DGPS SITE OPERATIONAL ASSESSMENT

NDGPS Site:	*St. Mary's DGPS Site (843)*
Inspector(s):	LT Christian Hernaez, CWO3 William Iozzino
Date:	10NOV11

PURPOSE:

- Validate advertised DGPS coverage of the St. Mary's DGPS site.
- Validate required RTCM message delivery.
- Test differential correction accuracy versus a predetermined survey monument.

EQUIPMENT: STARLINK DNAV-212 DGPS Receiver
Raven INVICTA RPR 210 DGPS Receiver
Hemisphere R110 USB DGPS Receiver
Trimble MBA-2 Receive Antenna

PARAMETERS:

Frequency	295 KHz
Forward Output Power	900W
Transmission Rate	200 baud
Field Strength/Range	100µV/m (40.0 dBµV/m) at 250 km

SITE PHOTO:

RESULTS

Signal Strength:

A verification of the St. Mary's Differential GPS (DGPS) coverage area was conducted from the southwest border of the advertised coverage area to Charleston, WV. The advertised signal strength range is 250 km. Figure 1 below displays adequate signal strength to approximately 196 km from the site at which point the signal strength began to drop below acceptable limits. A far-field signal strength reading was taken at the southwestern edge of the 250 km advertised range ring and received unsatisfactory results. Green points represent areas of satisfactory signal strength. Areas of unsatisfactory signal strength are represented with red points.

