

U.S. Department of
Homeland Security

United States
Coast Guard



LIGHT LIST

Volume IV

GULF OF MEXICO

Econfina River, Florida to the Rio Grande, Texas

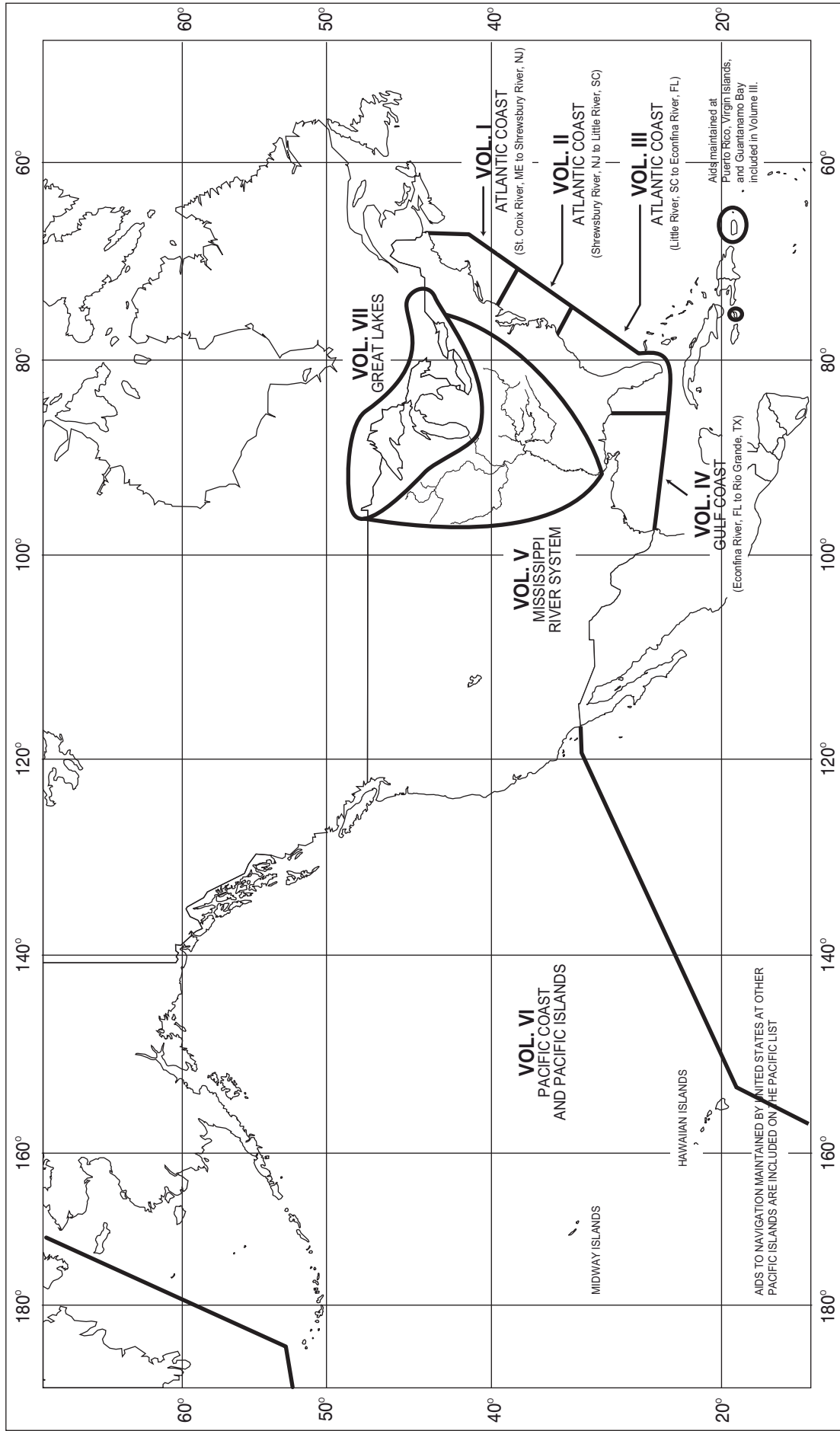
This Light List contains a list of lights, sound signals, buoys, daybeacons, and other aids to navigation.

IMPORTANT
THIS LIGHT LIST SHOULD BE CORRECTED
EACH WEEK FROM THE LOCAL NOTICES TO MARINERS
OR NOTICES TO MARINERS AS APPROPRIATE.

2017

COMDTPUB P16502.4

LIMITS OF LIGHT LISTS PUBLISHED BY
U.S. COAST GUARD





U.S. AIDS TO NAVIGATION SYSTEM

on navigable waters except Western Rivers

LATERAL SYSTEM AS SEEN ENTERING FROM SEAWARD

<p>PORT SIDE ODD NUMBERED AIDS</p> <p>GREEN LIGHT ONLY FLASHING (2) FLASHING OCCULTING QUICK FLASHING ISO</p>	<p>PREFERRED CHANNEL NO NUMBERS - MAY BE LETTERED</p> <p>PREFERRED CHANNEL TO STARBOARD TOPMOST BAND GREEN</p> <p>GREEN LIGHT ONLY</p> <p>COMPOSITE GROUP FLASHING (2+1)</p>	<p>PREFERRED CHANNEL NO NUMBERS - MAY BE LETTERED</p> <p>PREFERRED CHANNEL TO PORT TOPMOST BAND RED</p> <p>RED LIGHT ONLY</p> <p>COMPOSITE GROUP FLASHING (2+1)</p>	<p>STARBOARD SIDE EVEN NUMBERED AIDS</p> <p>RED LIGHT ONLY FLASHING (2) FLASHING OCCULTING QUICK FLASHING ISO</p>
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AIDS TO NAVIGATION HAVING NO LATERAL SIGNIFICANCE

<p>ISOLATED DANGER NO NUMBERS - MAY BE LETTERED</p> <p>WHITE LIGHT ONLY</p> <p>FI (2) 5s</p>	<p>SAFE WATER NO NUMBERS - MAY BE LETTERED</p> <p>WHITE LIGHT ONLY MORSE CODE</p> <p>Mo (A)</p>
<p>RANGE DAYBOARDS MAY BE LETTERED</p>	
<p>DAYBOARDS - MAY BE LETTERED</p> <p>WHITE LIGHT ONLY</p>	<p>SPECIAL MARKS - MAY BE LETTERED</p> <p>YELLOW LIGHT ONLY FIXED FLASHING FLASHING</p> <p>UNLIGHTED: A (C 'A'), C (N 'C')</p> <p>LIGHTED: B (Y 'B' FI)</p> <p>SHAPE OPTIONAL—BUT SELECTED TO BE APPROPRIATE FOR THE POSITION OF THE MARK IN RELATION TO THE NAVIGABLE WATERWAY AND THE DIRECTION OF BUOYAGE.</p>

Aids to Navigation marking the Intracoastal Waterway (ICW) display unique yellow symbols to distinguish them from aids marking other waters. Yellow triangles indicate aids should be passed by keeping them on the starboard (right) hand of the vessel. Yellow squares indicate aids should be passed by keeping them on the port (left) hand of the vessel. A yellow horizontal band provides no lateral information, but simply identifies aids as marking the ICW.

TYPICAL INFORMATION AND REGULATORY MARKS

INFORMATION AND REGULATORY MARKERS

WHEN LIGHTED, INFORMATION AND REGULATORY MARKS MAY DISPLAY ANY WHITE LIGHT RHYTHM EXCEPT QUICK FLASHING, Mo(A), AND FLASHING (2)

MOORING BUOY
 WHITE WITH BLUE BAND
 MAY SHOW WHITE REFLECTOR OR LIGHT

INFORMATION
 MULLET LAKE
 BLACK RIVER
 FOR DISPLAYING INFORMATION SUCH AS DIRECTIONS, DISTANCES, LOCATIONS, ETC.

BOAT EXCLUSION AREA

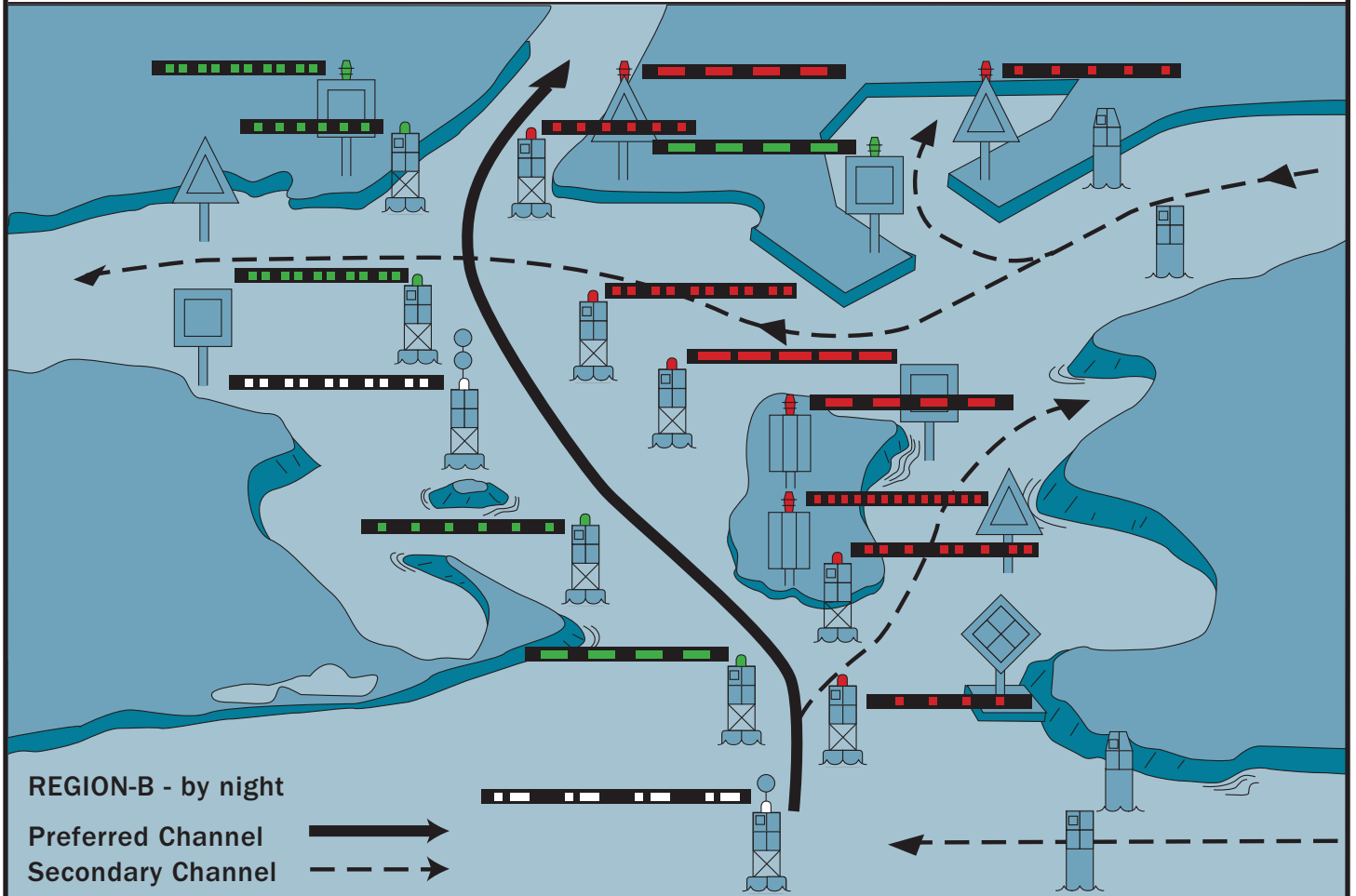
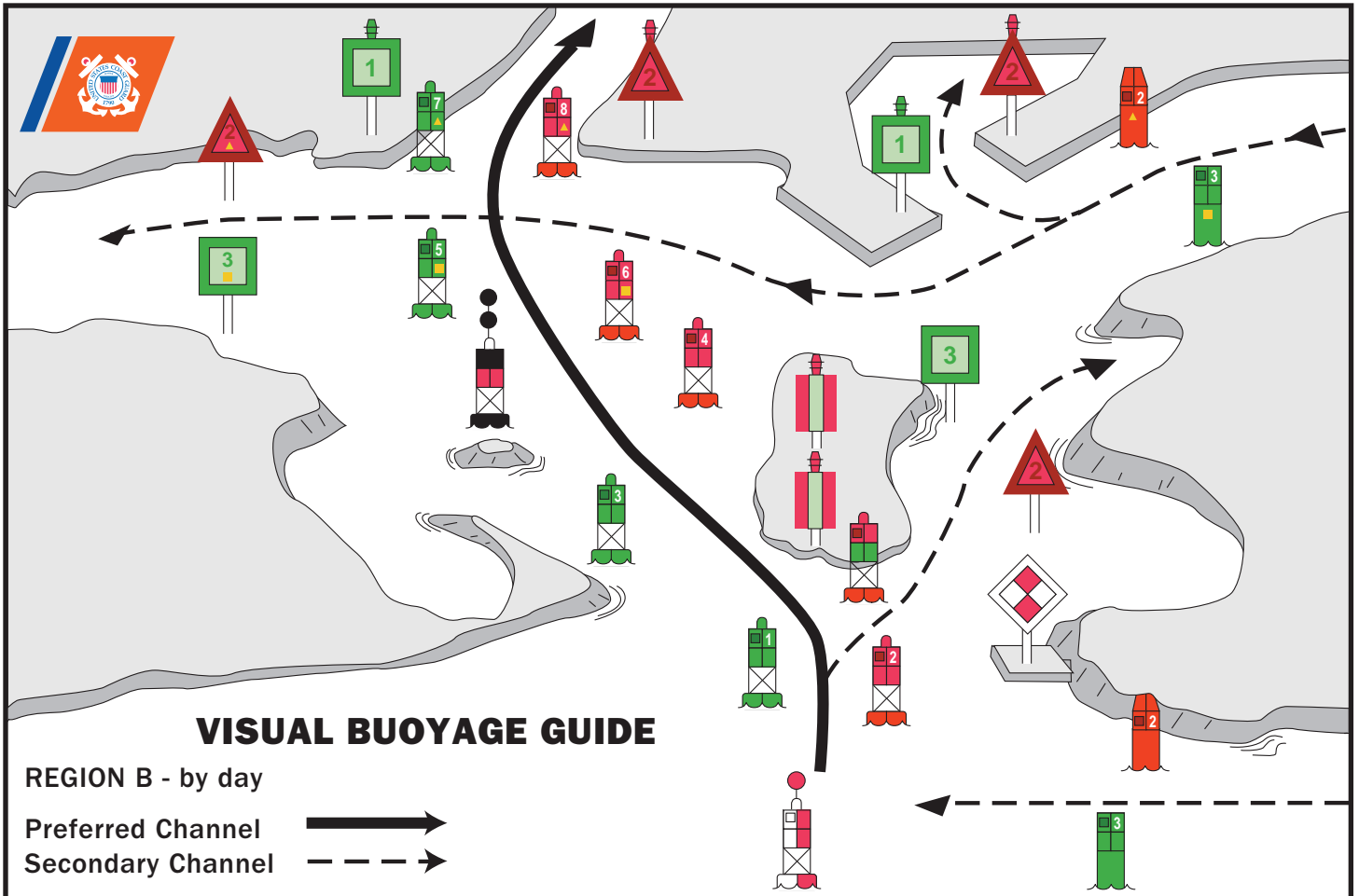
DANGER
 ROCK
 THE NATURE OF DANGER MAY BE INDICATED INSIDE THE DIAMOND SHAPE, SUCH AS ROCK, WRECK, SHOAL, DAM, ETC.

CONTROLLED AREA
 SLOW
 NO WAKE
 TYPE OF CONTROL IS INDICATED IN THE CIRCLE, SUCH AS SLOW, NO WAKE, ANCHORING, ETC.

DANGER
 DANGER
 MAY SHOW WHITE LIGHT MAY BE LETTERED

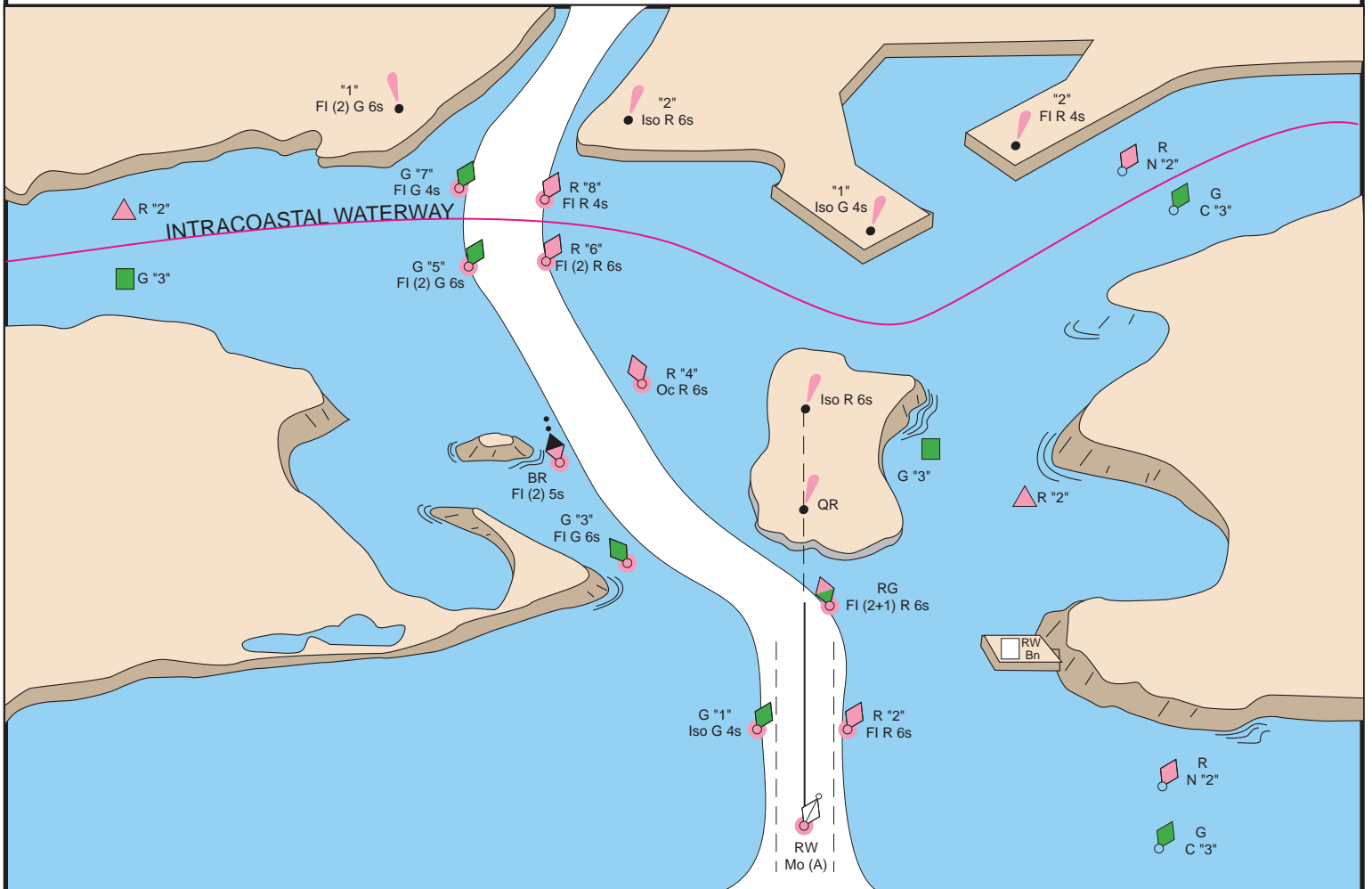
BUOY USED TO DISPLAY REGULATORY MARKERS

MAY SHOW WHITE LIGHT MAY BE LETTERED





FICTITIOUS NAUTICAL CHART





U.S. AIDS TO NAVIGATION SYSTEM

on the Western River System

AS SEEN ENTERING FROM SEAWARD

<p>PORT SIDE OR RIGHT DESCENDING BANK</p> <p>GREEN OR WHITE LIGHTS</p> <p>FLASHING ISO</p> <p>LIGHT LIGHTED BUOY CAN</p> <p>PASSING DAYBEACON CROSSING DAYBEACON</p> <p>176.9 MILE BOARD</p>	<p>PREFERRED CHANNEL MARK JUNCTIONS AND OBSTRUCTIONS COMPOSITE GROUP FLASHING (2+1)</p> <p>PREFERRED CHANNEL TO STARBOARD TOPMOST BAND GREEN FI (2+1) G</p> <p>PREFERRED CHANNEL TO PORT TOPMOST BAND RED FI (2+1) R</p> <p>JG JR</p> <p>DAYBOARDS HAVING NO LATERAL SIGNIFICANCE</p> <p>MAY BE LETTERED</p> <p>WHITE LIGHT ONLY</p> <p>NB</p>	<p>STARBOARD SIDE OR LEFT DESCENDING BANK</p> <p>RED OR WHITE LIGHTS</p> <p>FLASHING (2) ISO</p> <p>LIGHT LIGHTED BUOY NUN</p> <p>PASSING DAYBEACON CROSSING DAYBEACON</p> <p>123.5 MILE BOARD</p>
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SPECIAL MARKS--MAY BE LETTERED

SHAPE: OPTIONAL--BUT SELECTED TO BE APPROPRIATE FOR THE POSITION OF THE MARK IN RELATION TO THE NAVIGABLE WATERWAY AND THE DIRECTION OF BUOYAGE.

