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OFFICE OF THE COMMISSIONER
UNITED STATES SECTION

INTERNATIONAL BOUNDARY AND WATER COMMISSION

UNITED STATES AND MEXICO

IBWC BUILDING

4110 RIO BRAVO

EL PASO, TEXAS 79902

SEP 29 1981

Mr. Herman Forbes
Director, Surveying Division
General Land Office
Austin, Texas 78701

Dear Mr. Forbes:

Enclosed is a copy of the report entitled "Procedures for the Creation of a Boundary for the Maritime Zone Between Mexico and the United States in the Gulf of Mexico," which you requested by letter dated September 3, 1981.

If we can be of further service, please call.

Sincerely,

J. S. Valdez
Division Engineer,
Projects

Enclosure:
As stated

See Rolled Sketch 18

Counter 17032

C'



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
 Rockville, Md. 20852

November 25, 1970

Dr. Robert D. Hodgson
 Office of the Geographer
 Directorate for Functional Research
 Department of State
 Washington, D. C. 20520

Dear Dr. Hodgson:

This letter will verify geographic positions of five points furnished via telephone on November 13, 1970, as requested in your letter of November 12, 1970.

Point No. 1

Mid Point of mouth of Rio Grande as marked by line on map furnished.

9/21/1978 djh.
 NA027
 Corporation
 V.4.12

$x = 2,445,297.4408'$	$25^{\circ}57'22''18$	682.5m	(1163.9)
$y = 1,071,619.57286'$	97 08 41.67	1159.3m	(509.9)

Point No. 2

A point 2,000 feet (609.6m) due east of Point No. 1

$x = 2,447,297.32388'$	$25^{\circ}57'22''18$	682.5m	(1163.9)
$y = 1,071,641.09592'$	97 08 19.76	549.8m	(1119.6)

Point No. 3

A point approximately 12 nautical miles from the mean low-water line as marked on map furnished.

$x = 2,517,711.39246'$	$25^{\circ}58'30''57$	940.7m	(905.7)
$y = 1,153,346.05339'$	96 55 27.37	761.4m	(907.7)

Point No. 4

A point 1/2 nautical mile west of Point No. 2 and lying on an azimuth from Point No. 2 to Point No. 3 and within U. S. territory.

$25^{\circ}57'19''22$	591.5m	(1254.9)
97 08 52.88	1471.2m	(198.1)

2

Point No. 5

A point 1 1/2 nautical miles west of Point No. 2 and lying on an azimuth from Point No. 2 to Point No. 3 and within Mexican territory.

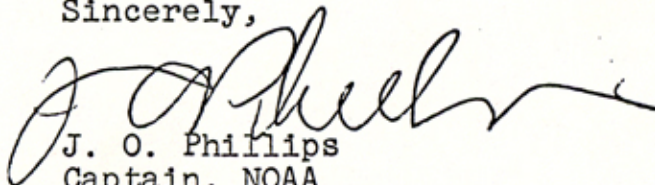
25°57'13"30	409.3m	(1437.1)
97 09 59.12	1644.8m	(24.5)

The azimuths involving Point Nos. 3, 2, 4, and 5 which are on the same line are:

No. 3 to 2 to 4 to 5	84°27'10"53
No. 4 to 2 to 3	264 21 17.86
No. 5 to 4 to 2 to 3	264 20 48.86

The output from the computer are attached. A manual containing the formulation is enclosed.

Sincerely,



J. O. Phillips
Captain, NOAA
Associate Director of Geodesy
and Photogrammetry
National Ocean Survey

Enclosures

PROCEDURES FOR THE CREATION OF A BOUNDARY FOR THE
MARITIME ZONE BETWEEN MEXICO AND THE UNITED
STATES IN THE GULF OF MEXICO

Article 5 of the treaty between the U.S. and Mexico states:

The Contracting States agree to establish and, recognize their maritime boundaries in the Gulf of Mexico and in the Pacific Ocean in accordance with the following provisions:

A. The international maritime boundary in the Gulf of Mexico shall begin at the center of the mouth of the Rio Grande, wherever it may be located; from there it shall run in a straight line to a fixed point, at 25°57'22.18" North latitude, and 97°8'19.76" West longitude, situated approximately 2,000 feet seaward from the coast; from this fixed point the maritime boundary shall continue seaward in a straight line the delineation of which represents a practical simplification of the line drawn in accordance with the principle of equidistance established in Articles 12 and 24 of the Geneva Convention of the Territorial Sea and the Contiguous Zone. This line shall extend into the Gulf of Mexico to a distance of 12 nautical miles from the baseline used for its delineation.

