

# NOS-USPS Cooperative Charting Program

## Navigational Range Initiative

Revised April 1, 2006

### Overview

This document outlines an initiative within the NOS-USPS Cooperative Charting Program. Under this proposal, USPS members will collect positioning information on navigational ranges that appear on NOAA charts. These data will be logged by the observer, entered into a computer file, and then uploaded to CCWEB. Collection of this information is of great importance to NOAA's nautical charting program.

### Navigational Ranges

The American Practical Navigator (Bowditch, 1995) defines a range as: "Two or more objects in line. Such objects are said to be in range. An observer having them in range is said to be on range. Two beacons are frequently located for the specific purpose of forming a range to indicate a safe route or the centerline of a channel...". Ranges on NOAA paper charts are typically shown as two fixed aids connected by a dashed line that extends out from the fixed aids. This dashed line, called a leading line, becomes a solid line on the portion of the range where vessels are to transit, for instance in a maintained channel as shown in Figure 1. This graphical representation of a range on a paper chart shows the navigator where a range exists, that is what course it marks and where the fixed aids are located. When actually navigating in the area, the mariner visually lines up the fixed aids and proceeds to follow the range, thus staying in the channel.

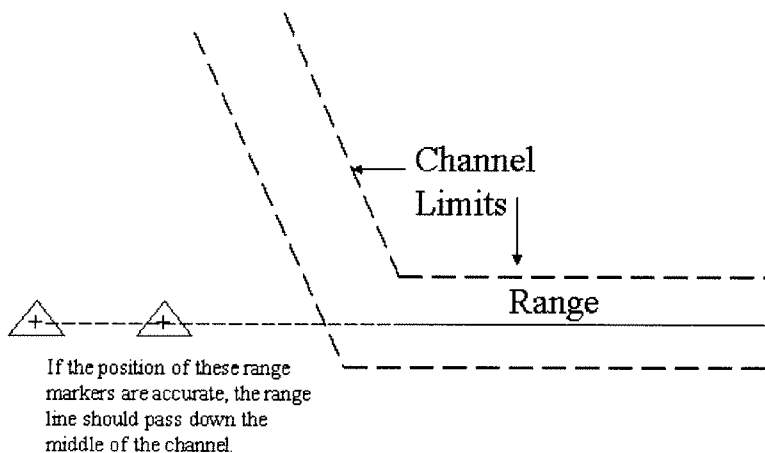


Figure 1 - Navigational Range aligning with channel

### The Problem

Now that mariners are navigating with GPS, differential GPS (DGPS), and WAAS, they have a very accurate, real-time position for their vessel. Visual ranges are still an important piloting aid, but with absolute positioning, they are arguably less important than in the past. When navigating with DGPS on a system that uses electronic charts, either raster or vector, it may quite often become apparent that the range line drawn on the chart does not accurately match the center of the channel. This can be due to any number of factors which include: generalization for chart scale, shifting of data due to datum conversions, manual plotting methods that were used until recently in the chart making process, inaccurate positions for the fixed aids marking the range, and so forth. NOAA is receiving an increasing number of comments from electronic chart users that “I’m visually on range in channel so-and-so, but my electronic charting system shows me to the left (or right) of the channel.” See Figure 2.