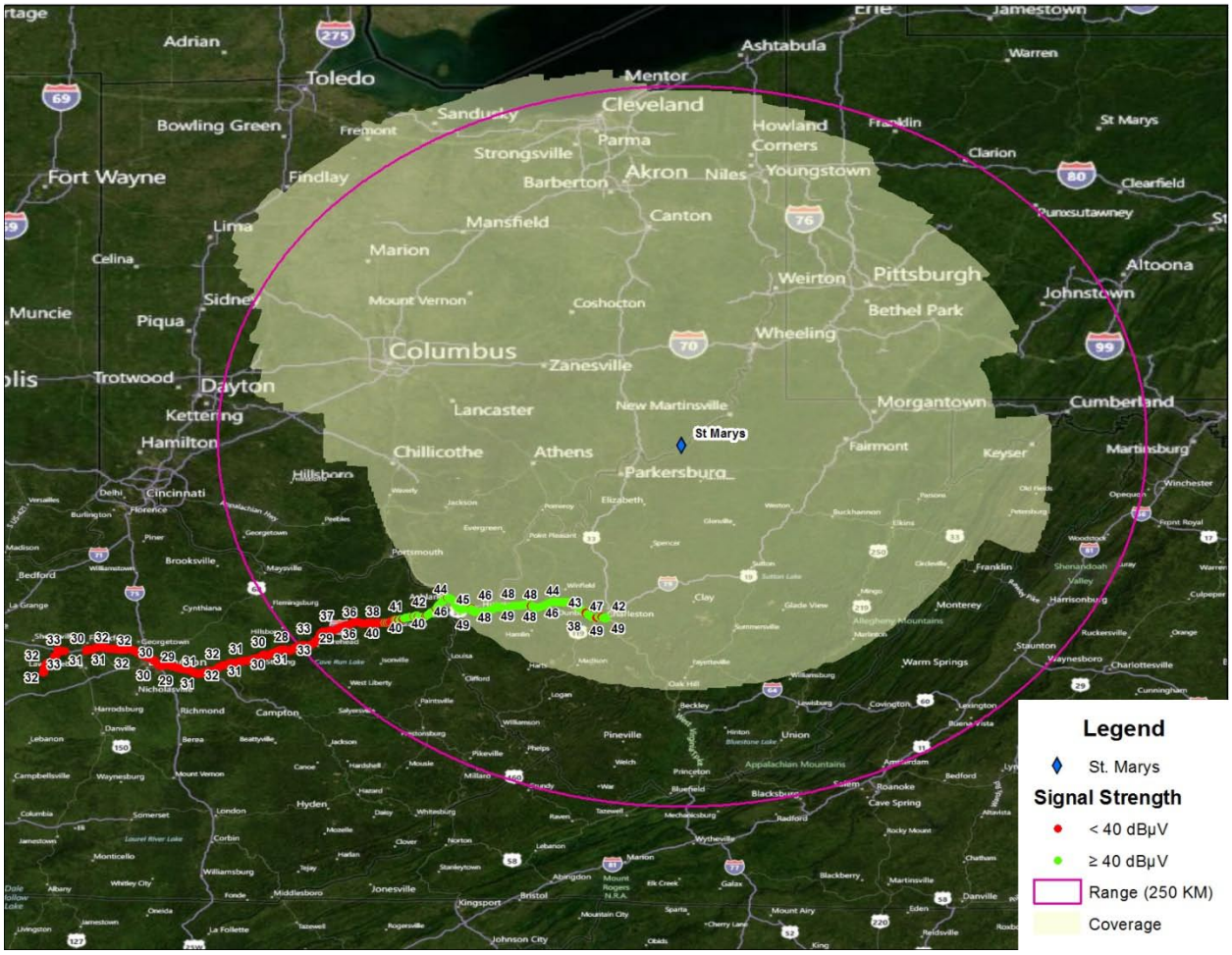

Figure 1.

Far-Field Signal Strength Reading 1:

Receiver:	STARLINK DNAV 212
Antenna:	Trimble MBA-2
Position	38º 10.919520'N 083º 33.773400'W
Side A Signal Strength	30 dBµV/m
Side B Signal Strength	32 dBµV/m

RTCM Message Verification:

RTCM messages were collected for sixty minutes from each side of the DGPS site utilizing a RAVEN INVICTA DGPS Receiver. All messages were received in accordance with Commandant Instruction Manual 16577.1 DGPS Broadcast Standard schedule for RTCM messages with the following exception: The positional data within the RTCM Type 7 message for Sides A & B were inaccurate. Specifically, the longitude information stated in the RTCM Type 7 message for the St. Mary's site, and sites adjacent to St. Mary's, did not match the actual positional longitude. Further research will be conducted to determine exact cause and corrective action required.

Side A

Message Type	**Received**	**Scheduled**	**Content Verified**
Type 3	Y	Y	Y
Type 5 (ensure message is not being transmitted)	N	N	N/A
Type 7	Y	Y	N
Type 9	Y	Y	Y
Type 16	Y	Y	Y

Side B

Message Type	**Received**	**Scheduled**	**Content Verified**
Type 3	Y	Y	Y
Type 5 (ensure message is not being transmitted)	N	N	N/A
Type 7	Y	Y	N
Type 9	Y	Y	Y
Type 16	Y	Y	Y

Accuracy Validation:

Positional data was collected for 10 minutes per side using a Hemisphere RPR 210 DGPS receiver with a Trimble MBA-2 DGPS Receive antenna. The data was then post processed and compared to a National Geodetic Survey (NGS) marker to verify the horizontal accuracy of the broadcast correction. Side A was 0.99 meters, bearing 219º, away from the monument while Side B was 0.95 meters, bearing 223.00º, away from the monument. Both respective distances were well within advertised accuracy requirements. Additionally a two dimension radial review for the same time period was completed for the integrity monitors. Side A's average deviation was 0.23701 meters; Side B's average deviation was 0.20930 meters. Both findings were consistent with the finding observed in the field and are well within system parameters.

NGS Monument ID:	**BBCD21**
Monument LAT:	38º 28.86595500' N
Monument LON:	082º 38.26024633' W

Side A

Averaged LAT:	38 28.86554371’ N
Averaged LON:	082º 38.26068252‘ W
Distance from DGPS Site:	165.0 km
Distance from Monument:	0.99 m
Bearing from Monument:	219º

Side B

Averaged LAT:	38º 28.86558249’ N
Averaged LON:	082º 38.26070105’ W
Distance from DGPS Site:	165.0 km
Distance from Monument:	0.95m
Bearing from Monument:	223º

SUMMARY:

Analysis of the St. Mary’s coverage area reveals that the actual coverage is consistent with the predicted coverage plot but is not consistent with the advertised range. Accuracy measurements were well within the required accuracy requirement. All RTCM messages were received as required, however, RTCM 7 message longitude content was inconsistent with the actual values of St. Mary’s and its adjacent sites. NAVCEN DGPS System Support will continue to analyze the coverage range ring and RTCM 7 message content.