YELLOW LIGHT ONLY
FIXED FLASHING

MOORING BUOY
WHITE WITH BLUE BAND
MAY SHOW WHITE REFLECTOR OR LIGHT

TYPICAL INFORMATION AND REGULATORY MARKS

INFORMATION AND REGULATORY MARKERS

WHEN LIGHTED, INFORMATION AND REGULATORY MARKS MAY DISPLAY ANY LIGHT RHYTHM EXCEPT QUICK FLASHING, Mo(a) AND FLASHING (2)

NW WHITE LIGHT ONLY

BOAT EXCLUSION AREA

DANGER

CONTROLLED AREA

INFORMATION

BUOY USED TO DISPLAY REGULATORY MARKERS

MAY SHOW WHITE LIGHT
MAY BE LETTERED

EXPLANATION MAY BE PLACED OUTSIDE THE CROSSED DIAMOND SHAPE, SUCH AS DAM, RAPIDS, SWIM AREA, ETC.

THE NATURE OF DANGER MAY BE INDICATED INSIDE THE DIAMOND SHAPE, SUCH AS ROCK, WRECK, SHOAL, DAM, ETC.

TYPE OF CONTROL IS INDICATED IN THE CIRCLE, SUCH AS SLOW, NO WAKE, ANCHORING, ETC.

STATE WATERS

INLAND (STATE) WATERS OBSTRUCTION MARK
MAY SHOW WHITE REFLECTOR OR QUICK FLASHING WHITE LIGHT

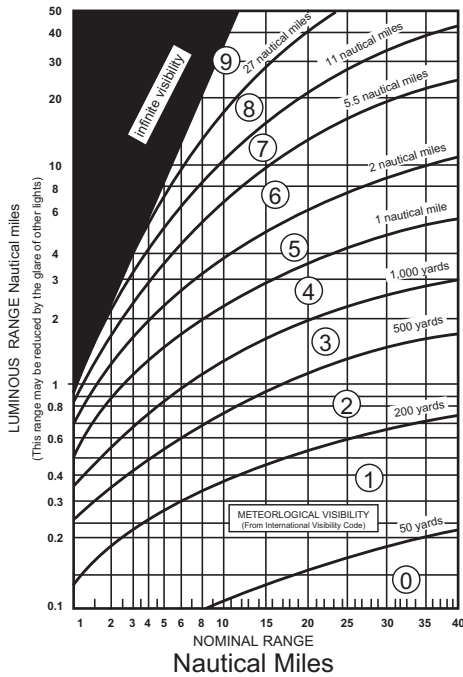
BLACK-STRIPED WHITE BUOY

Used to indicate an obstruction to navigation, extends from the nearest shore to the buoy. This means "do not pass between the buoy and the nearest shore." This aid is replacing the red and white striped buoy within the USWMS, but cannot be used until all red and white striped buoys on a waterway have been replaced.

LUMINOUS RANGE DIAGRAM

The nominal range given in this Light List is the maximum distance a given light can be seen when the meteorological visibility is 10 nautical miles. If the existing visibility is less than 10 NM, the range at which the light can be seen will be reduced below its nominal range. And, if the visibility is greater than 10 NM, the light can be seen at greater distances. The distance at which a light may be expected to be seen in the prevailing visibility is called its luminous range.

This diagram enables the mariner to determine the approximate luminous range of a light when the nominal range and the prevailing meteorological visibility are known. The diagram is entered from the bottom border using the nominal range listed in column 6 of this book. The intersection of the nominal range with the appropriate visibility curve (or, more often, a point between two curves) yields, by moving horizontally to the left border, the luminous range.



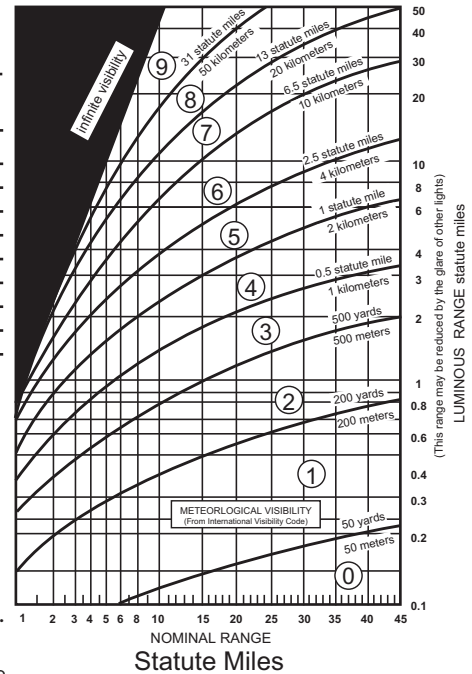
METEOROLOGICAL VISIBILITY (From International Visibility Code)

Code	Metric	Nautical (approximate)
0	less than 50 meters	less than 50 yards
1	50-200 meters	50-200 yards
2	200-500 meters	200-500 yards
3	500-1,000 meters	500-1,000 yards
4	1-2 kilometers	1,000-2,000 yards
5	2-4 kilometers	1-2 nautical miles
6	4-10 kilometers	2-5.5 nautical miles
7	10-20 kilometers	5.5-11 nautical miles
8	20-50 kilometers	11-27 nautical miles
9	greater than 50 km	greater than 27 nm

CAUTION

When using this diagram it must be remembered that:

1. The ranges obtained are approximate.
2. The transparency of the atmosphere may vary between observer and light.
3. Glare from background lighting will reduce the range that lights are sighted.
4. The rolling motion of a vessel and/or of a lighted aid may reduce the distance that lights can be detected or identified.



GEOGRAPHIC RANGE TABLE

The following table gives the approximate geographic range of visibility for an object which may be seen by an observer at sea level. It is necessary to add to the distance for the height of any object the distance corresponding to the height of the observer's eye above sea level.

Height Feet / Meters	Distance Nautical Miles (NM)	Height Feet / Meters	Distance Nautical Miles (NM)	Height Feet / Meters	Distance Nautical Miles (NM)
5/1.5	2.6	70/21.3	9.8	250/76.2	18.5
10/3.1	3.7	75/22.9	10.1	300/91.4	20.3
15/4.6	4.5	80/24.4	10.5	350/106.7	21.9
20/6.1	5.2	85/25.9	10.8	400/121.9	23.4
25/7.6	5.9	90/27.4	11.1	450/137.2	24.8
30/9.1	6.4	95/29.0	11.4	500/152.4	26.2
35/10.7	6.9	100/30.5	11.7	550/167.6	27.4
40/12.2	7.4	110/33.5	12.3	600/182.9	28.7
45/13.7	7.8	120/36.6	12.8	650/198.1	29.8
50/15.2	8.3	130/39.6	13.3	700/213.4	31.0
55/16.8	8.7	140/42.7	13.8	800/243.8	33.1
60/18.3	9.1	150/45.7	14.3	900/274.3	35.1
65/19.8	9.4	200/61.0	16.5	1000/304.8	37.0

Example: Determine the geographic visibility of an object, with a height above water of 65 feet, for an observer with a height of eye of 35 feet.

Enter above table;
 Height of object 65 feet= 9.4 NM
 Height of observer 35 feet= 6.9 NM
 Computed geographic visibility= 16.3 NM

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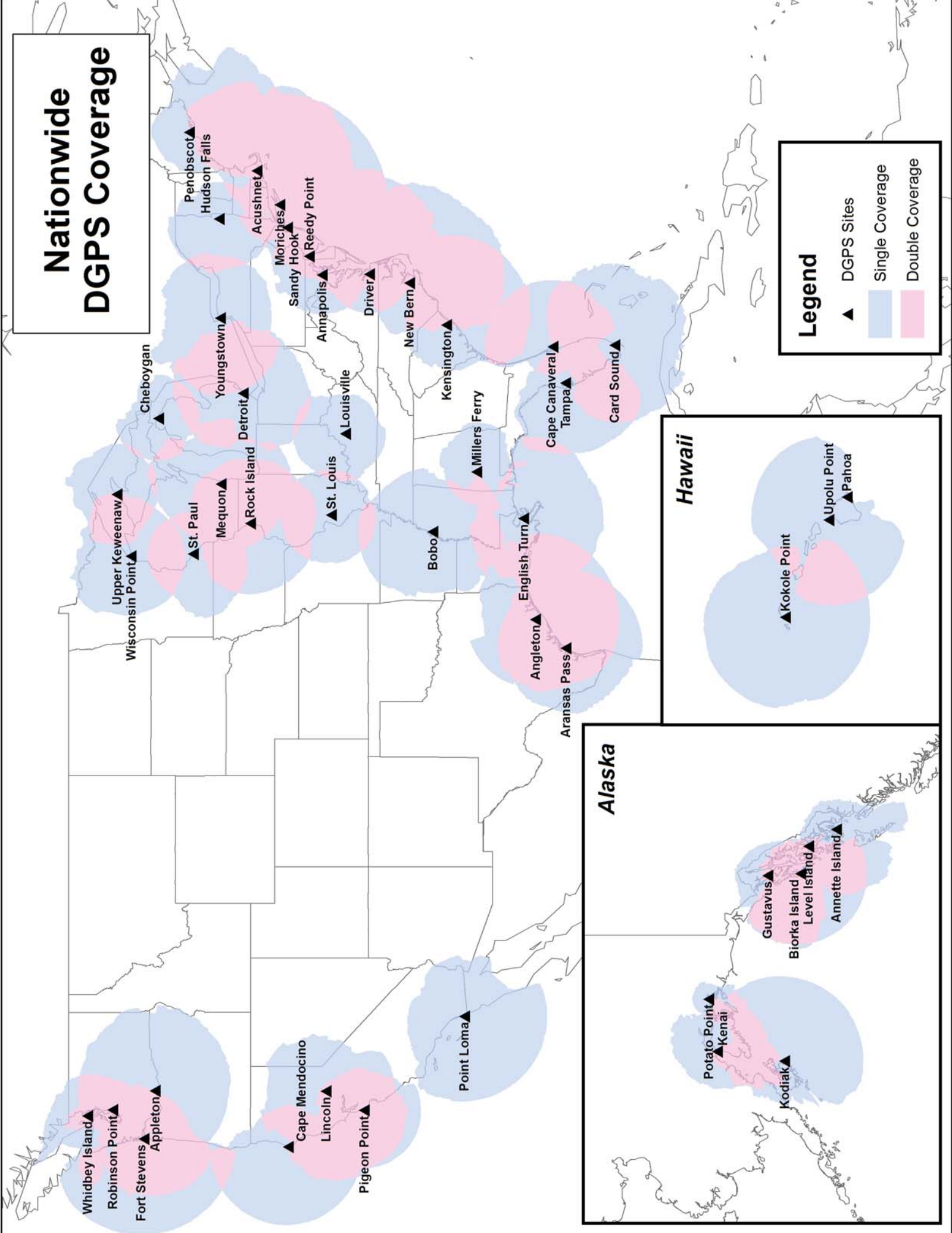
TABLE OF CONTENTS

Light List Regions	Inside Front Cover
U.S. DGPS Sites.....	i
USCG Contact Information	ii
Preface	vi
Introduction	vii
SEACOAST	
Florida	1
Alabama	2
Mississippi.....	3
Louisiana.....	4
Texas	10
BAYS, RIVERS, AND HARBORS	
Pensacola Bay	38
Mobile Bay	50
Pascagoula Harbor	68
Lake Pontchartrain.....	96
Mississippi River	105
Timbalier Bay	155
Vermilion Bay.....	178
Sabine Pass.....	195
Galveston Bay.....	207
Matagorda Bay.....	232
Corpus Christi Bay	242
Intracoastal Waterway, Florida - Pensacola Bay.....	280
Intracoastal Waterway, Louisiana – New Orleans.....	292
Intracoastal Waterway, Louisiana – Morgan City	297
Intracoastal Waterway, Texas – Sabine Neches Canal	301
Intracoastal Waterway, Texas – Carlos Bay.....	318
Intracoastal Waterway, Texas – Laguna Madre	340
INDEX.....	Index 1
CROSS REFERENCE.....	Cross Reference 1

Nationwide DGPS Coverage

Legend

- ▲ DGPS Sites
- Single Coverage
- Double Coverage



COAST GUARD DISTRICT COMMANDERS

DISTRICT	ADDRESS	WATERS OF JURISDICTION
FIRST	408 Atlantic Avenue Boston, MA 02110-3350 Tel: (617) 223-8351 http://www.uscg.mil/d1	Maine, New Hampshire, Massachusetts, Vermont (Lake Champlain), Rhode Island, Connecticut, New York, to Shrewsbury River, New Jersey.
FIFTH	Federal Building 431 Crawford Street Portsmouth, VA 23704-5004 Tel: (757) 398-6486 (757) 398-6552 http://www.uscg.mil/d5	Shrewsbury River, New Jersey to Delaware, Maryland, Virginia, District of Columbia, and North Carolina.
SEVENTH	Brickell Plaza Federal Building 909 SE 1st Avenue; Rm:406 Miami, FL 33131-3050 Tel: (305) 415-6752 (305) 415-6800 http://www.uscg.mil/d7	South Carolina, Georgia, Florida to 83°50'W, and Puerto Rico and adjacent islands of the United States.
EIGHTH	Hale Boggs Federal Building 500 Poydras Street New Orleans, LA 70130-3310 Tel: (504) 671-2327 (504) 671-2137 http://www.uscg.mil/d8	Florida westward from 83°50'W, Alabama, Mississippi, Louisiana, Texas, the Mississippi River System except that portion of the Illinois River north of Joliet, Illinois.
NINTH	1240 East 9th Street Cleveland, OH 44199-2060 Tel: (216) 902-6060 (216) 902-6117 http://www.uscg.mil/d9	Great Lakes and St. Lawrence River above St. Regis River.
ELEVENTH	Coast Guard Island Building 50-2 Alameda, CA 94501-5100 Tel: (510) 437-2975 http://www.uscg.mil/d11	California, Nevada, Utah, Arizona.
THIRTEENTH	Federal Building 915 Second Avenue 35th Floor, Rm 3510 Seattle, WA 98174-1067 Tel: (206) 220-7270 (206) 220-7004 http://www.uscg.mil/d13	Oregon, Washington, Idaho, and Montana.
FOURTEENTH	Prince Kalanianaʻole Federal Bldg. 300 Ala Moana Blvd 9th Floor, Room 9-220 Honolulu, HI 96850-4982 Tel: (808) 535-3409 (808) 535-3414 http://www.uscg.mil/d14	Hawaiian, American Samoa, Marshall, Marianas, and Caroline Islands.
SEVENTEENTH	PO Box 25517 Juneau, AK 99802-5517 Tel: (907) 463-2029 (907) 463-2269 http://www.uscg.mil/d17	Alaska.

**U. S. COAST GUARD EIGHTH DISTRICT UNIT LISTING
AIDS TO NAVIGATION TEAMS**

ANT CORPUS CHRISTI
1201 East Navigation Blvd
Corpus Christi, TX 78402
Tel: (361) 844-6521

ANT DULAC
241 Coast Guard Rd
Dulac, LA 70353
Tel: (985) 563-4473

ANT GALVESTON
3000 Fort Point Rd
Galveston, TX 77553
Tel: (409) 766-5654

ANT GULFPORT
991 23rd Rd. Ave
Gulfport, MS 39501
Tel: (228) 575-9173

ANT MOBILE
1500 15th St.
Mobile, AL 36615
Tel: (251) 441-6244

ANT MORGAN CITY
800 Youngs Rd Suite 100
Morgan City, LA 70380
Tel: (985) 384-7000

ANT NEW ORLEANS
1790 Saturn Rd.
New Orleans, LA 70129
Tel: (504) 253-4834

ANT PANAMA CITY
1700 Thomas Drive
Panama City, FL 32408-5804
Tel: (850) 234-8139

ANT PENSACOLA
21 Slemmer Ave.
Pensacola, FL 32508-7851
Tel: (850) 455-2354

ANT PORT O'CONNOR
PO Box 98
Port O'Connor, TX 77982
Tel: (361) 983-4313

ANT SABINE
7034 S. First St.
Sabine Pass, TX 77655
Tel: (409) 971-2111

ANT SOUTH PADRE
1 Wallace Reed Road
South Padre Island, TX
78597 Tel: (956) 364-7433

ANT VENICE
436 Coast Guard Rd
Venice, LA 70091
Tel: (504) 534-7650

BUOY TENDERS

USCGC AXE (WLIC-75310)
800 Youngs Road
Morgan City, LA 70380
Tel: (985) 385-0037

USCGC BARBARA MABRITY (WLM-559)
1500 15th St.
Mobile, AL 36615
Tel: (251) 441-6275

USCGC CLAMP (WLIC-75306)
1 Ferry Rd
Galveston, TX 77550
Tel: (409) 766-4779

USCGC CYPRESS (WLB-210)
211 South Ave. Bldg 38 Suite C
Pensacola, FL 32508
Tel: (850) 452-9044

USCGC HATCHET (WLIC-75309)
1 Ferry Road
Galveston, TX 77550
Tel: (409) 766-4776

USCGC HARRY CLAIBORNE (WLM-561)
1 Ferry Rd
Galveston, TX 77553
Tel: (409) 766-4771

USCGC MALLET (WLIC-75304)
1201 East Navigation Blvd
Corpus Christi, TX 78402-1911
Tel: (361) 844-6531

USCGC PAMLICO (WLIC-800)
1790 Saturn St.
New Orleans, LA 70129
Tel: (504) 253-2420

USCGC SAGINAW (WLIC-803)
1500 15th St.
Mobile, AL 36615
Tel: (251) 441-5197

USCG NAVIGATION CENTER Navigation Information Service (NIS)

The U.S. Coast Guard Navigation Center (NAVCEN) is the official government source of information for civil users of the Global Positioning System (GPS). The Navigation Information Service (NIS) is available 24 hours a day, seven days a week, for all Radio Navigation and maritime related needs via phone, fax or e-mail. The NIS provides users the ability to access real time or archived GPS, NDGPS, DGPS, and LNM information at <http://www.navcen.uscg.gov>, as well as subscribe to an automated list service which enables users to receive GPS status messages and Notice to NAVSTAR User (NANU) messages via direct Internet e-mail.

The NAVCEN also disseminates GPS and DGPS safety advisory broadcast messages through USCG broadcast stations utilizing VHF-FM voice, HF-SSB voice, and NAVTEX broadcasts. The broadcasts provide the GPS and DGPS user in the marine environment with the current status of the navigation systems, as well as any planned/unplanned system outages that could affect GPS and DGPS navigational accuracy.

To comment on any of these services or ask questions about the service offered, contact the NAVCEN at:

Commanding Officer
U.S. Coast Guard NAVCEN (NIS)
MS 7310
7323 Telegraph Road
Alexandria, VA 20598-7310
Phone: (703) 313-5900
FAX: (703) 313-5920
Internet: <http://www.navcen.uscg.gov>

This Light List is corrected through:

[Eighth Coast Guard District Local Notice to Mariners No. 01/17](#)

and through [National Geospatial-Intelligence Agency \(NGA\) Notice to Mariners No. 01/17](#)

The 2017 edition supersedes the 2016 edition.

RECORD OF CORRECTIONS

YEAR 2017

1.....	2.....	3.....	4.....	5.....
6.....	7.....	8.....	9.....	10.....
11.....	12.....	13.....	14.....	15.....
16.....	17.....	18.....	19.....	20.....
21.....	22.....	23.....	24.....	25.....
26.....	27.....	28.....	29.....	30.....
31.....	32.....	33.....	34.....	35.....
36.....	37.....	38.....	39.....	40.....
41.....	42.....	43.....	44.....	45.....
46.....	47.....	48.....	49.....	50.....
51.....	52.....			