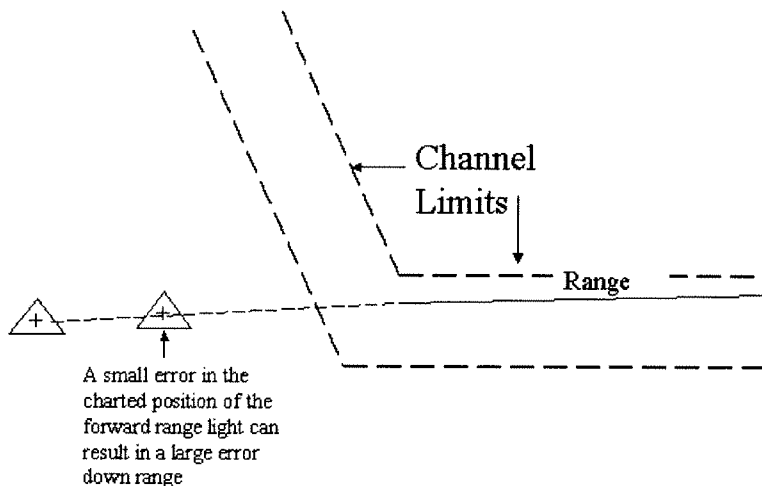


Figure 2 - Charted position of range in error

### Data Collection Initiative

In order to correct this problem, the range lines accuracy in the electronic products can be adjusted to match a series of positions recorded along the range lines using GPS, DGPS or WAAS. A vessel equipped with a GPS, DGPS or WAAS receiver follows the range line down the channel, being careful to stay as close to on-range as possible, and logs positions using the following criteria:

1. **Positions should be recorded at approximately 1-inch intervals at the scale of the paper chart.** Table 1 gives general guidelines as to the position interval. **Record positions only when precisely on range.** Quality of position readings should take precedent over quantity. Use Table 1 only as a general guideline.

2. Record positions only when in the channel. Do not record positions along the dashed portion of the range line. Try to record a position at the beginning and the end of the range **inside the channel.**

3. At a minimum, 4 positions should be recorded for each range line, no matter how short the range.

4. The data must be logged into a computer file using a very specific format, since NOAA will be importing it directly into an electronic charting production system. Variations in the format described below will make the data unusable. Use *Notepad* or an equivalent text-editing program. The file is structured as “pipe” delimited text. In other words, each field is separated by a | character (the shift “\” on the keyboard). Each position is a separate line in the file. The latitude and longitude are recorded in decimal degrees to 5 decimal places. Each line will have the name of the range that the position lies on at the end of the line. Western longitudes will have a minus sign at the beginning. Be sure to include a zero (“0”) for longitudes less than 100° W. The following is an example of an entry in a file:

Chart Scale	Distance Between Positions (nautical miles)
1:5,000	0.05 nm
1:10,000	0.1 nm
1:20,000	0.25 nm
1:40,000	0.5 nm
1:80,000	1.0 nm

46.34293|-070.12433|Port Smith Range A  
 46.34289|-070.13434|Port Smith Range A  
 46.34285|-070.14435|Port Smith Range A  
 46.34281|-070.15436|Port Smith Range A

**\*\*Only one range per file.**

The file should be saved using the “.txt” file extension.

If your GPS logs in degrees/minutes/seconds or degrees and decimal minutes, use the following conversion to decimal degrees.

Degrees/Minutes/Seconds to Decimal Degrees

$$46^{\circ}22'33.23'' = 46^{\circ} + 22' + (33.23/60)' = 46^{\circ} + 22.5538' = (46^{\circ} + 22.5538/60)^{\circ} = 46.37590^{\circ}$$

Degrees/Decimal Minutes to Decimal Degrees

$$46^{\circ}22.554' = 46^{\circ} + (22.554/60) = 46.37590^{\circ}$$

### **Transmitting the File to NOAA**

Text files are to be uploaded to NOAA by way of CCWEB in the Range Line Survey Data Category.

To upload a Range Line data file to CCWEB, click on the button to the right of “Range Line Data File” A new page will come up asking you to choose the file you want to upload. (NOS will only accept files with extensions of .dww or .txt). Click on the “Browse” button to find the file on your machine. Once you find the file, click on it. After this is done, click on “Post the File”.

