. Waters of the St. Lawrence Seaway

In addition to the requirements set forth elsewhere in these Practices and Procedures, ships transiting the U.S. waters of the St. Lawrence Seaway are subject to the requirements set out in Schedule 1.

Appendix C: Map of the Seaway AIS shore based stations

Appendix C: Map of the Seaway AIS
Shore-based stations