YEAR 2018

1.....	2.....	3.....	4.....	5.....
6.....	7.....	8.....	9.....	10.....
11.....	12.....	13.....	14.....	15.....
16.....	17.....	18.....	19.....	20.....
21.....	22.....	23.....	24.....	25.....
26.....	27.....	28.....	29.....	30.....
31.....	32.....	33.....	34.....	35.....
36.....	37.....	38.....	39.....	40.....
41.....	42.....	43.....	44.....	45.....
46.....	47.....	48.....	49.....	50.....
51.....	52.....			

PREFACE

Lights and other marine aids to navigation, maintained by or under authority of the U.S. Coast Guard and located on waters used by general navigation, are described in the Light List. This volume includes aids located in Econfina River, Florida to Rio Grande, Texas.

Included are all Coast Guard aids to navigation used for general navigation such as lights, sound signals, buoys, daybeacons, and other aids to navigation. Not included are some buoys having no lateral significance, such as special purpose, anchorage, fish net, and dredging.

Aids to Navigation Link: <http://www.uscgboating.org>

CAUTION: Mariners attempting to pass a buoy close aboard risk collision with a yawing buoy or with the obstruction, which the buoy marks. Mariners must not rely on buoys alone for determining their positions due to factors limiting buoy reliability.

PRIVATE AIDS TO NAVIGATION

Included: Class I aids to navigation on marine structures or other works which the owners are legally obligated to establish, maintain, and operate as prescribed by the Coast Guard.

Included: Class II aids to navigation exclusive of Class I, located in waters used by general navigation.

Not included: Class III aids to navigation exclusive of Class I and Class II, located in waters not ordinarily used by general navigation.

This Light List is published annually and is intended to furnish more complete information concerning aids to navigation than can be conveniently shown on charts. This Light List is not intended to be used in place of charts or Coast Pilots. Charts should be consulted for the location of all aids to navigation. It may be dangerous to use aids to navigation without reference to charts.

This list is corrected to the date of the notices to mariners shown on the title page. Changes to aids to navigation during the year are advertised in U.S. Coast Guard Local Notices to Mariners and National Geospatial-Intelligence Agency (NGA) Notices to Mariners. Important changes to aids to navigation are also broadcast through Coast Guard or Naval radio stations and NAVTEX. Mariners should keep their Light Lists, charts and other nautical publications corrected from these notices and should consult all notices issued after the date of publication of this Light List.

The electronic version of this publication is updated monthly and is available at.
<http://www.navcen.uscg.gov/index.php?pageName=lightLists>

Reporting Private Aids to Navigation Discrepancies D8:
http://www.uscg.mil/d8/waterways/paton_main.asp

IMPORTANT: A summary of corrections for this publication, which includes corrections from the dates shown on the title page to the date of availability, is advertised in the Local Notice to Mariners and the Notice to Mariners. These corrections must be applied in order to bring the Light List up-to-date. Additionally, this publication should be corrected weekly from the Local Notices to Mariners or the Notices to Mariners, as appropriate.

Mariners and others are requested to bring any apparent errors or omissions in these lists to the attention of:

Commander (dpw)
Eighth Coast Guard District
500 Poydras Street
New Orleans, LA 70130-3396
D8marineinfo@uscg.mil

or **USCG Navigation Center**
Charting Branch
MS 7310
7323 Telegraph Road
Alexandria, VA 20598-7310
Email: TIS-PF-NISWS@USCG.MIL

INTRODUCTION

Light List Arrangement

In the context of the Light List, aids to navigation on the coasts are arranged in geographic order clockwise from north to south along to Atlantic coast, east to west along the Gulf of Mexico, and south to north along the Pacific coast. On the Great Lakes, aids to navigation are arranged from east to west and from south to north, except on Lake Michigan, which is arranged from north to south. Seacoast aids to navigation are listed first, followed by entrance and harbor aids to navigation, arranged from seaward to the head of navigation.

Names of aids to navigation are printed as follows to help distinguish at a glance the type of aid to navigation.

Seacoast/Lake coast Lights and Secondary Lights
RACONS
Sound Signals
RIVER, HARBOR, OTHER LIGHTS, AND VIRTUAL AIS
Lighted Buoys
Daybeacons, Unlighted Buoys, and Virtual Automatic Identification System (V-AIS) ATON

Light List numbers are assigned to all Federal aids to navigation and many private aids to navigation for reference in the Light List. Aids to navigation are numbered by fives in accordance with their order of appearance in each volume of the Light List. Other numbers and decimal fractions are assigned where newly established aids to navigation are listed between previously numbered aids to navigation. The Light Lists are renumbered periodically to assign whole numbers to all aids to navigation.

International numbers are assigned to certain aids to navigation in cooperation with the International Hydrographic Organization. They consist of an alphabetic character followed by three or four numeric characters. A cross reference listing appears after the index.

Description of Columns

Column (1): Light List Number.

Column (2): Name and location of the aid to navigation.

Note: A dash (-) is used to indicate the bold heading is part of the name of the aid to navigation. When reporting discrepancies or making references to such an aid to navigation in correspondence, the full name of the aid including the geographic heading, should be given.

Bearings are in degrees true, read clockwise from 000° through 359°.

Bearings on range lines are given in degrees and tenths or hundredths where applicable.

(C) indicates Canadian aid to navigation.

Column (3): Geographic position of the aid to navigation in latitude and longitude.

Column (4): Light characteristic for lighted aids to navigation.

Column (5): Height above water from the focal plane of the fixed light to mean high water, listed in feet.

For Volume 7 (Great Lakes), height above water from the focal plane of the fixed light to low water datum, listed in feet and meters.

Column (6): Nominal range of lighted aids to navigation, in nautical miles, listed by color for sector and passing lights. Not listed for ranges, directional lights, or private aids to navigation.

Column (7): The structural characteristic of the aid to navigation, including: dayboard (if any), description of fixed structure, color and type of buoy, height of structure above ground for major lights.

Column (8): Aid remarks, sound signal characteristics, including: VHF-FM channel if remotely activated, RACON characteristic, light sector arc of visibility, radar reflector, emergency lights, seasonal remarks, and private aid to navigation identification. AIS specific information may include its unique Maritime Mobile Service Identity (MMSI), the MMSI(s) of its source AIS transmission, and the application identifier of any Application Specific Messages (ASM) it may also be transmitting.

U.S. Coast Guard Light List Distribution

U.S. regulations require that most commercial vessels maintain on board a currently corrected, copy or pertinent extract, of the U.S. Coast Guard Light Lists which are available for free and are updated weekly on the Coast Guard Navigation Center's website at <http://www.navcen.uscg.gov/?pageName=lightLists>. Commercially printed versions are also available, but the Coast Guard does not attest to their veracity or sanction such publications.

CHARTS & PUBLICATIONS

Nautical Charts & Publications

Nautical charts covering the coastal waters of the United States and its territories are published by the National Ocean Service (NOS). Up-to-date paper copies of NOS charts are available from NOS Certified Agents. A list of agents can be found at: http://www.nauticalcharts.noaa.gov/staff/print_agents.html. NOS also produces Raster Navigational Charts (RNC) and Electronic Navigational Charts (ENC). RNCs can be found at <http://www.nauticalcharts.noaa.gov/mcd/Raster/index.htm>. ENCs can be found at <http://www.nauticalcharts.noaa.gov/mcd/enc/index.htm>.

Inland Electronic Navigational Charts (IENC) and chart books are published by the U.S. Army Corps of Engineers and are available online at <http://www.agc.army.mil/Missions/Echarts.aspx>. Tide Tables and Tidal Current Tables are no longer printed or distributed by NOS. NOS Tide and Tidal Current predictions are available online at http://tidesandcurrents.noaa.gov/tide_predictions.html. Commercially printed versions, using data provided by NOS, are also available. These products may be obtained from local stores that carry marine publications.

Notices to Mariners

Broadcast Notices to Mariners are made by the Coast Guard through Coast Guard radio stations. These notices, which are broadcast on VHF-FM, NAVTEX, and other maritime frequencies, are warnings that contain important navigational safety information. Included are reports of discrepancies and changes to aids to navigation, the positions of ice and derelicts, and other important hydrographic information.

Radio stations broadcasting Notices to Mariners are listed in the National Ocean Service United States Coast Pilot and in the National Geospatial-Intelligence Agency publication Radio Navigational Aids (Publication No. 117). VHF-FM voice broadcast times can be found online at <http://www.nws.noaa.gov/om/marine/vhfvoice.htm>.

Local Notices to Mariners (U.S. regional coverage) are another means which the Coast Guard disseminates navigational information for the United States, its territories, and possessions. A Local Notice to Mariners is issued by each Coast Guard district and is used to report changes and discrepancies to aids to navigation maintained by and under the authority of the Coast Guard. The Local Notice to Mariners also contain chart and Light List corrections, proposed aids to navigation projects open for public comment, ongoing waterway projects, bridge regulation changes, marine event information, and other concerns pertinent to the mariner.

Local Notices to Mariners are essential to all navigators for the purposes of keeping charts, Light Lists, Coast Pilots, and other nautical publications up-to-date. These notices are published weekly and can be found online at <http://www.navcen.uscg.gov/index.php?pageName=lnmMain>. Mariners may register with the Coast Guard Navigation Center to receive automatic notifications via email when new editions of the Local Notice to Mariners are available. Register at <http://www.navcen.uscg.gov/?pageName=listServerForm>. Vessels operating in ports and waterways in several districts will have to obtain the Local Notice to Mariners for each district.

Notice to Mariners are prepared jointly by the National Geospatial-Intelligence Agency (NGA), the U.S. Coast Guard, and the National Ocean Service, and are published weekly by the NGA. The weekly Notice to Mariners advises mariners of important matters affecting navigational safety including new hydrographic discoveries, changes to aids to navigation, and foreign marine information. Also included are corrections to Light Lists, Coast Pilots, and Sailing Directions. This notice is intended for mariners and others who have a need for information related to oceangoing operations. Because it is intended for use by oceangoing vessels, many corrections that affect small craft navigation and associated waters are not included. Information concerning small craft is contained in the Coast Guard Local Notice to Mariners only. The weekly Notices to Marines may be found online at <http://msi.nga.mil/NGAPortal/MSI.portal>.

ATON DISCREPANCIES

The Coast Guard does not keep the tens of thousands of aids to navigation comprising the U.S. Aids to Navigation System under simultaneous and continuous observation. Mariners should realize that it is impossible to maintain every aid to navigation operating properly and on its assigned position at all times. Therefore, for the safety of all mariners, any who discovers an aid to navigation that is either off station or exhibiting characteristics other than those listed in

the Light Lists should promptly notify the nearest Coast Guard unit. Radio messages should be prefixed "COAST GUARD" and transmitted on VHF-FM channel 16 or directly to one of the U.S. Government radio stations listed in Chapter 3, Section 300L, Radio Navigation Aids (Publication No. 117). In addition to notifying the nearest Coast Guard unit by radio, a discrepant aid to navigation can be reported online at <http://www.navcen.uscg.gov/?pageName=atonOutageReport>.

U.S. AIDS TO NAVIGATION SYSTEM

GENERAL

The navigable waters of the United States are marked to assist navigation using the U.S. Aids to Navigation System, a system consistent with the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Maritime Buoyage System. The IALA Maritime Buoyage System is followed by most of the world's maritime nations and improves maritime safety by encouraging conformity in buoyage systems worldwide. IALA buoyage is divided into two regions made up of Region A and Region B. All navigable waters of the United States follow IALA Region B, except U.S. possessions west of the International Date Line and south of 10° north latitude, which follow Region A. Lateral aids to navigation in Region A vary from those located within Region B. Non-lateral aids to navigation in Region A are the same as those used in Region B. Appropriate nautical charts and publications should be consulted to determine whether the Region A or Region B marking schemes are in effect for a given area.

Aids to navigation are developed, established, operated, and maintained by the U.S. Coast Guard to accomplish the following:

1. Assist navigators in determining their position,
2. Assist the navigator in determining a safe course,
3. Warn the navigator of dangers and obstructions,
4. Promote the safe and economic movement of commercial vessel traffic, and
5. Promote the safe and efficient movement of military vessel traffic, and cargo of strategic military importance.

The U.S. Aids to Navigation System is designed for use with nautical charts. Nautical charts portray the physical features of the marine environment, which include: soundings, landmarks, hazards to navigation, and aids to navigation. To best understand the purpose of a specific aid to navigation, mariners should consult the associated nautical chart, which illustrates the relationship of the aid to navigation to channel limits, obstructions, hazards to navigation, and to the aids to navigation system as a whole. Seasonal aids to navigation are placed into service, withdrawn, or changed at specified times of the year. The dates shown in the Light Lists are approximate and may vary due to adverse weather or other conditions. These aids will be changed on Electronic Navigational Charts (ENC) based on Light List dates and electronic navigation system settings.

Mariners should maintain and consult suitable publications and navigation equipment depending on the vessel's requirements. This shipboard navigation equipment is separate from the aids to navigation system, but is often essential to its use.

The U.S. Aids to Navigation System is primarily a lateral system, which employs a simple arrangement of colors, shapes, numbers, and light characteristics to mark the limits of navigable

routes. This lateral system is supplemented with non-lateral aids to navigation where appropriate.

Federal aids to navigation consist of Coast Guard operated aids to navigation. The Coast Guard establishes, maintains, and operates a system of aids to navigation consisting of visual, audible, and electronic signals designed to assist the prudent mariner in the process of navigation.

The U.S. Aids to Navigation System contains the following subsystems:

1. **Intracoastal Waterway:** The aids to navigation marking the Intracoastal Waterway are arranged geographically from north to south on the Atlantic Coast and generally east to west on the coast of the Gulf of Mexico. Red lights (if so equipped), even numbers, and red buoys or triangle shaped daymarks are located on the southbound/westbound starboard waterway boundary. Green lights (if so equipped), odd numbers, and green buoys or square shaped daymarks are on the southbound/westbound port waterway boundary.
2. **Western Rivers:** The Western Rivers System is employed on the Mississippi River System, in addition to the Tennessee-Tombigbee Waterway and the Alabama, Atchafalaya, and Apalachicola-Chattahoochee-Flint River Systems. The Western Rivers System consists of the following characteristics:
 - a. Buoys are not numbered.
 - b. Numbers on beacons do not have lateral significance, but rather indicate mileage from a fixed point (normally the river mouth).
 - c. Diamond shaped non-lateral dayboards, red and white or green and white as appropriate, are used to indicate where the river channel crosses from one bank to the other.
 - d. Lights on green aids to navigation show a single-flash characteristic, which may be green or white.
 - e. Lights on red aids to navigation show a group-flash characteristic, which may be red or white.
 - f. Isolated danger marks are not used.
3. **Bridge Markings:** Bridges across navigable waters are marked with red, green and/or white lights for nighttime navigation. Red lights mark piers and other parts of the bridge. Red lights are also placed on drawbridges to show when they are in the closed position. Green lights are placed on drawbridges to show when they are in the open position. The location of these lights will vary according to the bridge structure. Green lights are also used to mark the centerline of navigable channels through fixed bridges. If there are two or more channels through the bridge, the preferred channel is also marked by three white lights in a vertical line above the green light.

Red and green retro-reflective panels may be used to mark bridge piers and may also be used on bridges not required to display lights. Lateral red and green lights and dayboards may mark main channels through bridges. Adjacent piers are marked with fixed yellow lights when the main channel is marked with lateral aids to navigation.

Centerlines of channels through fixed bridges may be marked with a safe water mark and an occulting white light when lateral marks are used to mark main channels. The centerline of the navigable channel through the draw span of floating bridges may be marked with a special mark. The mark will be a yellow diamond with yellow retro-reflective panels and may exhibit a yellow light that displays a Morse code "B" (a long flash followed by three short flashes). AIS-ATON and RACONs may be placed on the bridge structure to mark the centerline of the navigable channel through the bridge.

Vertical clearance gauges may be installed to enhance navigation safety. The gauges are located on the right channel pier or pier protective structure facing approaching vessels. Clearance gauges indicate the vertical distance between "low steel" of the bridge channel span (in the closed to navigation position for drawbridges) and the level of the water, measured to the bottom of the foot marks, read from top to bottom.

Drawbridges equipped with radiotelephones display a blue and white sign which indicates what VHF radiotelephone channels should be used to request bridge openings.

Private aids to navigation include aids to navigation that are either operated by private persons and organizations, or that are operated by states. Private aids to navigation are classified into three categories:

1. **Class I:** Aids to navigation on marine structures or other works which the owners are legally obligated to establish, maintain, and operate as prescribed by the U.S. Coast Guard.
2. **Class II:** Aids to navigation that, exclusive of Class I aids, are located in waters used by general navigation.
3. **Class III:** Aids to navigation that, exclusive of Class I and Class II aids, are located in waters not ordinarily used by general navigation.

Authorization for the establishment of a Class II or Class III private aid to navigation by the U.S. Coast Guard imposes no legal obligation that the aid actually be established and operated. It only specifies the location and operational characteristics of the aid for which the authorization was requested. Once the aid is established, however, the owner is legally obligated to maintain it in good working order and properly painted.

Lights and sound signals on oil wells or other offshore structures in navigable waters are private aids to navigation and are generally not listed in the Light List unless they are equipped with a RACON. Where space allows, the structures are shown on the appropriate nautical charts. Information concerning the location and characteristics of those structures which display lights and sound signals not located in obstruction areas are published in Local and/or weekly Notices to Mariners.

In general, during the nighttime, a series of white lights are displayed extending from the platform to the top of the derrick when drilling operations are in progress. At other times, structures are usually marked with one or more quick flashing white, red, or yellow lights, visible for at least one nautical mile during clear weather. Obstructions, which are a part of the appurtenances to the main structure, such as mooring piles, anchors, and mooring buoys, etc.,

are not normally lighted. In addition, some structures are equipped with a sound signal that produces a single two-second blast every 20 seconds.

BUOYS, BEACONS, AND AIS-ATON

The primary components of the U.S. Aids to Navigation System are buoys, beacons, and AIS-ATON.

Buoys are floating aids to navigation used extensively throughout U.S. waters. They are moored to sinkers by varying lengths of chain and may shift due to sea conditions and other causes. Buoys may also be carried away, capsized, or sunk. Prudent mariners will not rely solely on any single aid to navigation, particularly floating aids.

Buoy positions represented on nautical charts are approximate position only, due to the practical limitations of positioning and maintaining buoys and their sinkers in precise geographical locations. The position of buoys and beacons are indicated with a circle on the chart. The center of the symbol corresponds with the position of the aid.

Positions of Federal aids to navigation are verified during periodic maintenance visits. Between visits, environmental conditions, including atmospheric and sea conditions, seabed slope and composition, may shift buoys off their charted positions. Buoys may also be dragged off station, sunk, or capsized by a collision with a vessel.

Beacons are aids to navigation which are permanently fixed to the earth's surface. They range from large lighthouses to small single-pile structures and may be located on land or in the water. Lighted beacons are called lights; unlighted beacons are called daybeacons. Lighthouses are placed on shore or on marine sites and most often do not indicate lateral significance. Lighthouses with no lateral significance exhibit a white light.

Beacons exhibit a daymark. For small structures, these are colored geometric shapes that make an aid to navigation readily visible and easily identifiable against background conditions. Generally, the daymark conveys to the mariner, during daylight hours, the same significance as the aid's light or reflector does at night. The daymark of towers, however, consists of the structure itself. As a result, these daymarks do not infer lateral significance.

Ranges are non-lateral aids to navigation composed of two beacons, which when the structures appear to be in line, assist the mariner in maintaining a safe course. The appropriate nautical chart must be consulted when using ranges to determine whether the range marks the centerline of the navigable channel and also what section of the range may be safely traversed. Ranges typically display rectangular dayboards of various colors and are generally, but not always lighted. Ranges may display lights during daylight and at night. When lighted, ranges may display lights of any color.

Vessels should not pass fixed aids to navigation close aboard due to the danger of collision with rip-rap or structure foundations, or with the obstruction or danger being marked.

Aids to Navigation (ATON) may be enhanced by the use of an automatic identification system (AIS). AIS is a maritime navigation safety communications protocol standardized by the International Telecommunication Union and adopted by the International Maritime Organization for the broadcast or exchange of navigation information between vessels, aircraft, and shore

stations. AIS ATON can autonomously and at fixed intervals broadcast the name, position, dimensions, type, characteristics, and status from or concerning an aid to navigation. AIS ATON can be either real (physically fitted to an aid to navigation), synthetic (physically fitted somewhere other than to an aid to navigation) or virtual (physically nonexistent, but capable of being portrayed on AIS-capable displays).

Note: A Real or Physical AIS ATON can actively monitor and report the health and position status of its host; while Synthetic AIS ATON broadcasted from ashore (i.e. NAIS) can be used to electronically augment the range or portrayal (i.e., on radar and ECDIS) of an existing aid to navigation.