The international maritime boundary in the Gulf of Mexico should be recognized in accordance with the map entitled...., which the Commission shall prepare in conformity with the foregoing description and which, once approved by the Governments, shall be annexed to and form a part of this Treaty.

To establish this boundary for the maritime zone required the delineation of the following points or lines as constructed on, or from, Boundary Map TP-00317, 1:20,000, Rio Grande River - Gulf of Mexico, National Ocean Agency, 1970, polyconic projection; 1927 North American datum:

- 1) the midpoint of the mouth of the Rio Grande;
- 2) a point 2,000 feet (609.6 meters) due east of the point No. 1; and
- 3) an equidistant line extending 12 nautical miles from the respective baselines of the two countries.

- 4) the final boundary, to be straightened by the International Boundary and Water Commission-U.S. and Mexico, to extend from Point 1 (ambulatory) to point 2 (permanent) to point 3 (permanent), which, as agreed, is to be the intersection of the equidistant line and the 12 nautical mile limit measured from the respective baselines.

The Midpoint of the Mouth of the Rio Grande

It was proposed by the Geographer of the Department of State and accepted by the two Commissioners that the closing line of the Rio Grande (Rio Bravo) be drawn according to geometric principles whereby the angle of the general direction of the shoreline seaward of the closing line would face more on the Gulf of Mexico than on the river and the angle of the shoreline landward of the closing line would face more on the river than on the Gulf.

The points for the construction of the river closing line were determined by the following procedure: a) a line was drawn across the mouth of the river connecting the two most seaward points which could be

considered as "headlands" of the river. On one shore, the next logical headland inland was selected; this point was connected to the end point, on its shore, of the previously drawn closing line. If the angle made by the intersection of these two lines was less than 45°, geometrically, the general trend of the intervening shore faced more outward (seaward) than inward (riverward). If the angle were 45° or greater, the opposite condition, of course, would prevail.

If the former condition existed the closing line was redrawn landward to the selected second logical headland, a new inland headland chosen, and the process repeated. The same procedure was also followed for the second shore until angles of 45° or greater were encountered on both shores.

Having this established river closing line on the map, the National Ocean Agency, by scaling, determined its midpoint to have the following geographic coordinates:

25° 57' 22."18 North
97° 08' 41."67 West
(1927 North American Datum).

b) The National Ocean Agency then established the position of Point 2, defined as 2,000 feet (609.6 meters) due east of the original midpoint, to be:

25° 57' 22."18 North
97° 08' 19."76 West
(1927 North American Datum)

c) Using a method of perpendicular bisectors, the geometric equivalent of an equidistant line between points, an equidistant line was constructed eastward of point No. 2 to 12 nautical miles limit measured from the baselines of the two states (Point No. 3).

The National Ocean Agency, scaled off the coordinates of this Point No. 3 as:

25° 58' 30." 57 North

96° 55' 27".37 West

The system of perpendicular bisectors was cross-checked with a series of concentric arcs of circles held tangent to the respective baselines as proposed by the Mexican section of the boundary commission. The two systems coincided to a remarkable degree. The few, very minor divergences are due to the subjective judgments involved in determining tangency. They did not affect the final point (No. 3).

It was agreed, because the equidistant line did not deviate greatly from a line joining points No. 2 and No. 3 that this latter line would be used as the final segment of the maritime boundary in the Gulf of Mexico.