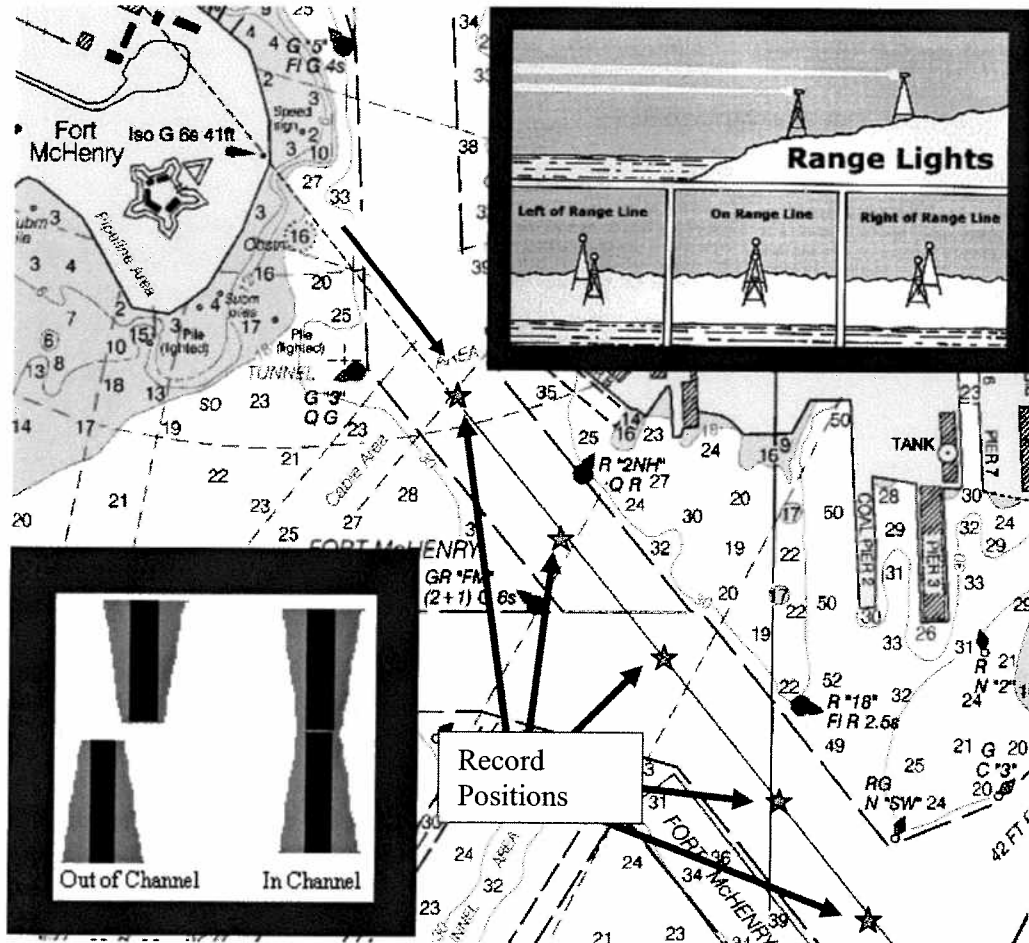
A scanned image of the nautical chart or an annotated chart from Maptech (NOS will only accept files with extensions of .gif or .jpg) needs to be uploaded to CCWEB showing the location of the Range Line that was surveyed. This chart section has to be uploaded in the Supporting Documentation field of CCWEB.

### **Awarding Credit**

When the Range Line Survey has been submitted to CCWEB and it has been reviewed by a National Committee member, credit for this report will be awarded automatically.

**\*\*** To avoid the duplication of Range Line Submissions, do not report on ranges that have been submitted within the past 3 years. Contact your District Chairman to find out which ranges have already been submitted to NOS.

# NOS-USPS Navigational Range Initiative



**USPS-NOS COOPERATIVE CHARTING PROGRAM**  
**RANGE LINE SURVEYS WORKSHEET**

**You may not submit a report that has been reported on in the past 3 years.**

To see which Range Lines that have been reported on go to the Main Menu page and click on the link 'Range Line Reports Previously Submitted'.

Required fields are indicated with an asterisk: \*

**SUPPORT FILES NEED TO BE UPLOADED ON THE MAIN REPORT PAGE.**

\*Range Survey Location: \_\_\_\_\_

\*Range Survey Date: \_\_\_\_\_

\*Observations Taken: \_\_\_\_\_

Support Label(s) & Item(s)

\*Special Investigation:       Yes       No

\*Position Data: See Position Data and Method Worksheet.

\*Range Line Data File: Upload Range Line Data file here. The Range Line Data File should be uploaded to CCWEB in the following format. Latitude|Longitude|Name of Range. This file has to be in the .txt format.

Example: 46.34293|-070.12433|Port Smith Range A

Description:

April 9, 2007