Although all existing AIS mobile devices can receive AIS ATON Reports and ASM messages, they may not readily appear on an AIS Minimal Keyboard Display or other shipboard navigational display systems (i.e., radar, ECDIS, ECS), which would require software updates to make these systems compliant with international navigation presentation standards (i.e., IEC 62288 (Ed. 2), IHO S-52 (Ed. 4.4.0)).

AIS ATON can also be used to broadcast both laterally (e.g., Port Hand Mark) and non-laterally significant marine safety information (e.g., environmental data, tidal information, and navigation warnings).

Note: AIS ATON stations broadcast their presence, identity (9-digit Marine Mobile Service Identity (MMSI) number), position, type, and status at least every three minutes or less via an AIS (ITU-R M.1371) message 21–AIS ATON Report. In addition to its AIS ATON Report, AIS ATON can broadcast significant marine safety information via Application Specific Messages (ASM), which are customized messages that can be used to broadcast additional aid information or other marine safety information (i.e., environmental conditions, wind speed and direction, tidal/current data, bridge air clearances, area notices, etc. They are identified by their: AIS message number (i.e. 6, 8, 25 or 26), Designated Area Code (DAC), Function Identifier (FI), and Version Number, e.g. U.S. Geographic Notice message: Msg# = 8, DAC = 367, FI = 22, Version = 2, and, denoted as 8/367.22.2.

TYPES OF SIGNALS

Lighted aids to navigation are, for the most part, equipped with daylight controls which automatically cause the light to operate during darkness and to be extinguished during daylight. These devices are not of equal sensitivity; therefore, all lights do not come on or go off at the same time. Mariners should ensure correct identification of aids to navigation during twilight periods when some lighted aids to navigation are lit while others are not.

The lighting apparatus is serviced at periodic intervals to assure reliable operation, but there is always the possibility of a light being extinguished or operating improperly. The condition of the atmosphere has a considerable effect upon the distance at which lights can be seen. Sometimes lights are obscured by fog, haze, dust, smoke, or precipitation which may be present at the light, or between the light and the observer, and which is possibly unknown by the observer. Atmospheric refraction may cause a light to be seen farther than under ordinary circumstances.

A light of low intensity will be easily obscured by unfavorable conditions of the atmosphere and little dependence can be placed on it being seen. For this reason, the intensity of a light should always be considered when expecting to sight it in reduced visibility. Haze and distance may

reduce the apparent duration of the flash of a light. In some atmospheric conditions, white lights may have a reddish hue. Lights placed at high elevations are more frequently obscured by clouds, mist, and fog than those lights located at or near sea level.

In regions where ice conditions prevail in the winter, the lantern panes of lights may become covered with ice or snow, which will greatly reduce the visibility of the lights and may also cause colored lights to appear white.

The increasing use of brilliant shore lights for advertising, illuminating bridges, and other purposes, may cause marine navigational lights, particularly those in densely inhabited areas, to be outshone and difficult to distinguish from the background lighting. Mariners are requested to report such cases in order that steps may be taken to improve the conditions.

The "loom" (glow) of a powerful light is often seen beyond the limit of visibility of the actual rays of the light. The loom may sometimes appear sufficiently sharp enough to obtain a bearing. At short distances, some flashing lights may show a faint continuous light between flashes.

The distance of an observer from a light cannot be estimated by its apparent intensity. Always check the characteristics of lights in order to avoid mistaking powerful lights, visible in the distance, for nearby lights (such as those on lighted buoys) showing similar characteristics of low intensity. If lights are not sighted within a reasonable time after prediction, a dangerous situation may exist, requiring prompt resolution or action in order to ensure the safety of the vessel.

The apparent characteristic of a complex light may change with the distance of the observer. For example, a light which actually displays a characteristic of fixed white varied by flashes of alternating white and red (the rhythms having a decreasing range of visibility in the order: flashing white, flashing red, fixed white) may, when first sighted in clear weather, show as a simple flashing white light. As the vessel draws nearer, the red flash will become visible and the characteristics will appear as alternating flashing white and red. Later, the fixed white light will be seen between the flashes and the true characteristic of the light will finally be recognized as fixed white, alternating flashing white and red (F W A I W R).

If a vessel has considerable vertical motion due to pitching in heavy seas, a light sighted on the horizon may alternatively appear and disappear. This may lead the unwary to assign a false characteristic and hence, to error in its identification. The true characteristic will be evident after the distance has been sufficiently decreased or by increasing the height of eye of the observer.

Similarly, the effect of wave motion on lighted buoys may produce the appearance of incorrect light phase characteristics when certain flashes occur, but are not viewed by the mariner. In addition, buoy motion can reduce the distance at which buoy lights are detected.

Sectors of colored glass are placed in the lanterns of some lights in order to produce a system of light sectors of different colors. In general, red sectors are used to mark shoals or to warn the mariner of other obstructions to navigation or of nearby land. Such lights provide approximate bearing information, since observers may note the change of color as they cross the boundary between sectors. These boundaries are indicated in the Light List (Col. 8) and by dotted lines on charts. These bearings, as all bearings referring to lights, are given in true degrees from 000° to 359°, as observed from a vessel toward the light.

Altering course on the changing sectors of a light or using the boundaries between light sectors to determine the bearing for any purpose is not recommended. Be guided instead by the correct compass bearing to the light and do not rely on being able to accurately observe the point at which the color changes. This is difficult to determine because the edges of a colored sector cannot be cut off sharply. On either side of the line of demarcation between white, red, or green sectors, there is always a small arc of uncertain color. Moreover, when haze or smoke is present in the intervening atmosphere, a white sector might have a reddish hue.

The area in which a light can be observed is normally an arc with the light as the center and the range of visibility as the radius. However, on some bearings, the range may be reduced by obstructions. In such cases, the obstructed arc might differ with height of eye and distance. When adjoining land cuts off a light and the arc of visibility is given, the bearing on which the light disappears may vary with the distance of the vessel from which observed and with the height of eye. When the light is cut off by a sloping hill or point of land, the light may be seen over a wider arc by a vessel farther away than by one closer to the light.

The arc drawn on charts around a light is not intended to give information as to the distance at which it can be seen. The arc indicates the bearings between which the variation of visibility or obstruction of the light occurs.

Only aids to navigation with green or red lights have lateral significance and exhibit either flashing, quick flashing, group flashing, occulting, or isophase light rhythms. When proceeding in the conventional direction of buoyage, the mariner in IALA Region B, may see the following lighted aids to navigation:

Green lights on aids to navigation mark port sides of channels and locations of wrecks or obstructions that must be passed by keeping these lighted aids to navigation on the port hand of a vessel. Green lights are also used on preferred channel marks where the preferred channel is to starboard (i.e., aid to navigation left to port when proceeding in the conventional direction of buoyage). Red lights on aids to navigation mark starboard sides of channels and locations of wrecks or obstructions that must be passed by keeping these lighted aids to navigation on the starboard hand of a vessel. Red lights are also used on preferred channel marks where the preferred channel is to port (i.e., aid to navigation left to starboard when proceeding in the conventional direction of buoyage).

White and yellow lights have no lateral significance. The shapes, colors, letters, and light rhythms may determine the purpose of aids to navigation exhibiting white or yellow lights.

Most aids to navigation are fitted with retro reflective material to increase their visibility in darkness. Colored reflective material is used on aids to navigation that, if lighted, will display lights of the same color.

Preferred channel marks exhibit a composite group-flashing light rhythm of two flashes followed by a single flash.

Safe water marks exhibit a white Morse code "A" rhythm (a short flash followed by a long flash).

Isolated danger marks exhibit a white flashing (2) rhythm (two flashes repeated regularly).

Special marks exhibit yellow lights and exhibit a flashing or fixed rhythm.

Information and regulatory marks exhibit a white light with any light rhythm except quick flashing, flashing (2) and Morse code “A.”

For situations where lights require a distinct cautionary significance, as at sharp turns, sudden channel constrictions, wrecks, or obstructions, a quick flashing light rhythm will be used.

Shapes are used to provide easy identification on certain unlighted buoys and dayboards on beacons. These shapes are laterally significant only when associated with laterally significant colors.

In IALA Region B, cylindrical buoys (referred to as “can buoys”) and square dayboards mark the port side of a channel when proceeding from seaward. These aids to navigation are associated with solid green or green and red-banded marks where the topmost band is green. Conical buoys (referred to as “nun buoys”) and triangular dayboards mark the starboard side of the channel when proceeding from seaward. These aids to navigation are associated with solid red or red and green-banded marks where the topmost band is red.

Unless fitted with topmarks; lighted, sound, pillar, and spar buoys have no shape significance. Their numbers, colors, and light characteristics convey their meanings.

Dayboards throughout the U.S. Aids to Navigation System are described using standard designations that describe the appearance of each dayboard. A brief explanation of the designations and of the purpose of each type of dayboard in the system is given below, followed by a verbal description of the appearance of each dayboard type.

Designations:

1. First Letter – Shape or Purpose

- C: Crossing (Western Rivers only) diamond-shaped, used to indicate the points at which the channel crosses the river.
- J: Junction (square or triangle) used to mark (preferred channel) junctions or bifurcations in the channel, or wrecks or obstructions which may be passed on either side; color of top band has lateral significance for the preferred channel.
- K: Range (rectangular) when both the front and rear range dayboards are aligned on the same bearing, the observer is on the azimuth of the range, usually used to mark the center of the channel.
- M: Safe Water (octagonal) used to mark the fairway or middle of the channel.
- N: No lateral significance (diamond or rectangular) used for special purpose, warning, distance, or location markers.
- S: Square used to mark the port side of channels when proceeding from seaward.
- T: Triangle used to mark the starboard side of channels when proceeding from seaward.

2. Second Letter – Key Color

B – Black G – Green R – Red W – White Y – Yellow

3. Third Letter – Color of Center Stripe (Range Dayboards Only)

4. Additional Information after a (-)

-I: Intracoastal Waterway; a yellow reflective horizontal band on a dayboard; indicates the aid to navigation marks the Intracoastal Waterway.

-SY: Intracoastal Waterway; a yellow reflective square on a dayboard; indicates the aid to navigation is a port hand mark for vessels traversing the Intracoastal Waterway. May appear on a triangular daymark where the Intracoastal Waterway coincides with a waterway having opposite conventional direction of buoyage.

-TY: Intracoastal Waterway; a yellow reflective triangle on a dayboard; indicates the aid to navigation is a starboard hand mark for vessels traversing the Intracoastal Waterway. May appear on a square daymark where the Intracoastal Waterway coincides with a waterway having opposite conventional direction of buoyage.

Descriptions:

CNG: Diamond-shaped dayboard divided into four diamond-shaped colored sectors with the sectors at the side corners white and the sectors at the top and bottom corners green, with green reflective diamonds at the top and bottom corners and white reflective diamonds in the side corners (Western Rivers only).

CNR: Diamond-shaped dayboard divided into four diamond-shaped colored sectors with the sectors at the side corners white and the sectors at the top and bottom corners red, with red reflective diamonds at the top and bottom corners and white reflective diamonds in the side corners (Western Rivers only).

JG: Dayboard bearing horizontal bands of green and red, green band topmost, with corresponding reflective borders.

JG-I: Square dayboard bearing horizontal bands of green and red, green band topmost, with corresponding reflective borders and a yellow reflective horizontal band.

JG-SY: Square dayboard bearing horizontal bands of green and red, green band topmost, with corresponding reflective borders and a yellow reflective square.

JG-TY: Square dayboard bearing horizontal bands of green and red, green band topmost, with corresponding reflective borders and a yellow reflective triangle.

JR: Dayboard bearing horizontal bands of red and green, red band topmost, with corresponding reflective borders.

JR-I: Triangular dayboard bearing horizontal bands of red and green, red band topmost, with corresponding reflective borders and a yellow reflective horizontal band.

JR-SY: Triangular dayboard bearing horizontal bands of red and green, red band topmost, with corresponding reflective borders and a yellow reflective square.

JR-TY: Triangular dayboard bearing horizontal bands of red and green, red band topmost, with corresponding reflective borders and a yellow reflective triangle.

KBG: Rectangular black dayboard bearing a central green stripe.

KBG-I: Rectangular black dayboard bearing a central green stripe and a yellow reflective horizontal band.

KBR: Rectangular black dayboard bearing a central red stripe.

KBR-I: Rectangular black dayboard bearing a central red stripe and a yellow reflective horizontal band.

KBW: Rectangular black dayboard bearing a central white stripe.

KBW-I: Rectangular black dayboard bearing a central white stripe and a yellow reflective horizontal band.

KGB: Rectangular green dayboard bearing a central black stripe.

KGB-I: Rectangular green dayboard bearing a central black stripe and a yellow reflective horizontal band.

KGR: Rectangular green dayboard bearing a central red stripe.

KGR-I: Rectangular green dayboard bearing a central red stripe and a yellow reflective horizontal band.

KGW: Rectangular green dayboard bearing a central white stripe.

KGW-I: Rectangular green dayboard bearing a central white stripe and a yellow reflective horizontal band.

KRB: Rectangular red dayboard bearing a central black stripe.

KRB-I: Rectangular red dayboard bearing a central black stripe and a yellow reflective horizontal band.

KRG: Rectangular red dayboard bearing a central green stripe.

KRG-I: Rectangular red dayboard bearing a central green stripe and a yellow reflective horizontal band.

KRW: Rectangular red dayboard bearing a central white stripe.

KRW-I: Rectangular red dayboard bearing a central white stripe and a yellow reflective horizontal band.

KWB: Rectangular white dayboard bearing a central black stripe.

KWB-I: Rectangular white dayboard bearing a central black stripe and a yellow reflective horizontal band.

KWG: Rectangular white dayboard bearing a central green stripe.

KWG-I: Rectangular white dayboard bearing a central green stripe and a yellow reflective horizontal band.

KWR: Rectangular white dayboard bearing a central red stripe.

KWR-I: Rectangular white dayboard bearing a central red stripe and a yellow reflective horizontal band.

MR: Octagonal dayboard bearing stripes of white and red, with a white reflective border.

MR-I: Octagonal dayboard bearing stripes of white and red, with a white reflective border and a yellow reflective horizontal band.

NB: Diamond-shaped dayboard divided into four diamond-shaped colored sectors with the sectors at the side corners white and the sectors at the top and bottom corners black, with a white reflective border.

ND: Rectangular white mileage marker with black numerals indicating the mile number (Western Rivers only).

NG: Diamond-shaped dayboard divided into four diamond-shaped colored sectors with the sectors at the side corners white and the sectors at the top and bottom corners green, with a white reflective border.

NL: Rectangular white location marker with an orange reflective border and black letters indicating the location.

NR: Diamond-shaped dayboard divided into four diamond-shaped colored sectors with the sectors at the side corners white and the sectors at the top and bottom corners red, with a white reflective border.

NW: Diamond-shaped white dayboard with an orange reflective border and black letters describing the information or regulatory nature of the mark.

NY: Diamond-shaped yellow dayboard with yellow reflective border.

SG: Square green dayboard with a green reflective border.

SG-I: Square green dayboard with a green reflective border and a yellow reflective horizontal band.

SG-SY: Square green dayboard with a green reflective border and a yellow reflective square.

SG-TY: Square green dayboard with a green reflective border and a yellow reflective triangle.

SR: Square red dayboard with a red reflective border. (IALA Region “A”)

TG: Triangular green dayboard with a green reflective border. (IALA Region “A”)

TR: Triangular red dayboard with a red reflective border.

TR-I: Triangular red dayboard with a red reflective border and a yellow reflective horizontal band.

TR-SY: Triangular red dayboard with a red reflective border and a yellow reflective square.

TR-TY: Triangular red dayboard with a red reflective border and a yellow reflective triangle. These abbreviated descriptions are used in column (7) and may also be found on the illustrations of the U.S. Aids to Navigation System.

Numbers are used to provide easy identification of aids to navigation. In IALA Region B, all solid red and solid green aids are numbered, with the exception of buoys located on the Western Rivers. Red aids to navigation have even numbers and green aids to navigation have odd numbers. The numbers for each increase from seaward when proceeding in the conventional direction of buoyage. Numbers are kept in approximate sequence on both sides of the channel by omitting numbers where necessary.

Letters may be used to augment numbers when lateral aids to navigation are added to channels with previously completed numerical sequences. Letters will increase in alphabetical order from seaward, proceeding in the conventional direction of buoyage and are added to numbers as suffixes. Letters are not used for buoys on the Western Rivers.

No other aids to navigation are numbered. Preferred channel, safe water, isolated danger, special marks, and information and regulatory aids to navigation may be lettered, but not numbered.

Sound signal is a generic term used to describe aids to navigation that produce an audible signal designed to assist the mariner in periods of reduced visibility. These aids to navigation can be activated by several means (e.g., manually, remotely, or fog detector). The Coast Guard is replacing many fog detectors with mariner radio activated sound signals (MRASS). To activate, mariners key their VHF-FM radio a designated number of times on a designated VHF-FM channel. The sound signal is activated for a period of 15, 30, 45, or 60 minutes after which the activated assistance automatically turns off. In cases where a fog detector is in use, there may be a delay in the automatic activation of the signal. Additionally, fog detectors may not be capable of detecting patchy fog conditions.

Sound signals are distinguished by their tone and phase characteristics. The devices producing the sound, e.g., diaphones, diaphragm horns, sirens, whistles, bells, or gongs determine tones.

Phase characteristics are defined by the signal's sound pattern, i.e., the number of blasts and silent periods per minute and their durations. Sound signals sounded from fixed structures generally produce a specific number of blasts and silent periods each minute when operating. Sound signals installed on buoys are generally activated by the motion of the sea and therefore do not emit a regular signal characteristic. It is common, in fact, for a buoy to produce no sound signal when seas are calm.

The characteristic of a sound signal is listed in column (8) of the Light List. If the sound signal is remotely activated, column (8) will contain the VHF-FM channel and number of times the VHF-FM radio should be keyed. All waterway users equipped with a VHF-FM radio may activate the sound signal, but they are not required to do so. Unless it is specifically stated that a sound signal "Operates continuously," or the signal is a bell, gong, or whistle on a buoy, it can be assumed that the sound signal only operates during times of fog, reduced visibility, or adverse weather.

Caution: *Mariners should not rely on sound signals to determine their position. Distance cannot be accurately determined by sound intensity. Occasionally, sound signals may not be heard in areas close to their location. Signals may not sound in cases where fog exists close to, but not at, the location of the sound signal.*

Radar Beacons (RACONS) are radar transponders that when triggered by an X-band radar produce a coded response from its location, which is portrayed radially as a series of dots and dashes on the triggering radar. Although RACONS may be used on both laterally significant and non-laterally significant aids to navigation, their signal should just be used for identification purposes only.

RACONS have a typical output of 600 milliwatts and are considered a short range aid to navigation. Reception varies from a nominal range of 6 to 8 nautical miles when mounted on a buoy to as much as 17 nautical miles for a RACON mounted on a fixed structure. It must be understood that these nominal ranges are dependent upon many factors.

The beginning of the RACON presentation occurs about 50 yards beyond the RACON position and will persist for a number of revolutions of the radar antenna (depending on its rotation rate). Distance to the RACON can be measured to the point at which the RACON flash begins, but the figure obtained will be greater than the vessel's distance from the RACON. This is due to the slight response delay in the RACON apparatus.

Radar operators may notice some broadening or spoking of the RACON presentation when their vessel approaches closely to the source of the RACON. This effect can be minimized by adjusting the IF gain or sweep gain control of the radar. If desired, the RACON presentation can be virtually eliminated by operation of the FTC (fast time constant) controls of the radar.

Radar Reflectors are special fixtures, incorporated into both lighted and unlighted aids to navigation, to enhance the reflection of radar energy. These fixtures help radar-equipped vessels to detect buoys and beacons, which are so equipped. However, they do not positively identify a radar target as an aid to navigation.

NAVIGATION SERVICES

GLOBAL POSITIONING SYSTEM (GPS), DIFFERENTIAL GPS (DGPS), AND NATION-WIDE AUTOMATIC IDENTIFICATION SYSTEM (NAIS)

Global Positioning System (GPS) is a satellite based navigation system, operated and controlled by the Department of Defense (DOD) under U.S. Air Force management, which provides precise, worldwide, three-dimensional navigation capabilities. The system was originally designed for military application; however, it is now available to all and used almost ubiquitously. The United States is committed to maintaining the availability of at least 24

operational GPS satellites, is six precise orbital planes, each of which complete a circular 10,900 nautical mile orbit of the earth once every 12 hours. Ideally, a minimum of four satellites will be visible from any position on the earth and will provide positions with a global horizontal accuracy within 3 meters, 95% percent of the time. Whenever possible, advance notice of when GPS satellites should not be used will be provided by the DOD and made available by the US Coast Guard through GPS status messages.