To provide for the possible later construction of a range for a line of site on the maritime boundary (outer segment), the National Ocean Survey was requested to determine the geographic positions of two points on the shore, preferably one in the U.S. and one in Mexico. The Survey determined these points to be:

Point No. 4

25° 57' 19."22 North

97° 08' 52."88 West

Point No. 5

25° 57' 13."30 North

97° 09' 59."12

The azimuths involving Points No. 3, 2, 4 and 5 which are on the same line are:

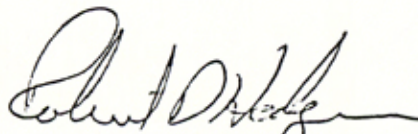
No. 3 to 2 to 4 to 5 84° 27' 10." 53

No. 4 to 2 to 3 264° 21' 17."86

No. 5 to 4 to 2 to 3 264° 20' 48." 86

The three points necessary for the construction of the maritime boundary and the equidistant line have been plotted on the attached copies of a composite of the boundary map mentioned previously. The three boundary points are labelled 1, 2 and 3. The equidistant line, constructed by the Geographer of the Department of State, is represented by the blue line.

A copy of the letter transmitting the values of the points, as computed by the National Ocean Survey, is attached.



Robert D. Hodgson
The Geographer
Office of the Geographer
Directorate for Functional Research
Bureau of Intelligence and Research

DIRECT

Azimuth
#1 - #2 270°
0'
0"

Lat.
#1 25°
57'
22" 18

Long.
#1 97°
8'
41" 57

Dist.
#1 - #2 0.
0.
609.5 m.

Lat.
#2 25°
57'
22" 17954

Long.
#2 97°
8'
19" 75872

Azimuth
#2 - #1 80°
0'
9" 59020

$\Delta\alpha$
0.
0'
9" 59020

INDIRECT

Lat.
#3 25°
58'
30" 57

Long.
#3 96°
55'
27" 37

Lat.
#2 25°
57'
22" 17954

Long.
#2 97°
8'
19" 75872

Distance
#3 - #2 0.
0.
21589.84555
meters

Azimuth
#3 - #2 84°
27'
10" 52795

Azimuth
#2 - #3 264°
21'
32" 35083

$\Delta\alpha$
0.
5.
38.17711

DIRECT

Azimuth
#3 - 2 - 4 84°
27'
10" 53

Lat.
#3 25°
58'
30" 57

Long.
#3 96°
55'
27" 37

Distance
#3 - #4 0.
0.
22515.845 m.

Lat. #4 25°
57'
19" 22055

Long. #4 97°
8'
52" 88118

Azimuth
#4 - 2 - 3 264°
21'
17" 85595

$\Delta\alpha$
0.
-5.
-52.67405

DIRECT

Azimuth
#3 - 2 - 4 - 5 84°
27'
10" 53

Lat.
#3 25°
58'
30" 57

Long.
#3 96°
55'
27" 37

Distance
#3 - #5 0.
0.
24367.845 m.

Lat. #5 25°
57'
19" 22055

Long. #5 97°
8'
59" 12470

Azimuth
#5 - 4 - 2 - 3 264°
20'
48" 86398

$\Delta\alpha$
0.
-6.
-21.66502
Counter 17040

FOR CHECK

INDIRECT

Lat. 25°
 "4 57'
 19" 22065

Long. 97°
 "4 8'
 52" 88118

Lat. 25°
 "5 57'
 13" 29656

Long. 97°
 "5 9'
 59" 12470

Distance 98.
 5. ~~54988~~
 4-5 1852.00015m.

Azimuth 84°
 "4-"5 21'
 17" 88471

Azimuth 264°
 "5-"4 20'
 48" 89274

OK 0.
 0.
 28.99197

DIRECT

Azimuth 264°
 "5-4-2-3 20'
 48" 85

Lat. 25°
 "5 57'
 13" 29656

Long. 97°
 "5 9'
 59" 1247

Distance 0.
 "5-"3 0.
 24367.946 m.

Lat. 25°
 "3 58'
 30" 57002

Long. 96°
 "3 55'
 27" 37000

Azimuth 84°
 "3-2-4-5 27'
 10" 52602

0.
 5.
 21.66602