The Navigation Center coordinates and manages the Civil GPS Service Interface Committee (CGSIC), which comprises members from U.S. and international private, government, and industry user groups. The CGSIC is the recognized worldwide forum for effective interaction between all civil GPS users and the U.S. GPS authorities.

At least three satellites are required for a two-dimensional solution, however, GPS does not provide integrity information and mariners should exercise extreme caution when using GPS in restricted waterways.

Differential GPS (DGPS) is an augmentation to the GPS signals. Each site corrects for small variations in the signals from each satellite that is in view at that time. Satellite signals can vary due to small changes in the satellite's circuitry and orbit and from changes caused by local weather conditions. Satellite corrections are transmitted to users via radio signals in the medium frequency band (285-325 kHz) previously used for marine radiobeacons. DGPS corrections and integrity information are transmitted using Minimum Shift Keying (MSK) modulation. The modulation data rate is usually 100 or 200 bits per second (bps), but can also be 50 bps. The range of DGPS transmissions is from 40 to 300 nautical miles.

DGPS was the first Federal radionavigation system capable of providing the 10-meter navigation service required for the Harbor Entrance and Approach phase of maritime navigation. DGPS provides integrity messages for signals from the GPS satellites, as well as DGPS position corrections, and typically provides position accuracy of 1-3 meters.

Each DGPS site has two reference stations (which calculate the differential corrections), two integrity monitors (which ensure the differential corrections are accurate), a transmitter, and equipment to communicate status information to and receive commands from the control station. Each transmitter and reference station has a unique identification number that permits users to determine which site/equipment is providing their differential corrections. As distance from the transmitting site increases, the small error in the differential corrections increases. The best accuracy is achieved when using the DGPS site closest to the user.

Information regarding the location of DGPS transmitters is given on the map labeled U.S. DGPS Sites & Identification Numbers on page i. Users can access additional information and DGPS statuses, submit questions, and provide comments via the Navigation Information Service's website or by calling the Coast Guard Navigation Center DGPS watchstander at (703) 313-5902.

Navigation Information Service (NIS): The Coast Guard is the government interface for civil users of GPS and has established a Navigation Information Service (NIS) to meet the information needs of the civil user. The NIS is a Coast Guard entity that is manned 24 hours a day, 7 days a week, and is located at the Navigation Center (NAVCEN) in Alexandria, VA. It provides data broadcasts and on-line computer-based information services which are available 24 hours a day. The information provided includes present or future satellite outages, constellation changes, user instructions and tutorials, lists of service and receiver provides/users, and other GPS and DGPS related information.

Navigation Center Internet Service (www) website also offers an e-mail subscription service for GPS status messages, Notice Advisory to NAVSTAR Users (NANU) messages, Local Notice to Mariners, and Coast Guard Light List.

The NAVCEN disseminates GPS and DGPS safety advisory broadcast messages through USCG broadcast stations utilizing VHF-FM voice, HF-SSB voice, and NAVTEX broadcasts. The broadcasts provide the GPS and DGPS user in the marine environment with the current status of the navigation systems, as well as any planned/unplanned system outages that could affect GPS and DGPS navigational accuracy.

Nationwide Automatic Identification System (NAIS) consists of approximately 200 VHF receiver sites located throughout the coastal continental United States, inland rivers, Alaska, Hawaii, Puerto Rico, and Guam. NAIS couples AIS technology with a comprehensive network infrastructure to achieve ship-to-shore and shore-to-ship data transmission throughout the navigable waters of the United States. The system enables AIS-equipped vessels to receive important marine information such as safety and security messages, weather alerts, and electronic aids to navigation.

NAIS is designed to collect safety and security data from AIS-equipped vessels in navigable waters of the United States and share that data with Coast Guard operators and other government and port partners. The primary goal of NAIS is to increase situational awareness through data dissemination via a network infrastructure, particularly focusing on improving maritime security, marine and navigational safety, search and rescue, and environmental protection services. Collected AIS data improves the safety of vessels and ports through collision avoidance and the safety of the nation through detection, identification, and classification of vessels. NAIS broadcasts navigation enhancing safety related messages such as Synthetic AIS ATON Reports and Application Specific Messages.

For more information see:

- AIS messages at www.navcen.uscg.gov/?pageName=AIMessages,
- IMO Safety of Navigation Circular 289 and 290 regarding ASM's at www.navcen.uscg.gov/?pageName=AISReferences,
- IALA AIS ASM Catalog at www.e-navigation.nl/asm, and
- USCG Special Notice 14-02 regarding eATON at www.navcen.uscg.gov/?pageName=AISFAQ#21.

To comment on any of these services or ask questions about the service offered, contact the NAVCEN at:

Commanding Officer
U.S. Coast Guard Navigation Center
7323 Telegraph Road STOP 7310
Alexandria, VA 20598-7310
Phone: (703) 313-5900
Internet: <http://www.navcen.uscg.gov>

ABBREVIATIONS

Various abbreviations are utilized in Broadcast Notices to Mariners, Local Notices to Mariners, on charts, and in the Light Lists. Refer to the following list.

Light Characteristics

Alternating	AL
Characteristic	CHAR
Composite Group-Flashing	FL (2+1)
Composite Group-Occulting	OC (2+1)
Continuous Quick-Flashing	Q
Eclipse	EC
Fixed and Flashing	FFL
Fixed	F
Group-Flashing	FL (3)
Group-Occulting	OC (2)
Interrupted Quick-Flashing	IQ
Isophase	ISO
Morse Code	MO (A)
Occulting	OC
Single-Flashing	FL

Sound Signal Characteristics

Blast	BL
Every	EV
Seconds	S
Silent	SI

Colors*

Black	B
Blue	BU
Green	G
Orange	OR
Red	R
White	W
Yellow	Y

*NOTE: Color refers to characteristics of aids to navigation only.

Aids to Navigation

Aeronautical Radiobeacon	AERO RBN
Automatic Identification System	AIS
Daybeacon	DBN
Destroyed	DESTR
Differential GPS	DGPS
Discontinued	DISCONTD
Established	ESTAB
Exposed Location Buoy	ELB
Extinguished	EXT
Fog Signal Station	FOG SIG
Light List Number	LLNR

Light	LT
Lighted Bell Buoy	LBB
Lighted Buoy	LB
Lighted Gong Buoy	LGB
Lighted Horn Buoy	LHB
Lighted Whistle Buoy	LWB
Mariner Radio Activated	
Sound Signal	MRASS
Ocean Data Acquisition System	ODAS
Privately Maintained	PRIV MAINTD
Radar Reflector	RA REF
Radar Responder Beacon	RACON
Remote Radio Activated	
Sound Signal	RRASS
Single Point Mooring Buoy	SPM
Sound Signal	SS
Temporarily Replaced by	
Lighted Buoy	TRLB
Temporarily Replaced by	
Unlighted Buoy	TRUB
Topmark	TMK
Virtual AIS Aid to Navigation	V-AIS
Whistle	WHIS

Organizations

Commander, Coast Guard District CCGD (#)	
Coast Guard	CG
Corps of Engineers	USACE
National Geospatial-Intelligence Agency	NGA
National Ocean Service	NOS
National Weather Service	NWS

Vessels

Aircraft	A/C
Fishing Vessel	F/V
Liquefied Natural Gas Carrier	LNG
Motor Vessel (includes Steam Ship, Container Ship, Cargo Vessel, Tanker etc)	M/V
Pleasure Craft	P/C
Research Vessel	R/V
Sailing Vessel	S/V

Compass Directions

North	N
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South	S	Explosive Anchorage	EXPLOS ANCH
East	E	Fathom(s)	FM(S)
West	W	Foot/Feet	FT
Northeast	NE	Harbor	HBR
Northwest	NW	Height	HT
Southeast	SE	Hertz	HZ
Southwest	SW	Horizontal Clearance	HOR CL
		Hour	HR
<u>Months</u>		International Regulations for	
January	JAN	Preventing Collisions at Sea	COLREGS
February	FEB	Kilohertz	KHZ
March	MAR	Kilometer	KM
April	APR	Knot(s)	KT(S)
May	MAY	Minute (time, geo, pos)	MIN
June	JUN	Megahertz	MHZ
July	JUL	Moderate	MOD
August	AUG	Mountain, Mount	MT
September	SEP	Nautical Mile(s)	NM
October	OCT	Notice to Mariners	NTM
November	NOV	Obstruction	OBSTR
December	DEC	Occasion/Occasionally	OCCASION
		Operating Area	OPAREA
<u>Days of the Week</u>		Pacific	PAC
Monday	MON	Point(s)	PT(S)
Tuesday	TUE	Position	POS
Wednesday	WED	Position Approximate	PA
Thursday	THU	Pressure	PRES
Friday	FRI	Private, Privately	PRIV
Saturday	SAT	Prohibited	PROHIB
Sunday	SUN	Publication	PUB
		Range	RGE
<u>Various</u>		Reported	REP
Anchorage	ANCH	Restricted	RESTR
Anchorage Prohibited	ANCH PROHIB	River	RIV
Approximate	APPROX	Rock	RK
Atlantic	ATL	Saint	ST
Authorized	AUTH	Second (time, geo, pos)	SEC
Average	AVG	Signal Station	SIG STA
Bearing	BRG	Station	STA
Breakwater	BKW	Statute Mile(s)	SM
Broadcast Notice to Mariners	BNM	Storm Signal Station	S SIG STA
Canadian Aid	(C)	Temporary	TEMP
Captain of the Port	COTP	Thunderstorm	TSTORM
Channel	CHAN	Through	THRU
Code of Federal Regulations	CFR	True	T
Continue	CONT	Uncovers, Dries	UNCOV
Degrees (temp, geo, pos)	DEG	Universal Coordinate Time	UTC
Diameter	DIA	Urgent Marine Information Broadcast	UMIB
Edition	ED	Velocity	VEL
Effect/Effective	EFF	Vertical Clearance	VERT CL
Entrance	ENTR	Vessel Traffic Service	VTS

Visibility	VIS	Missouri	MO
Yard(s)	YD	Mississippi	MS
Warning	WARN	Mexico	MX
Weather	WX	Michigan	MI
Wreck	WK	Minnesota	MN

Countries and States

Alabama	AL	Nevada	NV
Alaska	AK	New Hampshire	NH
American Samoa	AS	New Jersey	NJ
Arizona	AZ	New Mexico	NM
Arkansas	AR	New York	NY
California	CA	North Carolina	NC
Canada	CN	North Dakota	ND
Colorado	CO	Northern Marianas	MP
Connecticut	CT	Ohio	OH
Delaware	DE	Oklahoma	OK
District of Columbia	DC	Oregon	OR
Florida	FL	Pennsylvania	PA
Georgia	GA	Puerto Rico	PR
Guam	GU	Rhode Island	RI
Hawaii	HI	South Carolina	SC
Idaho	ID	South Dakota	SD
Illinois	IL	Tennessee	TN
Indiana	IN	Texas	TX
Iowa	IA	United States	US
Kansas	KS	Utah	UT
Kentucky	KY	Vermont	VT
Louisiana	LA	Virgin Islands	VI
Maine	ME	Washington	WA
Maryland	MD	West Virginia	WV
Marshall Islands	MH	Wisconsin	WI
Massachusetts	MA	Wyoming	WY

GLOSSARY OF AIDS TO NAVIGATION TERMS

Adrift: Afloat and unattached in any way to the shore or seabed.

Aid to Navigation: Any device external to a vessel or aircraft specifically intended to assist navigators in determining their position or safe course, or to warn them of dangers or obstructions to navigation.

Alternating Lights: A rhythmic light showing light of alternating colors.

Arc of Visibility: The portion of the horizon over which a lighted aid to navigation is visible from seaward.

Articulated Beacon: A beacon-like buoyant structure, tethered directly to the seabed and having no watch circle. Called articulated light or articulated daybeacon, as appropriate.

Assigned Position: The latitude and longitude position for an aid to navigation.

Beacon: A lighted or unlighted fixed aid to navigation attached directly to the earth's surface. (Lights and daybeacons both constitute beacons.

Bearing: The horizontal direction of a line of sight between two objects on the surface of the earth.

Bell: A sound signal producing bell tones by means of a hammer actuated by electricity on fixed aids and by sea motion on buoys.

Bifurcation: The point where a channel divides when proceeding from seaward. The place where two tributaries meet.

Broadcast Notice to Mariners: A radio broadcast designed to provide important marine information.

Buoy: A floating object of defined shape and color, which is anchored at a given position and serves as an aid to navigation.

Characteristic: The audible, visual, or electronic signal displayed by an aid to navigation to assist in the identification of an aid to navigation. Characteristic refers to lights, sound signals, RACONS, and daybeacons.

Commissioned: The action of placing a previously discontinued aid to navigation back in service.

Composite Group Flashing Light: A group flashing light in which the flashes are combined in successive groups of different numbers of flashes.

Composite Group-Occulting Light: A light similar to a group occulting light except that the successive groups in a period have different numbers of eclipses.

Conventional Direction of Buoyage: The general direction taken by the mariner when approaching a harbor, river, estuary, or other waterway from seaward, or proceeding upstream or in a direction of the main stream of flood tide, or in the direction indicated in appropriate nautical documents (normally, following a clockwise direction around land masses).

Daybeacon: An unlighted fixed structure which is equipped with a dayboard for daytime identification.

Dayboard: The daytime identifier of an aid to navigation presenting one of several standard shapes (square, triangle, rectangle) and colors (red, green, white, orange, yellow, or black).

Daymark: The daytime identifier of an aid to navigation. (See column 7 of the Light List)

Diaphone: A sound signal which produces sound by means of a slotted piston moved back and forth by compressed air. A "two-

tone” diaphone produces two sequential tones with a second tone of lower pitch.

Directional Light: A light illuminating a sector or very narrow angle and intended to mark a direction to be followed.

Discontinued: To remove from operation (permanently or temporarily) a previously authorized aid to navigation.

Discrepancy: Failure of an aid to navigation to maintain its position or function as prescribed in the Light List.

Discrepancy Buoy: An easily transportable buoy used to temporarily replace an aid to navigation not watching properly.

Dolphin: A minor aid to navigation structure consisting of a number of piles driven into the seabed or riverbed in a circular pattern and drawn together with rope.

Eclipse: AN interval of darkness between appearances of a light.

Emergency Light: A light of reduced intensity displayed by certain aids to navigation when the main light is extinguished.

Establish: To place an authorized aid to navigation in operation for the first time.

Extinguished: A lighted aid to navigation which fails to show a light characteristic.

Fixed Light: A light showing continuously and steady, as opposed to a rhythmic light. (Do not confuse with “fixed” as used to differentiate from “floating”.)

Flash: A relatively brief appearance of a light, in comparison with the longest interval of darkness in the same characteristic.

Flash tube: An electronically controlled high-intensity discharge lamp with a very brief flash duration.

Flashing Light: A light in which the total duration of the light in each period is clearly shorter than the total duration of the darkness and in which the flashed of light are all of equal duration. (Commonly used for a single-flashing light which exhibits only single flashes which are repeated at regular intervals.)

Floating Aid to Navigation: A buoy, secured in its assigned position by a mooring.

Fog Detector: An electronic devise used to automatically determine conditions of visibility which warrant the activation of a sound signal or additional light signals.

Fog Signal: See sound signal.

Geographic Range: The greatest distance the curvature of the earth permits an object of a given height to be seen from a particular height of eye without regard to luminous intensity or visibility conditions.

Global Positioning System (GPS): A satellite based radio-navigation system providing continuous worldwide coverage. It provides navigation, position, and timing information to air, marine, and land users.

Gong: A wave actuated sound signal on buoys which uses a group of saucer-shaped bells to produce different tones.

Group Flashing Light: A flashing light in which a group of flashes, specified in number, is regularly repeated.

Group Occulting Light: An occulting light in which a group of eclipses, specified in number, regularly repeated.

Horn: A sound signal which uses electricity or compressed air to vibrate a disc diaphragm.

Inoperative: Sound signal or electronic aid to navigation out of service due to a malfunction.

Interrupted Quick Flash: A quick flashing light in which the rapid alternations are interrupted at regular intervals by eclipses of long duration.

Isolated Danger Mark: A mark erected on, or moored above or very near, an isolated danger which has navigable water all around it.

Isophase Light: A rhythmic light in which all durations of light and darkness are equal.

Junction: The point where a channel divides when proceeding seaward. The place where a distributary departs from the main stream.

Lateral System: A system of aids to navigation in which characteristics of buoys and beacons indicate the sides of a channel or route relative to a Conventional Direction of Buoyage (usually upstream).

Light: The signal emitted by a lighted aid to navigation. The illuminating apparatus used to emit the light signal. A lighted aid to navigation on a fixed structure.

Light Sector: The arc over which a light is visible, described in degrees true, as observed from seaward towards the light. May be used to define distinctive color difference of two adjoining sectors, or an obscured sector.

Lighted Ice Buoy (LIB): A lighted buoy without a sound signal, and designed to withstand the forces of shifting and flowing ice. Used to replace a conventional buoy when that aid to navigation is endangered by ice.

Lighthouse: A lighted beacon of major importance.

Local Notice to Mariners: A written document issued by each U.S. Coast Guard district to disseminate important information affecting aids to navigation, dredging, marine construction, special marine activities, and

bridge construction on waterways within that district.

LORAN: An acronym for Long Range Navigation, is an electronic aid to navigation consisting of shore-based radio transmitters. The LORAN system enables users equipped with a LORAN receiver to determine their position quickly and accurately, day or night, in practically any weather.

Luminous Range: The greatest distance a light can be expected to be seen given its nominal range and the prevailing meteorological visibility.

Mark: A visual aid to navigation. Often called navigational mark, including floating marks (buoys) and fixed marks (beacons).

Meteorological Visibility: The greatest distance at which a black object of suitable dimension could be seen and recognized against the horizon sky by day, or in case of night observations, could be seen and recognized if the general illumination were raised to the daylight level.

Mileage Number: A number assigned to aids to navigation which gives the distance in sailing miles along the river from a reference point to the aid to navigation. The number is used principally in the Mississippi River System.

Nominal Range: The maximum distance a light can be seen in clear weather (meteorological visibility of 10 nautical miles). Listed for all lighted aids to navigation except range lights, directional lights, and private aids to navigation.

Occulting Light: A light in which the total duration of light in each period is clearly longer than the total duration of the darkness and in which the intervals of darkness (occultations) are all of equal duration. Commonly used for single occulting light which exhibits only single occultations which are repeated at regular intervals.

Ocean Data Acquisition System (ODAS):

Certain very large buoys in deep water for the collection of oceanographic and meteorological information. All ODAS buoys are yellow in color and display a yellow light.

Off Shore Tower: Monitored light stations built on exposed marine sites to replace lightships.

Off Station: A floating aid to navigation that is not on its assigned position.

Passing Light: A low intensity light which may be mounted on the structure of another light to enable the mariner to keep the latter light in sight when passing out of its beam during transit.

Period: The interval of time between the commencement of two identical successive cycles of the characteristic of the light or sound signal.

Pile: A long, heavy timber driven into the seabed or riverbed to serve as a support for an aid to navigation.

Port Hand Mark: A buoy or beacon which is left to the port hand when proceeding in the “Conventional Direction of Buoyage”.

Preferred Channel Mark: A lateral mark indicating a channel junction or bifurcation, or a wreck or other obstruction which after consulting a chart, may be passed on either side.

Primary Aid to Navigation: An aid to navigation established for the purpose of making landfalls and coastwise passages from headland to headland.

Quick Light: A light exhibiting very rapid regular alternations of light and darkness, normally 60 flashes per minute.

RACON: A radar beacon which produces a coded response or radar paint, when triggered by a radar signal.

Radar: An electronic system designed to transmit radio signals and receive reflected images of those signals from a “target” in order to determine the bearing and distance to the “target”.

Radar Reflector: A special fixture fitted to or incorporated into the design of certain aids to navigation to enhance their ability to reflect radar energy. In general, these fixtures will materially improve the aid to navigation for use by vessels with radar.

Range: A line formed by the extension of a line connecting two charted points.

Range lights: Two lights associated to form a range which often, but not necessarily, indicates the channel centerline. The front range light is the lower of the two, and nearer to the mariner using the range. The rear light is higher and further from the mariner.

Rebuilt: A fixed aid to navigation, previously destroyed, which has been restored as an aid to navigation.

Regulatory Marks: A white and orange aid to navigation with no lateral significance. Used to indicate a special meaning to the mariner, such as danger, restricted operations, or exclusion area.

Relighted: An extinguished aid to navigation returned to its advertised light characteristics.

Replaced: An aid to navigation previously off station, adrift, or missing, restored by another aid to navigation of the same type and characteristics.

Replaced (temporarily): An aid to navigation previously off station, adrift, or missing restored by another aid to navigation of a different type and/or characteristic.

Reset: A floating aid to navigation previously off station, adrift or missing, returned to its assigned position (station).

Rhythmic Light: A light showing intermittently with a regular periodicity.

Sector: See light sector.

Setting a Buoy: The act of placing a buoy on assigned position in the water.

Siren: A sound signal which uses electricity or compressed air to actuate either a disc or a cup shaped rotor.

Skeleton Tower: A tower, usually of steel, constructed of heavy corner members and various horizontal and diagonal bracing members.

Sound Signal: A device which transmits sound, intended to provide information to mariners during periods of restricted visibility and foul weather.

Starboard Hand Mark: A buoy or beacon which is left to the starboard hand when proceeding in the Conventional Direction of Buoyage.

Topmark: One or more relatively small objects of characteristic shape and color placed on aid to identify its purpose.

Traffic Separation Scheme: Shipping corridors marked by buoys which separate incoming from outgoing vessels. Improperly called SEA LANES.

Watching Properly: An aid to navigation on its assigned position exhibiting the advertised characteristics in all respects.

Whistle: A wave actuated sound signal on buoys which produces sound by emitting compressed air through a circumferential slot into a cylindrical bell chamber.

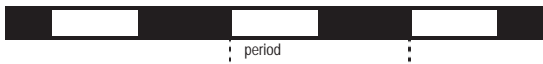
Winter Marker: An unlighted buoy without a sound signal, used to replace a conventional buoy when an aid to navigation is endangered by ice.

Winter Light: A light which is maintained during those winter months when the regular light is extinguished. It is of lower candlepower than the regular light, but usually the same characteristic.

Withdrawn: The discontinuance of an aid to navigation or equipment on an aid to navigation during severe ice conditions or for the winter season.

CHARACTERISTICS OF LIGHTS

Illustration



Type Description

1. **FIXED.**
A light showing continuously and steadily.
2. **OCCULTING.**
A light in which the total duration of light in a period is longer than the total duration of darkness and the intervals of darkness (eclipses) are usually of equal duration
 - 2.1 **Single-occulting.**
An occulting light in which an eclipse is regularly repeated.
 - 2.2 **Group-occulting.**
An occulting light in which a group of eclipses, specified in numbers, is regularly repeated.
 - 2.3 **Composite group-occulting.**
A light, similar to a group-occulting light, except that successive groups in a period have different numbers of eclipses.
3. **ISOPHASE.**
A light in which all durations of light and darkness are equal.
4. **FLASHING.**
A light in which the total duration of light in a period is shorter than the total duration of darkness and the appearances of light (flashes) are usually of equal duration.
 - 4.1 **Single-flashing.**
A flashing light in which a flash is regularly repeated (frequency not exceeding 30 flashes per minute).
 - 4.2 **Group-flashing.**
A flashing light in which a group of flashes, specified in number, is regularly repeated.
 - 4.3 **Composite group-flashing.**
A light similar to a group flashing light except that successive groups in the period have different numbers of
5. **QUICK.**
A light in which flashes are produced at a rate of 60 flashes per minute.
 - 5.1 **Continuous quick.**
A quick light in which a flash is regularly repeated.
 - 5.2 **Interrupted quick.**
A quick light in which the sequence of flashes is interrupted by regularly repeated eclipses of constant and long duration.
6. **MORSE CODE.**
A light in which appearances of light of two clearly different durations (dots and dashes) are grouped to represent a character or characters in the Morse code.
7. **FIXED AND FLASHING.**
A light in which a fixed light is combined with a flashing light of higher luminous intensity.
8. **ALTERNATING.**
A light showing different colors alternately

Abbreviation

- F
- Oc
- Oc (2)
- Oc (2+1)
- Iso
- FI
- FI (2)
- FI (2+1)
- Q
- I Q
- Mo (A)
- F FI
- AI RW

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INDEX

A

Acadiana Navigation Channel	20295
Adams Bay	15730
Adams Bayou	23180, 35445
Algiers Alternate Route	34940
Alligator Harbor	2310
Amerada Pass Channel	18770
Amite River	11650
Anahuac Channel	25910
Apalachee Bay	1475
Apalachicola Bay	30210
Apalachicola River	30410
Apalachicola River Entrance	30285
Aransas Bay	39680
Aransas Bay	38645
Aransas Bay Alternate Route	39470.01
Aransas Channel	28210
Aransas Pass	28155
Aransas-Corpus Christi Bay Cutoff Channel	39060
Arlington Channel	7535
Arroyo Colorado Cutoff Channel	42190
Atchafalaya Bay	19250
Atchafalaya Channel	18520
Atchafalaya River	18876
Avery Canal	20470
Avoca Island Cutoff Channel	18970.01

B

Back Bay of Biloxi	9260
Baffin Bay	41010.01
Baffin Bay Land Cut	41150.01
Baptiste Collette Bayou	12380
Barataria Bay	16025
Barataria Pass	15802
Barataria Waterway	16095
Bay Cove Marina to Casino Magic Marina	10300
Bayou Aloe	34090
Bayou Bonfouca Channel	11025
Bayou Caddy	10390
Bayou Casotte Channel	8390
Bayou Castine	11190
Bayou Chico	5295
Bayou Coden	7765
Bayou Decade	18325
Bayou Dupont Canal Weir	16510
Bayou Dupre	10785
Bayou Garcon	6030
Bayou Grand Caillou	17975
Bayou Grande	5415
Bayou La Batre	7670
Bayou La Batre	7665, 34315
Bayou Petit Caillou Flood Canal	17570
Bayou Portage Channel	10205
Bayou Rigaud	15915
Bayou Rosa	17250
Bayou Sale Channel	19750
Bayou Shaffer	19075

C

Bayou St John	5940.01
Bayou St. Denis	16595
Bayou Terre Aux Boeufs	12355
Bayou Yscloskey	10760
Bayport Ship Channel	24430
Baytown Goose Creek Channel	24880
Baytown Marina Channel	24820
Belle Isle 340-29 Channel	19285
Belle Isle 340-39 Channel	19350
Belle Isle Well 38	19375
Belle Pass	16975
Bernard Bayou	9445
Big Lake	9380
Biloxi Channel	8955
Biloxi East Channel	8639
Black Bay Channel	12075
Blakeley River	7075
Boggy Bayou	32050
Bolivar Peninsula	35880
Bolivar Roads Alternate Inbound Route	23940
Bon Secour River	6805, 33770
Boston Bayou Channel	20560
Brazos River Crossing	37395
Brazos Santiago Pass	29460
Breton Sound	11905
Broadwater Beach Hotel Marina Channel	9540
Brownsville Channel	29855, 42975

D

Dauphin Bay	34135
Dauphin Island Channel	7155
Davis Bayou Channel	8830
Dickinson Bayou Channel	26220
Dog Keys Pass	8595
Dog River Channel	7450
Double Bayou Channel	25845
Double Bayou Light 19	12860
Dupre Cut	16470

E

East Atchafalaya Bay	18365
East Bay	30780
East Bay Bayou	35770
East Point Channel	30115
Eden Isles Channel	10960
Empire Waterway	15720
Escambia Bay	5665
Escatawpa River	8350
Espiritu Santo Bay - Barroom Bay Navigation	27980
Espiritu Santo Bay Ferry Channel	37935

F

Fannin Bayou	4190
Fannin Bayou Channel A	4210
Fannin Bayou Channel B	4285
Five Mile Cut	24410
Fly Creek	7045
Fowl River	7255
Freeport Entrance	26910
Freshwater Bayou	20573
Fulton Channel	38790

G

Galveston Bay	23760
Galveston Channel	23865, 36065
Galveston Channel	36050
Galveston Inner Bar	23845
Galveston Outer Bar	23830
Galveston-Freeport	36100.01
Galveston-Freeport Cutoff Channel	35950
Gibbstown	35330
Goose Bayou Weir	16560
Goose Island Breakwater	38815
Governor Nicholls Harbor Traffic Control Light 94	13855, 34770
Grand Canal Channel	32915
Grand Hotel Yacht Basin	7015
Grand Island Channel	34575
Grand Isle Turning Basin	15945.01
Grand Lagoon Boat Basin Channel	33200
Grand Lagoon Channel	4305

INDEX

Grand Lake 20919
 Gretna Harbor Traffic Control
 Light 97 13880, 34795
 Gulf County Canal 3180
 Gulf Power Electrical Tower . . . 3510
 Gulfport Ship Channel 9585
 Gulfport Small Boat Harbor . . . 9975
 Gulfport Yacht Basin Channel . 10025

H

Harbor Towne Channel 3780
 Harborwalk Entrance East . . . 36700
 Harborwalk Entrance West . . .
 36775
 Harlingen-Port Isabel 42365
 Head of Passes to New
 Orleans 12945
 Hilton Hotel Marina Channel . . 26760
 Holiday Harbor Marina
 Channel 33355
 Horn Island Pass 7855
 Houma Navigation Canal 17750
 Houston Ship Channel 23900, 36055
 Houston Yacht Club 26900
 Huey P. Long Bridge 14035

I

Ideal Channel 26790
 Indian Bayou 31945
 Inner Harbor Navigation Canal . 13835, 34760
 Ivanhoe Canal 19960

J

Jackson River 30510
 Jamaica Beach Village
 Channel 36880
 Jarboe Bayou Channel 26600
 Jourdan River Channel 10280
 Jug Lake 18250
 Junction Channel 1920

K

Krebs Lake Channel 8265
 Krueger Channel 38945

L

La Grange Bayou 31575
 La Quinta Channel 28920
 Lacombe Bayou 11090

Laguna Madre Channel 29540
 Lake Arthur 21075
 Lake Borgne 10755
 Lake Boudreaux 17475
 Lake Cocodrie 35015
 Lake Decade 18240
 Lake Fausse Pointe Channel . . 19520
 Lake Five 16055
 Lake La Graise 17440
 Lake Maurepas 11610
 Lake Pelto 17915
 Lake Pontchartrain 11230
 Lake Pontchartrain Causeway
 Cut No. 2 11280
 Lake Pontchartrain Causeway
 Cut No.1 11239
 Lake Salvador 16840
 Lake Wimico 30545
 Lakewood Yacht Club Channel
 26475
 Land Cut 41370
 Land Cut-Arroyo Colorado . . . 41480.01
 Lavaca Bay 27915
 Lavaca Bay Channel 27840
 Lavaca River 27905
 Lincoln Beach 11075
 Little Lake 10460
 Little Lake North Pass 10505
 Little Sabine Bay 32985
 Little Wax Bayou 35200
 Lonesome Bayou 12515
 Long Beach Harbor 10075
 Long Point 31000
 Louisiana Coastal Restoration
 Project 19820
 Lower Atchafalaya River 19245
 15790

M

Marianne Channel 34403
 Marina Del Sol Channel 26665
 Mariners Village Marina 11200
 Matagorda Bay - Alternate
 Route 37550
 Matagorda Bay 27930
 Matagorda Bay 37405
 Matagorda Marine Education
 Channel 27940
 Matagorda Ship Channel
 Entrance Light 1385, 27110
 Matagorda Ship Channel 27120
 Mc Faddin Wildlife Refuge . . . 35745
 Mermentau Channel 20675
 Mermentau River 20990
 Mermentau River Crossing . . . 20950, 35295
 Mexico Beach Canal Entrance . 3265
 Mid-Bay Marina Channel 31900
 Mississippi Fishing Reef
 FR-MS-04 10360
 Mississippi River - Gulf
 Outlet 11885, 34735

Mississippi River - Gulf
 Outlet 11705
 Mississippi Sound 7632
 Mobil State Lease 356-2
 Channel 16280
 Mobile Bar 6100
 Mobile Bay 6080
 Mobile Channel 6240
 Mobile Channel 6255
 Mobile Point Light 180, 6095
 Mobile River 6705
 Morgan City-Port Allen
 Alternate Route 35100
 Mound Point 20060

N

Nautical Landing Channel 27770
 Navy Cove Harbor Channel . . . 6055
 Navy Dive School 3605
 Neches River 23295
 New Canal 11185
 New Orleans - Port Arthur . . . 34960
 New Orleans Harbor 13850, 34765
 New Orleans to Baton Rouge . . 13955
 North Bay 4130
 North Shore Beach 11005
 North Shore Channel 10890

O

Offatts Bayou Entrance
 Channel 36335
 Old East Pass Harbor
 Channel 4590
 Old Fort Bayou Channel 9160
 Orange County Pier 23280
 Ott Bayou Channel 9130
 Oyster Bay Channel 1955
 Oyster Lake 37350

P

Padre Island National
 Seashore 40630
 Padre Isles North Channel . . . 39985
 Padre Isles South Channel . . . 40145
 Palacios Channel 37695
 Panacea Channel 2160
 Pascagoula Channel 7955
 Pascagoula River 8295
 Pass A Loutre 12540
 Pass Aux Herons 33965
 Pass Christian 10185
 Pass Manchac South Channel . 11575
 Pass Marianne 34505
 Pearl River 10550
 Pearl River Entrance Channel . 10430, 34640
 Pend Oreille-Bay Batiste 15745

INDEX

Pensacola Bay 4705
 Pensacola Light 140, 4715
 Pensacola Navy Homeport
 Channel 4875
 Pensacola-Mobile 33090
 Perdido Pass 5890
 Peterson Builders Turning
 Basin Channel 29020
 Petit Lac des Allemands 16910
 Pier 77 Channel 36215
 Pita Island Channel 40225
 Plantation Channel 26835
 Point Comfort Inner Channel 27660
 Point Comfort Turning Basin 27625
 Polynesian Isle Channel 5635
 Port Arthur Canal 22780
 Port Bienville 10575
 Port Isabel Channel 29800
 Port Isabel Cutoff Channel 29830, 42940
 Port Isabel Small Boat Harbor
 Channel 42805
 Port Lavaca Channel 27700
 Port Lavaca Harbor of Refuge 27795
 Port Louis Channel 11355
 Port Mansfield Channel 29270
 Port O' Connor Channel 37905
 Port O' Connor Landcut 38005
 Port St Joe North Channel 3130
 Posten Bayou Channel 3820
 Presnells Channel 2970
 Pretty Bayou Channel 3880

Q

Quarantine Bay Channel 11920
 Queen Isabella Causeway 42860

R

Rigolets - New Orleans 34705
 Rincon Canal 29105
 Robinson Bayou 3990
 Rockport Channel 38985
 Rockport Smallboat Harbor
 Channel 39015
 Rollover Bay 35805
 Round Island 8580
 Round Island South Channel 34335

S

S.L. 11107 Pipeline 12555
 Sabine Bank Channel 22305
 Sabine Pass 22445
 Sabine Pass East Jetty Light 1105, 22440
 Sabine River 23100, 35530
 Sabine River 35460
 Sabine-Neches Canal 22885, 35735
 Sabine-Neches Canal 35742

San Antonio Bay 38355.01
 San Bernard River 27040
 San Jacinto Bay Barge
 Channel 25105
 San Jacinto River 25560
 San Jose Island Dock Channel 39290
 Sandestin Beach Channel 31720
 Santa Rosa Sound 32220
 Santa Rosa Sound Entrance
 32140
 12885
 Scotts Canal Light 23 22770
 Scurlock Channel 22770
 Sea Ranch Marina Channel 29480
 Seadrift Channel 38285
 Section Base Channel 3650
 Section Base Magazine Area 3625
 Shell Point Channel 1840
 Sherman Cove Marina 33135
 Shoal Point Bayou Channel 30970
 South Boater Cut 24265
 South Fork Channel 6855
 South Louisiana Electric Co
 Op 18270
 South Padre Island 29510
 South Pass 12575
 South Shore Harbor Marina 11105
 Southwest Pass - Vermilion
 Bay Channel 20115
 Southwest Pass 12685
 Southwest Pass Entrance Light
 420, 12740
 1975
 Spring Creek Channel 1975
 St Andrew Bay 105, 3335
 St Andrew Bay Entrance 3340
 St George Island 2830
 St Joseph Bay Entrance 3020
 St Marks River 1485
 St. George Sound 2430
 St. Louis Bay 10270
 Stone Quarry Channel 33535
 Sulphur Point 3680, 31170
 Sundown Bay 38595
 Sunshine Bridge Approach 14835
 Sweet Lake 35350
 95, 3030

T

Tangipahoa River 11560
 Tchefonctua River 11320
 Tensaw River 7145
 Terrebonne Bay 17015
 Texas City Channel 26030
 Texas City Connection
 Channel 26185
 The Rigolets 10840
 Theodore Ship Channel 7335
 Tiger Pass 15430
 Tiki Island Channel 36455
 Timbalier - Terrebonne Bay 17155
 Timbalier Bay 17240
 Timbalier Island 2703 Well 1 17110
 Timbalier Island 2703 Well 4 17135

Treasure Bay Casino Channel 9490
 Treasure Island Marina
 Channel 4355
 Trinity Bay 25990
 Tule Lake Channel 28835
 Turkey Point 2440
 Two Mile Channel 2855

U

U. S. Coast Guard Base 4655
 U.S. Air Force
 Instrumentation Tower 20
 University Beach 29180
 Upper Mud Lake 20800

V

Vermillion Bay Cutoff Channel 20190
 Via Mississippi River and
 Harvey Canal 34825
 Victoria Channel 38090
 Victoria East Entrance Channel
 38065

 Victoria West Entrance
 Channel 38330
 Viola Channel 28895

W

Ward Cove 32030
 Waterford Harbor Channel 26620
 Watergate Marina Channel 26525
 Weeks Bay 20435
 Weeks Island Channel 20365
 West Black Bay Channel 12345
 West Grand Lagoon Channel 4370
 West Pass 2950
 West Pearl River 10740
 Wetappo Creek 30615
 Weyerhaeuser Water Intake
 6785
 Windmark Beach 3215
 Wolf River 10255
 Woodlawn Bayou Channel 3730

INDEX

A

Acadiana Navigation Channel	20295
Adams Bay	15730
Adams Bayou	23180, 35445
Algiers Alternate Route	34940
Alligator Harbor	2310
Amerada Pass Channel	18770
Amite River	11650
Anahuac Channel	25910
Apalachee Bay	1475
Apalachicola Bay	30210
Apalachicola River	30410
Apalachicola River Entrance	30285
Aransas Bay	39680
Aransas Bay	38645
Aransas Bay Alternate Route	39470.01
Aransas Channel	28210
Aransas Pass	28155
Aransas-Corpus Christi Bay Cutoff Channel	39060
Arlington Channel	7535
Arroyo Colorado Cutoff Channel	42190
Atchafalaya Bay	19250
Atchafalaya Channel	18520
Atchafalaya River	18876
Avery Canal	20470
Avoca Island Cutoff Channel	18970.01

B

Back Bay of Biloxi	9260
Baffin Bay	41010.01
Baffin Bay Land Cut	41150.01
Baptiste Collette Bayou	12380
Barataria Bay	16025
Barataria Pass	15802
Barataria Waterway	16095
Bay Cove Marina to Casino Magic Marina	10300
Bayou Aloe	34090
Bayou Bonfouca Channel	11025
Bayou Caddy	10390
Bayou Casotte Channel	8390
Bayou Castine	11190
Bayou Chico	5295
Bayou Coden	7765
Bayou Decade	18325
Bayou Dupont Canal Weir	16510
Bayou Dupre	10785
Bayou Garcon	6030
Bayou Grand Caillou	17975
Bayou Grande	5415
Bayou La Batre	7665, 34315
Bayou La Batre	7670
Bayou Petit Caillou Flood Canal	17570
Bayou Portage Channel	10205
Bayou Rigaud	15915
Bayou Rosa	17250
Bayou Sale Channel	19750
Bayou Shaffer	19075

C

Bayou St John	5940.01
Bayou St. Denis	16595
Bayou Terre Aux Boeufs	12355
Bayou Yscloskey	10760
Bayport Ship Channel	24430
Baytown Goose Creek Channel	24880
Baytown Marina Channel	24820
Belle Isle 340-29 Channel	19285
Belle Isle 340-39 Channel	19350
Belle Isle Well 38	19375
Belle Pass	16975
Bernard Bayou	9445
Big Lake	9380
Biloxi Channel	8955
Biloxi East Channel	8639
Black Bay Channel	12075
Blackwater Channel	5480
Blakeley River	7075
Boggy Bayou	32050
Bolivar Peninsula	35880
Bolivar Roads Alternate Inbound Route	23940
Bon Secour River	6805, 33770
Boston Bayou Channel	20560
Brazos River Crossing	37395
Brazos Santiago Pass	29460
Breton Sound	11905
Broadwater Beach Hotel Marina Channel	9540
Brownsville Channel	29855, 42975

D

Dauphin Bay	34135
Dauphin Island Channel	7155
Davis Bayou Channel	8830
Dickinson Bayou Channel	26220
Dog Keys Pass	8595
Dog River Channel	7450
Double Bayou Channel	25845
Double Bayou Light 19	12860
Dupre Cut	16470

E

East Atchafalaya Bay	18365
East Bay	30780
East Bay Bayou	35770
East Point Channel	30115
Eden Isles Channel	10960
Empire Waterway	15720
Escambia Bay	4786
Escatawpa River	8350
Espiritu Santo Bay - Barroom Bay Navigation	27980
Espiritu Santo Bay Ferry Channel	37935
Exxon West Black Bay Channel	12155

F

Fannin Bayou	4190
Fannin Bayou Channel A	4205
Fannin Bayou Channel B	4285
Five Mile Cut	24410
Fly Creek	7045
Fowl River	7255
Freeport Entrance	26910
Freshwater Bayou	20573
Fulton Channel	38790

G

Galveston Bay	23760
Galveston Channel	23865, 36065
Galveston Channel	36050
Galveston Inner Bar	23845
Galveston Outer Bar	23830
Galveston-Freeport	36100.01
Galveston-Freeport Cutoff Channel	35950
Gibbstown	35330
Goose Bayou Weir	16560
Goose Island Breakwater	38815
Governor Nicholls Harbor Traffic Control Light 94	13855, 34770
Grand Canal Channel	32915
Grand Hotel Yacht Basin	7015
Grand Island Channel	34575
Grand Isle Turning Basin	15945.01

INDEX

L

Grand Lagoon Boat Basin
Channel 33200
Grand Lagoon Channel 4305
Grand Lake 20919
Gretna Harbor Traffic Control
Light 97 13880, 34795
Gulf County Canal 3180
Gulf Power Electrical Tower 3510
Gulfport Ship Channel 9585
Gulfport Small Boat Harbor 9975
Gulfport Yacht Basin Channel 10025

H

Harbor Towne Channel 3780
Harborwalk Entrance East 36700
Harborwalk Entrance West
. 36775
Harlingen-Port Isabel 42365
Head of Passes to New
Orleans 12945
Hilton Hotel Marina Channel 26760
Holiday Harbor Marina
Channel 33355
Horn Island Pass 7855
Houma Navigation Canal 17750
Houston Ship Channel 23900, 36055
Houston Yacht Club 26900
Huey P. Long Bridge 14035

I

Ideal Channel 26790
Indian Bayou 31945
Inner Harbor Navigation Canal 13835, 34760
Ivanhoe Canal 19960

J

Jackson River 30510
Jamaica Beach Village
Channel 36880
Jarboe Bayou Channel 26600
Jourdan River Channel 10280
Jug Lake 18250
Junction Channel 1920

K

Krebs Lake Channel 8265
Krueger Channel 38945

La Grange Bayou 31575
La Quinta Channel 28920
Lacombe Bayou 11090
Laguna Madre Channel 29540
Lake Arthur 21075
Lake Borgne 10755
Lake Boudreaux 17475
Lake Cocodrie 35015
Lake Decade 18240
Lake Fausse Pointe Channel 19520
Lake Five 16055
Lake La Graise 17440
Lake Maurepas 11610
Lake Pelto 17915
Lake Pontchartrain 11230
Lake Pontchartrain Causeway
Cut No. 2 11280
Lake Pontchartrain Causeway
Cut No.1 11239
Lake Salvador 16840
Lake Wimico 30545
Lakewood Yacht Club Channel
. 26475
Land Cut 41370
Land Cut-Arroyo Colorado 41480.01
Lavaca Bay 27915
Lavaca Bay Channel 27840
Lavaca River 27905
Lincoln Beach 11075
Little Lake 10460
Little Lake North Pass 10505
Little Sabine Bay 32985
Little Wax Bayou 35200
Lonesome Bayou 12515
Long Beach Harbor 10075
Long Point 31000
Louisiana Coastal Restoration
Project 19820
Lower Atchafalaya River 19245
15790

M

Marianne Channel 34403
Marina Del Sol Channel 26665
Mariners Village Marina 11200
Matagorda Bay - Alternate
Route 37550
Matagorda Bay 37405
Matagorda Bay 27930
Matagorda Marine Education
Channel 27940
Matagorda Ship Channel
Entrance Light 1385, 27110
Matagorda Ship Channel 27120
Mc Faddin Wildlife Refuge 35745
Mermentau Channel 20675
Mermentau River 20990
Mermentau River Crossing 20950, 35295
Mexico Beach Canal Entrance 3265
Mid-Bay Marina Channel 31900
Mississippi Fishing Reef
FR-MS-04 10360

Mississippi River - Gulf
Outlet 11885, 34735
Mississippi River - Gulf
Outlet 11695
Mississippi Sound 7632
Mobil State Lease 356-2
Channel 16280
Mobile Bar 6100
Mobile Bay 6080
Mobile Channel 6240
Mobile Channel 6255
Mobile Point Light 180, 6095
Mobile River 6705
Morgan City-Port Allen
Alternate Route 35100
Mound Point 20060

N

Nautical Landing Channel 27770
Navy Cove Harbor Channel 6055
Navy Dive School 3605
Neches River 23295
New Canal 11185
New Orleans - Port Arthur 34960
New Orleans Harbor 13850, 34765
New Orleans to Baton Rouge 13955
North Bay 4130
North Shore Beach 11005
North Shore Channel 10890

O

Offatts Bayou Entrance
Channel 36335
Old East Pass Harbor
Channel 4590
Old Fort Bayou Channel 9160
Orange County Pier 23280
Ott Bayou Channel 9130
Oyster Bay Channel 1955
Oyster Lake 37350

P

Padre Island National
Seashore 40630
Padre Isles North Channel 39985
Padre Isles South Channel 40145
Palacios Channel 37695
Panacea Channel 2160
Pascagoula Channel 7955
Pascagoula River 8295
Pass A Loutre 12540
Pass Aux Herons 33965
Pass Christian 10185
Pass Manchac South Channel 11575
Pass Marianne 34505
Pearl River 10550

INDEX

Pearl River Entrance Channel . 10430, 34640
 Pend Oreille-Bay Batiste 15745
 Pensacola Bay 4705
 Pensacola Light 140, 4715
 Pensacola Navy Homeport
 Channel 4875
 Pensacola-Mobile 33090
 Perdido Pass 5890
 Peterson Builders Turning
 Basin Channel 29020
 Petit Lac des Allemands 16910
 Pier 77 Channel 36215
 Pita Island Channel 40225
 Plantation Channel 26835
 Point Comfort Inner Channel 27660
 Point Comfort Turning Basin 27625
 Polynesian Isle Channel 5635
 Port Arthur Canal 22780
 Port Bienville 10575
 Port Isabel Channel 29800
 Port Isabel Cutoff Channel 29830, 42940
 Port Isabel Small Boat Harbor
 Channel 42805
 Port Lavaca Channel 27700
 Port Lavaca Harbor of Refuge 27795
 Port Louis Channel 11355
 Port Mansfield Channel 29270
 Port O' Connor Channel 37905
 Port O' Connor Landcut 38005
 Port St Joe North Channel 3130
 Posten Bayou Channel 3820
 Presnells Channel 2970
 Pretty Bayou Channel 3880

Q

Quarantine Bay Channel 11920
 Queen Isabella Causeway 42860

R

Red Bayou Channel 26005
 Rigolets - New Orleans 34705
 Rincon Canal 29105
 Robinson Bayou 3990
 Rockport Channel 38985
 Rockport Smallboat Harbor
 Channel 39015
 Rollover Bay 35805
 Round Island 8580
 Round Island South Channel 34335

S

S.L. 11107 Pipeline 12555
 Sabine Bank Channel 22305
 Sabine Pass 22445
 Sabine Pass East Jetty Light 1105, 22440
 Sabine River 23100, 35530

Sabine River 35460
 Sabine-Neches Canal 22885, 35735
 Sabine-Neches Canal 35742
 San Antonio Bay 38355.01
 San Bernard River 27040
 San Jacinto Bay Barge
 Channel 25105
 San Jacinto River 25560
 San Jose Island Dock Channel 39290
 Sandestin Beach Channel 31720
 Santa Rosa Sound 32220
 Santa Rosa Sound Entrance
 32140
 Scotts Canal Light 23 12885
 Scurlock Channel 22770
 Sea Ranch Marina Channel 29480
 Seadrift Channel 38285
 Section Base Channel 3650
 Section Base Magazine Area 3625
 Shell Point Channel 1840
 Sherman Cove Marina 33135
 Shoal Point Bayou Channel 30970
 South Boater Cut 24265
 South Fork Channel 6855
 South Louisiana Electric Co
 Op 18270
 South Padre Island 29510
 South Pass 12575
 South Shore Harbor Marina 11105
 Southwest Pass - Vermilion
 Bay Channel 20115
 Southwest Pass 12685
 Southwest Pass Entrance Light
 420, 12740
 Spring Creek Channel 1975
 St Andrew Bay 105, 3335
 St Andrew Bay Entrance 3340
 St George Island 2830
 St Joseph Bay Entrance 3020
 St Marks River 1485
 St. George Sound 2430
 St. Louis Bay 10270
 Stone Quarry Channel 33535
 Sulphur Point 3680, 31170
 Sundown Bay 38595
 Sunshine Bridge Approach 14835
 Sweet Lake 35350
 95, 3030

T

Tangipahoa River 11560
 Tchefuncta River 11320
 Tensaw River 7145
 Terrebonne Bay 17015
 Texas City Channel 26030
 Texas City Connection
 Channel 26185
 The Rigolets 10840
 Theodore Ship Channel 7335
 Tiger Pass 15430
 Tiki Island Channel 36455
 Timbalier - Terrebonne Bay 17155

Timbalier Bay 17240
 Timbalier Island 2703 Well 1 17110
 Timbalier Island 2703 Well 4 17135
 Treasure Bay Casino Channel 9490
 Treasure Island Marina
 Channel 4355
 Trinity Bay 25990
 Tule Lake Channel 28835
 Turkey Point 2440
 Two Mile Channel 2855

U

U. S. Coast Guard Base 4655
 U.S. Air Force
 Instrumentation Tower 20
 University Beach 29180
 Upper Mud Lake 20800

V

Vermilion Bay Cutoff Channel 20190
 Via Mississippi River and
 Harvey Canal 34825
 Victoria Channel 38090
 Victoria East Entrance Channel
 38065
 Victoria West Entrance
 Channel 38330
 Viola Channel 28895

W

Ward Cove 32030
 Waterford Harbor Channel 26620
 Watergate Marina Channel 26525
 Weeks Bay 20435
 Weeks Island Channel 20365
 West Grand Lagoon Channel 4370
 West Pass 2950
 West Pearl River 10740
 Wetappo Creek 30615
 Weyerhaeuser Water Intake
 6785
 Windmark Beach 3215
 Wolf River 10255
 Woodlawn Bayou Channel 3730

CROSS REFERENCE - INTERNATIONAL VS. U.S. LIGHT NUMBER

Inter.	-	U.S.	Inter.	-	U.S.	Inter.	-	U.S.	Inter.	-	U.S.
J3299.40		1475	J3406.00		4920	J3481.00		6435	J3543.00		33965
J3299.60		1480	J3406.10		4925	J3481.20		6440	J3544.00		33970
J3300.00		1485	J3408.00		5070	J3482.00		6445	J3544.10		33980
J3300.10		10	J3409.00		4960	J3482.60		6450	J3548.30		34085
J3305.00		1830	J3409.30		4980	J3483.00		6475	J3548.40		34095
J3306.00		30	J3409.31		4985	J3484.00		6480	J3548.60		34105
J3306.20		40	J3410		5295	J3485.00		6485	J3548.80		34125
J3306.30		35	J3412.00		5325	J3489.60		6510	J3550.00		34215
J3306.32		45	J3413		5415	J3490.00		6515	J3550.10		34225
J3306.34		25	J3418.00		33050	J3493.50		7335	J3552.00		34295
J3306.40		2290	J3419.00		33045	J3493.51		7340	J3553		7765
J3310		2560	J3420		33040	J3494.00		6545	J3553.2		7780
J3310.1		2565	J3438.00		6080	J3497.00		6555	J3553.4		7805
J3311.00		2570	J3438.10		180	J3498.00		6560	J3553.6		7815
J3338		2830	J3438.10		6090	J3503.00		6570	J3555.40		7685
J3338.10		2835	J3440.00		33950	J3504.00		6575	J3558		7895
J3350.00		2950	J3441.00		33945	J3504.20		6580	J3558.10		7900
J3351		2960	J3442.00		33935	J3504.30		6585	J3561		7960
J3352.00		2965	J3443.00		33925	J3504.50		6590	J3561.10		7970
J3368.00		3025	J3444.00		33895	J3505.00		6595	J3561.40		7980
J3368.10		95	J3445.00		33860	J3506.00		6600	J3562		7990
J3370.40		3165	J3446.00		33840	J3507.00		6605	J3562.10		7995
J3371.40		3340	J3447.00		33820	J3508.00		6610	J3564		8095
J3371.41		3345	J3448.00		33800	J3509.00		6615	J3564.10		8100
J3372.40		3440	J3449.00		33785	J3509.50		6620	J3566.00		8110
J3372.60		3450	J3449.60		6805	J3510.00		6640	J3566.10		8115
J3373.00		3470	J3450.00		33755	J3510.10		6650	J3566.5		8120
J3373.24		3485	J3451.00		33745	J3511.00		6630	J3567		8125
J3373.26		3550	J3458.00		6960	J3512.00		6635	J3567.2		8130
J3373.30		4325	J3459.00		6970	J3516.00		6660	J3567.3		8135
J3373.60		3600	J3460.00		6980	J3517.00		6665	J3567.4		8175
J3373.8		3650	J3460.4		7025	J3517.10		6675	J3568		8180
J3373.90		3655	J3460.42		7030	J3517.50		6685	J3568.2		8185
J3374.00		3660	J3461.00		7045	J3518.00		6695	J3568.3		8190
J3374.2		3665	J3462.00		6180	J3524.20		6705	J3568.4		8195
J3374.40		3670	J3462.10		6190	J3524.3		6710	J3569		8200
J3374.60		3675	J3464.00		6495	J3525		7560	J3569.4		8205
J3374.8		4135	J3467.50		6295	J3526.20		7600	J3570		8210
J3375.50		4550	J3468.00		6300	J3526.60		7610	J3570.2		8225
J3376.00		4555	J3472.00		6305	J3527.00		7615	J3571.22		8335
J3377.00		4585	J3473.00		6310	J3527.1		7620	J3571.24		8360
J3394.00		140	J3474.00		6315	J3537		7260	J3571.26		8375
J3396.00		4705	J3475.00		6320	J3538		7280	J3571.28		8385
J3396.10		4710	J3477.00		6325	J3539		7300	J3571.30		8390
J3400		4780	J3478.00		6330	J3541.50		7155	J3571.31		8400
J3400.10		4785	J3478.40		6335	J3541.60		7205	J3571.32		8405
J3404.00		4850	J3479.00		6340	J3542.00		7210	J3571.33		8410
J3404.10		4855	J3479.40		6430	J3542.20		7220	J3571.34		8530

CROSS REFERENCE - INTERNATIONAL VS. U.S. LIGHT NUMBER

Inter.	-	U.S.	Inter.	-	U.S.	Inter.	-	U.S.	Inter.	-	U.S.
J3571.36	.....	8525	J3624.60	.....	9915	J3700.00	.....	12635	J3818.00	.....	13115
J3571.40	.....	8420	J3626.00	.....	9920	J3702.00	.....	12645	J3820.00	.....	13120
J3571.42	.....	8425	J3626.20	.....	9925	J3704.00	.....	12650	J3822.00	.....	13135
J3571.44	.....	8430	J3626.40	.....	9930	J3708.10	.....	12660	J3823.00	.....	13140
J3571.46	.....	8435	J3626.60	.....	9935	J3710	.....	12665	J3824.00	.....	13145
J3571.47	.....	8450	J3626.80	.....	9940	J3714.00	.....	420	J3825.00	.....	13150
J3571.48	.....	8455	J3628.00	.....	9870	J3716.00	.....	12730	J3826.00	.....	13155
J3571.49	.....	8470	J3628.10	.....	9875	J3734	.....	12780	J3828.00	.....	13160
J3571.5	.....	8475	J3631.40	.....	9990	J3736	.....	12785	J3834.00	.....	13180
J3571.6	.....	8485	J3632	.....	10025	J3738	.....	12790	J3835.00	.....	13190
J3571.7	.....	8510	J3633	.....	10055	J3740	.....	12795	J3836.00	.....	13195
J3571.71	.....	8515	J3650.2	.....	11690	J3742	.....	12800	J3836.10	.....	13200
J3571.73	.....	8540	J3651.2	.....	11680	J3750	.....	12805	J3836.20	.....	13205
J3571.74	.....	8545	J3651.24	.....	11675	J3752	.....	12810	J3837.00	.....	13210
J3574.00	.....	8585	J3651.26	.....	11670	J3754	.....	12815	J3838.00	.....	13215
J3576.00	.....	8700	J3661.30	.....	11695	J3758	.....	12820	J3840.00	.....	13220
J3576.60	.....	8710	J3661.32	.....	11700	J3762	.....	12825	J3841.00	.....	13225
J3576.80	.....	8735	J3661.34	.....	11705	J3763	.....	12830	J3841.20	.....	13230
J3577.00	.....	8745	J3661.36	.....	11710	J3764	.....	12835	J3842.00	.....	13235
J3577.11	.....	8325	J3663.4	.....	11715	J3765.40	.....	12845	J3843.00	.....	13240
J3577.20	.....	8765	J3664	.....	11720	J3766.00	.....	12855	J3844.00	.....	13245
J3577.40	.....	8780	J3666	.....	11725	J3770.00	.....	12860	J3845	.....	13255
J3577.60	.....	8795	J3666.2	.....	11730	J3772	.....	12870	J3846.00	.....	13260
J3577.80	.....	8805	J3666.4	.....	11735	J3774	.....	12875	J3848.00	.....	13265
J3577.84	.....	8815	J3666.45	.....	11740	J3775.00	.....	12880	J3850.00	.....	13270
J3578.00	.....	8955	J3666.5	.....	11745	J3778.00	.....	12885	J3850.20	.....	13275
J3580.00	.....	8965	J3666.6	.....	11750	J3779.00	.....	12895	J3851.80	.....	13295
J3582.00	.....	8970	J3666.8	.....	11755	J3780	.....	12890	J3854.00	.....	13305
J3586	.....	8980	J3667	.....	11760	J3782	.....	12900	J3856.00	.....	13310
J3588	.....	8985	J3667.1	.....	11765	J3783	.....	12905	J3858.00	.....	13315
J3590.00	.....	8995	J3667.14	.....	11770	J3784.00	.....	12910	J3859.00	.....	13330
J3608.00	.....	9675	J3667.2	.....	11775	J3784.10	.....	12920	J3860.00	.....	13335
J3608.10	.....	9680	J3667.3	.....	11780	J3790.00	.....	12945	J3864	.....	13350
J3610	.....	10070	J3667.37	.....	11785	J3794.00	.....	12970	J3865.00	.....	13355
J3616.00	.....	34395	J3667.4	.....	11790	J3794.10	.....	12975	J3866.00	.....	13370
J3618.00	.....	34390	J3667.6	.....	11795	J3796.00	.....	13000	J3869.00	.....	13450
J3618.20	.....	9840	J3667.8	.....	11800	J3797.00	.....	13005	J3870.00	.....	13460
J3618.30	.....	9845	J3668.4	.....	11855	J3797.20	.....	13010	J3872.00	.....	13465
J3618.40	.....	9850	J3668.6	.....	11860	J3799.00	.....	13015	J3876.00	.....	13475
J3618.50	.....	9855	J3668.7	.....	11870	J3800.00	.....	13025	J3880.00	.....	13480
J3618.60	.....	9860	J3668.8	.....	11880	J3804.00	.....	13035	J3881.00	.....	13485
J3618.70	.....	9865	J3669.00	.....	11875	J3804.20	.....	13040	J3881.20	.....	13490
J3618.80	.....	9880	J3671.00	.....	12510	J3805.00	.....	13050	J3881.40	.....	13495
J3618.90	.....	9885	J3673.00	.....	12540	J3806.00	.....	13055	J3884.00	.....	13520
J3619.30	.....	9890	J3675.00	.....	12550	J3809	.....	13070	J3888.00	.....	13550
J3624.00	.....	9895	J3692.00	.....	12605	J3810.00	.....	13090	J3890.00	.....	13560
J3624.20	.....	9905	J3694.00	.....	12610	J3814.00	.....	13100	J3895.00	.....	13580
J3624.40	.....	9910	J3696.00	.....	12620	J3816.00	.....	13105	J3898.00	.....	13590

CROSS REFERENCE - INTERNATIONAL VS. U.S. LIGHT NUMBER

Inter.	-	U.S.	Inter.	-	U.S.	Inter.	-	U.S.	Inter.	-	U.S.
J3900.00		13600	J3914.32		14120	J3915.46		14625	J3916.38		14970
J3900.20		13605	J3914.34		14130	J3915.48		14630	J3916.47		14990
J3900.40		13610	J3914.36		14140	J3915.50		14635	J3916.50		15000
J3900.60		13615	J3914.37		14145	J3915.52		14650	J3916.52		15005
J3901.00		13620	J3914.38		14150	J3915.53		14655	J3916.54		15010
J3901.80		13625	J3914.41		14185	J3915.54		14670	J3916.56		15015
J3902.00		13630	J3914.42		14190	J3915.56		14680	J3916.58		15020
J3904.00		13635	J3914.43		14195	J3915.57		14685	J3916.60		15025
J3905.00		13660	J3914.44		14200	J3915.58		14690	J3916.61		15030
J3906.00		13665	J3914.46		14205	J3915.60		14695	J3916.64		15045
J3909.00		13680	J3914.48		14210	J3915.62		14700	J3916.65		15050
J3910.00		13690	J3914.50		14215	J3915.64		14715	J3916.66		15055
J3910.40		13695	J3914.52		14220	J3915.66		14720	J3916.68		15060
J3911.00		13715	J3914.54		14225	J3915.68		14725	J3916.70		15065
J3911.20		13720	J3914.60		14260	J3915.70		14730	J3916.72		15070
J3911.50		13730	J3914.64		14300	J3915.72		14735	J3916.74		15075
J3911.70		13735	J3914.66		14305	J3915.74		14740	J3916.75		15080
J3912.00		13745	J3914.72		14315	J3915.82		14760	J3916.78		15090
J3912.02		13750	J3914.74		14330	J3915.84		14770	J3916.79		15095
J3912.04		13740	J3914.76		14335	J3915.86		14775	J3916.82		15105
J3912.20		13755	J3914.78		14340	J3915.88		14780	J3916.84		15110
J3913.20		13770	J3914.80		14360	J3915.90		14785	J3916.88		15115
J3913.40		13785	J3914.82		14355	J3915.92		14800	J3916.90		15120
J3913.44		13805	J3914.88		14365	J3915.94		14805	J3916.92		15135
J3913.50		13825	J3914.90		14370	J3915.96		14820	J3916.93		15140
J3913.60		13830	J3914.94		14380	J3915.97		14825	J3916.96		15165
J3913.62		13840	J3914.96		14395	J3915.98		14830	J3917.00		15170
J3913.64		13835	J3914.98		14400	J3916.00		14855	J3917.01		15175
J3913.69		13855	J3915.00		14410	J3916.02		14860	J3917.02		15180
J3913.70		13865	J3915.02		14420	J3916.04		14865	J3917.04		15185
J3913.72		13870	J3915.04		14425	J3916.06		14880	J3917.06		15190
J3913.74		13875	J3915.06		14440	J3916.08		14885	J3917.08		15195
J3913.80		13885	J3915.07		14455	J3916.10		14890	J3917.10		15200
J3913.82		13890	J3915.10		14480	J3916.12		14895	J3917.11		15205
J3913.86		13900	J3915.12		14485	J3916.14		14900	J3917.13		15210
J3913.88		13905	J3915.16		14495	J3916.16		14905	J3917.14		15215
J3913.90		13910	J3915.22		14510	J3916.18		14910	J3917.18		15225
J3914.00		13955	J3915.24		14515	J3916.20		14925	J3917.20		15230
J3914.01		13965	J3915.26		14520	J3916.22		14915	J3917.22		15235
J3914.06		13975	J3915.28		14525	J3916.24		14920	J3917.24		15240
J3914.07		13985	J3915.30		14530	J3916.26		14930	J3917.30		15255
J3914.12		13980	J3915.32		14535	J3916.28		14935	J3917.32		15260
J3914.14		13995	J3915.34		14545	J3916.29		14940	J3917.34		15265
J3914.16		14000	J3915.36		14550	J3916.30		14945	J3917.36		15270
J3914.18		14005	J3915.38		14595	J3916.32		14950	J3917.38		15275
J3914.24		14065	J3915.40		14605	J3916.34		14955	J3917.40		15280
J3914.28		14100	J3915.42		14615	J3916.35		14960	J3917.41		15285
J3914.29		14115	J3915.44		14620	J3916.36		14965	J3917.43		15300

CROSS REFERENCE - INTERNATIONAL VS. U.S. LIGHT NUMBER

Inter.	-	U.S.	Inter.	-	U.S.	Inter.	-	U.S.	Inter.	-	U.S.
J3917.44	.....	15305	J3989.25	.....	21450	J3991.70	.....	21870	J3993.85	.....	22280
J3917.46	.....	15310	J3989.3	.....	21455	J3991.75	.....	21875	J3993.90	.....	22285
J3917.48	.....	15320	J3989.35	.....	21530	J3991.8	.....	21880	J3993.95	.....	22290
J3917.52	.....	15400	J3989.36	.....	21535	J3991.85	.....	21885	J3994.00	.....	22295
J3917.58	.....	15425	J3989.40	.....	21540	J3991.9	.....	21905	J3996.00	.....	1095
J3918.50	.....	15435	J3989.41	.....	21550	J3991.91	.....	21910	J4000.00	.....	1105
J3931.00	.....	15900	J3989.45	.....	21555	J3992.05	.....	21915	J4002.00	.....	22410
J3932.00	.....	16610	J3989.50	.....	21560	J3992.10	.....	21920	J4002.10	.....	22415
J3940.00	.....	505	J3989.55	.....	21565	J3992.2	.....	21925	J4006	.....	22475
J3945.00	.....	585	J3989.60	.....	21570	J3992.25	.....	21935	J4006.1	.....	22480
J3945.20	.....	580	J3989.65	.....	21575	J3992.30	.....	21940	J4008	.....	22535
J3950	.....	17005	J3989.70	.....	21580	J3992.35	.....	21945	J4008.1	.....	22540
J3950.40	.....	16995	J3989.75	.....	21595	J3992.375	.....	21950	J4011	.....	22575
J3951.00	.....	17010	J3989.80	.....	21600	J3992.45	.....	21970	J4013.00	.....	22610
J3954.00	.....	16980	J3989.85	.....	21605	J3992.50	.....	21980	J4017.00	.....	22630
J3954.10	.....	16985	J3989.90	.....	21610	J3992.55	.....	21990	J4019.00	.....	22635
J3966.00	.....	17955	J3989.95	.....	21615	J3992.60	.....	21995	J4020.00	.....	22780
J3967.40	.....	17970	J3990.00	.....	21625	J3992.65	.....	22000	J4022	.....	22785
J3968	.....	17985	J3990.05	.....	21630	J3992.73	.....	22005	J4022.1	.....	22790
J3968.20	.....	17990	J3990.10	.....	21635	J3992.74	.....	22120	J4022.2	.....	22810
J3968.40	.....	17995	J3990.15	.....	21640	J3992.76	.....	22035	J4022.21	.....	22820
J3977.20	.....	18655	J3990.20	.....	21645	J3992.77	.....	22040	J4022.25	.....	22825
J3977.30	.....	18665	J3990.25	.....	21650	J3992.78	.....	22090	J4022.30	.....	22830
J3977.40	.....	18685	J3990.30	.....	21655	J3992.80	.....	22065	J4022.35	.....	22835
J3978.2	.....	18705	J3990.35	.....	21660	J3992.82	.....	22075	J4022.36	.....	22840
J3978.24	.....	18710	J3990.40	.....	21665	J3992.84	.....	22080	J4022.40	.....	22845
J3978.40	.....	18720	J3990.45	.....	21670	J3992.86	.....	22085	J4022.45	.....	22850
J3978.6	.....	18725	J3990.50	.....	21675	J3992.90	.....	22125	J4022.46	.....	22855
J3978.70	.....	18735	J3990.55	.....	21680	J3992.95	.....	22130	J4022.50	.....	22860
J3978.72	.....	18730	J3990.60	.....	21685	J3993.00	.....	22135	J4022.55	.....	22865
J3978.74	.....	18740	J3990.65	.....	21690	J3993.05	.....	22140	J4022.60	.....	22870
J3978.76	.....	18745	J3990.8	.....	21695	J3993.10	.....	22145	J4022.65	.....	22875
J3978.78	.....	18750	J3990.85	.....	21700	J3993.15	.....	22150	J4022.70	.....	22885
J3978.8	.....	18755	J3990.90	.....	21730	J3993.20	.....	22165	J4022.75	.....	22895
J3978.82	.....	18760	J3990.95	.....	21755	J3993.25	.....	22170	J4022.80	.....	22900
J3979.00	.....	18765	J3991.00	.....	21760	J3993.30	.....	22175	J4022.85	.....	22905
J3979.02	.....	18815	J3991.05	.....	21740	J3993.35	.....	22180	J4022.86	.....	22910
J3979.04	.....	18820	J3991.06	.....	21750	J3993.45	.....	22190	J4022.90	.....	22915
J3979.06	.....	18825	J3991.10	.....	21765	J3993.5	.....	22200	J4022.95	.....	22920
J3979.08	.....	18830	J3991.15	.....	21770	J3993.55	.....	22205	J4023.00	.....	22925
J3979.20	.....	18835	J3991.2	.....	21775	J3993.60	.....	22210	J4023.05	.....	22930
J3988	.....	21325	J3991.25	.....	21780	J3993.63	.....	22215	J4023.10	.....	22935
J3988.10	.....	21335	J3991.30	.....	21805	J3993.65	.....	22235	J4023.15	.....	22940
J3988.5	.....	21410	J3991.31	.....	21810	J3993.67	.....	22240	J4023.20	.....	22955
J3988.60	.....	21415	J3991.50	.....	21855	J3993.68	.....	22245	J4023.21	.....	22965
J3989.00	.....	21430	J3991.55	.....	21800	J3993.70	.....	22250	J4023.25	.....	22945
J3989.05	.....	21435	J3991.6	.....	21860	J3993.75	.....	22260	J4023.26	.....	22950
J3989.1	.....	21440	J3991.65	.....	21865	J3993.80	.....	22265	J4023.30	.....	22970

CROSS REFERENCE - INTERNATIONAL VS. U.S. LIGHT NUMBER

Inter.	-	U.S.	Inter.	-	U.S.	Inter.	-	U.S.	Inter.	-	U.S.
J4023.31		22975	J4025.90		23605	J4076.10		23975	J4142.55		24810
J4023.35		22980	J4026.2		23610	J4080.00		24055	J4142.65		25230
J4023.40		22995	J4032.00		23725	J4080.10		24060	J4142.66		25235
J4023.45		23005	J4034.00		23720	J4084.00		24025	J4142.70		25240
J4023.46		23010	J4036.00		23690	J4086.00		24040	J4142.71		25245
J4023.50		22990	J4036.10		23695	J4088.00		24070	J4142.85		25280
J4023.55		23000	J4037.00		23740	J4090.00		24075	J4142.9		25285
J4023.63		23300	J4037.10		23745	J4091.00		24090	J4143.00		25320
J4023.65		23305	J4040		23780	J4092.00		24095	J4143.01		25325
J4023.70		23315	J4040.10		23785	J4098.00		24120	J4143.05		25330
J4023.71		23325	J4041.00		23870	J4099.00		24125	J4143.06		25335
J4023.8		23335	J4042.00		23880	J4101.00		26350	J4143.15		25305
J4023.9		23345	J4042.40		23885	J4103.00		24205	J4143.31		25400
J4023.95		23350	J4043.00		23890	J4104.00		24215	J4143.35		25405
J4024		23355	J4045.00		35965	J4104.10		24220	J4143.36		25415
J4024.05		23360	J4046.00		35970	J4114.00		24245	J4143.50		25465
J4024.1		23365	J4047.00		35995	J4116.00		24250	J4143.51		25475
J4024.11		23370	J4047.50		36005	J4117.00		24295	J4143.56		25485
J4024.15		23375	J4048.00		36025	J4118.00		24300	J4143.6		25455
J4024.20		23380	J4050.90		36145	J4121.00		24315	J4143.75		25505
J4024.25		23385	J4051.00		36140	J4122.00		24320	J4143.8		25515
J4024.30		23390	J4051.1		36310	J4124.00		24365	J4143.85		25525
J4024.35		23395	J4051.9		36520	J4126.00		24370	J4143.86		25530
J4024.4		23400	J4052.00		36515	J4129		24385	J4143.90		25535
J4024.45		23410	J4052.1		36590	J4130.00		24390	J4143.91		25540
J4024.50		23415	J4052.30		36615	J4132.00		24395	J4143.95		25545
J4024.55		23420	J4052.60		36645	J4132.10		24400	J4144.00		25550
J4024.70		23425	J4052.61		36650	J4132.40		24430	J4144.20		25695
J4024.75		23430	J4052.80		36820	J4132.41		24440	J4144.25		25700
J4024.76		23435	J4052.81		36825	J4133.00		24525	J4144.3		25715
J4024.8		23440	J4056		26030	J4134.00		24530	J4144.35		25720
J4024.81		23445	J4056.10		26035	J4138.00		24545	J4144.4		25725
J4024.85		23450	J4058		26045	J4139.00		24550	J4144.5		25740
J4024.90		23460	J4058.10		26055	J4141.00		24565	J4144.55		25750
J4025.05		23515	J4060		26095	J4142.00		24575	J4144.6		25755
J4025.10		23520	J4060.10		26105	J4142.05		24585	J4144.65		25760
J4025.2		23530	J4062.00		26110	J4142.06		24590	J4144.75		25775
J4025.25		23535	J4062.10		26115	J4142.10		24605	J4144.9		25790
J4025.3		23540	J4064.00		26140	J4142.11		24610	J4145		25800
J4025.35		23545	J4064.1		26145	J4142.25		24595	J4145.05		25810
J4025.4		23550	J4067		26175	J4142.35		24760	J4145.1		25815
J4025.45		23555	J4067.1		26180	J4142.36		24770	J4145.25		25825
J4025.50		23565	J4069		26170	J4142.40		24775	J4148.00		26355
J4025.55		23570	J4071.00		23905	J4142.41		24780	J4158		24645
J4025.60		23575	J4071.10		23910	J4142.45		25060	J4160		24670
J4025.65		23585	J4072.00		23915	J4142.46		25065	J4165		25845
J4025.80		23595	J4072.10		23920	J4142.50		25070	J4166		25855
J4025.85		23600	J4076.00		23970	J4142.51		25075	J4167		25865

CROSS REFERENCE - INTERNATIONAL VS. U.S. LIGHT NUMBER

Inter.	-	U.S.	Inter.	-	U.S.	Inter.	-	U.S.	Inter.	-	U.S.
J4168		25905	J4195.16		27380	J4196.23		27695	J4215.10		28800
J4179.00		26940	J4195.18		27385	J4196.26		27915	J4215.15		28805
J4180.00		26965	J4195.2		27390	J4196.28		27920	J4215.2		28810
J4180.10		26975	J4195.22		27395	J4196.3		27925	J4215.25		28770
J4181.1		26980	J4195.24		27400	J4196.40		27715	J4215.26		28775
J4181.2		26985	J4195.26		27405	J4196.44		27765	J4215.3		29250
J4181.30		27005	J4195.28		27410	J4196.50		37905	J4215.35		29260
J4181.31		27010	J4195.30		27415	J4197.00		37910	J4215.55		28835
J4181.70		27020	J4195.32		27420	J4213.00		28145	J4215.56		28840
J4181.8		27030	J4195.34		27425	J4213.1		28150	J4215.75		28850
J4181.90		27035	J4195.36		27430	J4213.20		28205	J4215.76		28855
J4192.00		27120	J4195.38		27435	J4213.25		28305	J4215.80		28860
J4192.10		27125	J4195.40		27440	J4213.26		28310	J4215.81		28865
J4193.00		27170	J4195.42		27445	J4213.30		28320	J4215.90		28875
J4193.10		27180	J4195.44		27450	J4213.45		28345	J4215.91		28880
J4193.24		27165	J4195.46		27455	J4213.47		28350	J4215.95		28885
J4193.32		27195	J4195.48		27460	J4213.49		28355	J4215.96		28890
J4193.36		27205	J4195.50		27465	J4213.61		28600	J4216.00		28895
J4193.40		27210	J4195.52		27470	J4213.65		28605	J4216.01		28900
J4193.50		27215	J4195.54		27475	J4213.70		28610	J4216.15		28910
J4193.70		27220	J4195.56		27480	J4213.75		28615	J4216.16		28915
J4193.80		27235	J4195.58		27490	J4213.80		28630	J4216.2		28210
J4194.00		27240	J4195.59		27495	J4213.85		28635	J4216.25		28215
J4194.05		27245	J4195.62		27510	J4213.9		28640	J4216.30		28245
J4194.15		27250	J4195.63		27520	J4213.95		28645	J4216.35		28260
J4194.20		27255	J4195.66		27500	J4214.00		28650	J4216.4		28280
J4194.40		27260	J4195.68		27505	J4214.05		28655	J4216.45		28290
J4194.50		27265	J4195.70		27530	J4214.10		28665	J4216.55		39620
J4194.55		27270	J4195.72		27535	J4214.18		28675	J4216.57		39680
J4194.60		27275	J4195.74		27540	J4214.2		28680	J4216.6		28925
J4194.80		27280	J4195.76		27545	J4214.25		28685	J4216.65		28930
J4194.82		27285	J4195.78		27550	J4214.3		28620	J4216.75		28945
J4194.84		27290	J4195.80		27555	J4214.31		28625	J4216.80		28955
J4194.86		27295	J4195.82		27560	J4214.35		28690	J4216.9		28960
J4194.88		27300	J4195.84		27565	J4214.40		28700	J4216.91		28965
J4194.90		27305	J4195.85		27580	J4214.41		28710	J4216.95		28970
J4194.92		27310	J4195.88		27585	J4214.45		28720	J4216.96		28975
J4194.94		27315	J4195.90		27595	J4214.50		28725	J4217		28980
J4194.96		27320	J4195.91		27600	J4214.55		28730	J4217.05		28985
J4194.98		27325	J4195.94		27615	J4214.6		28735	J4217.2		29000
J4195.00		27330	J4195.96		27620	J4214.65		28750	J4217.25		29050
J4195.02		27335	J4196.02		27660	J4214.70		28755	J4217.3		29055
J4195.03		27345	J4196.04		27665	J4214.75		28760	J4217.35		29065
J4195.06		27355	J4196.06		27670	J4214.80		28765	J4217.40		29070
J4195.08		27360	J4196.12		27675	J4214.85		28780	J4217.45		29075
J4195.10		27365	J4196.14		27680	J4214.9		28785	J4217.55		29080
J4195.12		27370	J4196.2		27685	J4215.03		28790	J4217.6		29085
J4195.14		27375	J4196.22		27690	J4215.05		28795	J4217.65		29090

CROSS REFERENCE - INTERNATIONAL VS. U.S. LIGHT NUMBER

Inter.	-	U.S.	Inter.	-	U.S.	Inter.	-	U.S.	Inter.	-	U.S.
J4217.70		29100	J4228.40		29830						
J4217.75		29165	J4228.45		42905						
J4217.8		29170									
J4217.85		29175									
J4224		29300									
J4224.20		29305									
J4226.50		29465									
J4226.51		29470									
J4226.55		29550									
J4226.56		29560									
J4226.60		29565									
J4226.65		29580									
J4226.75		29600									
J4226.80		29605									
J4226.85		29855									
J4226.90		29860									
J4226.91		29865									
J4226.95		29870									
J4226.96		29875									
J4227.00		29890									
J4227.05		29895									
J4227.10		29900									
J4227.11		29905									
J4227.15		29920									
J4227.20		29925									
J4227.21		29930									
J4227.25		29935									
J4227.3		29940									
J4227.35		29945									
J4227.4		29965									
J4227.41		29970									
J4227.45		29960									
J4227.50		29950									
J4227.51		29955									
J4227.55		29985									
J4227.70		30000									
J4227.80		30005									
J4227.90		30015									
J4227.95		30020									
J4228		30025									
J4228.05		29990									
J4228.06		29995									
J4228.10		29815									
J4228.15		29825									
J4228.2		29835									
J4228.25		29840									
J4228.30		29845									
J4228.35		29850									