



## DGPS SITE OPERATIONAL ASSESSMENT

**NDGPS Site:** *Klamath Falls DGPS Site*

**Inspector(s):** LT Michael Brashier

**Date:** 01DEC11

### PURPOSE:

- Validate advertised DGPS coverage of the Klamath Falls 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	294 KHz
Forward Output Power	1000W
Transmission Rate	100 baud
Field Strength/Range	75 $\mu$ V/m (37.5 dB $\mu$ V/m) at 350 km

### SITE PHOTO: (JAN2006)



## RESULTS

### Signal Strength:

A verification of the Klamath Falls Differential GPS (DGPS) coverage area was conducted from a southwestern point along the west coast to a northwest point of the coverage area. Figure 1, below is a pictorial representation of the readings taken during daylight hours. The outer purple ring represents the published coverage area of the Klamath Falls site, 75 uV/m (37.5dBuV/m) at 350 km. The Green points indicate satisfactory signal strength and the red points are unsatisfactory.

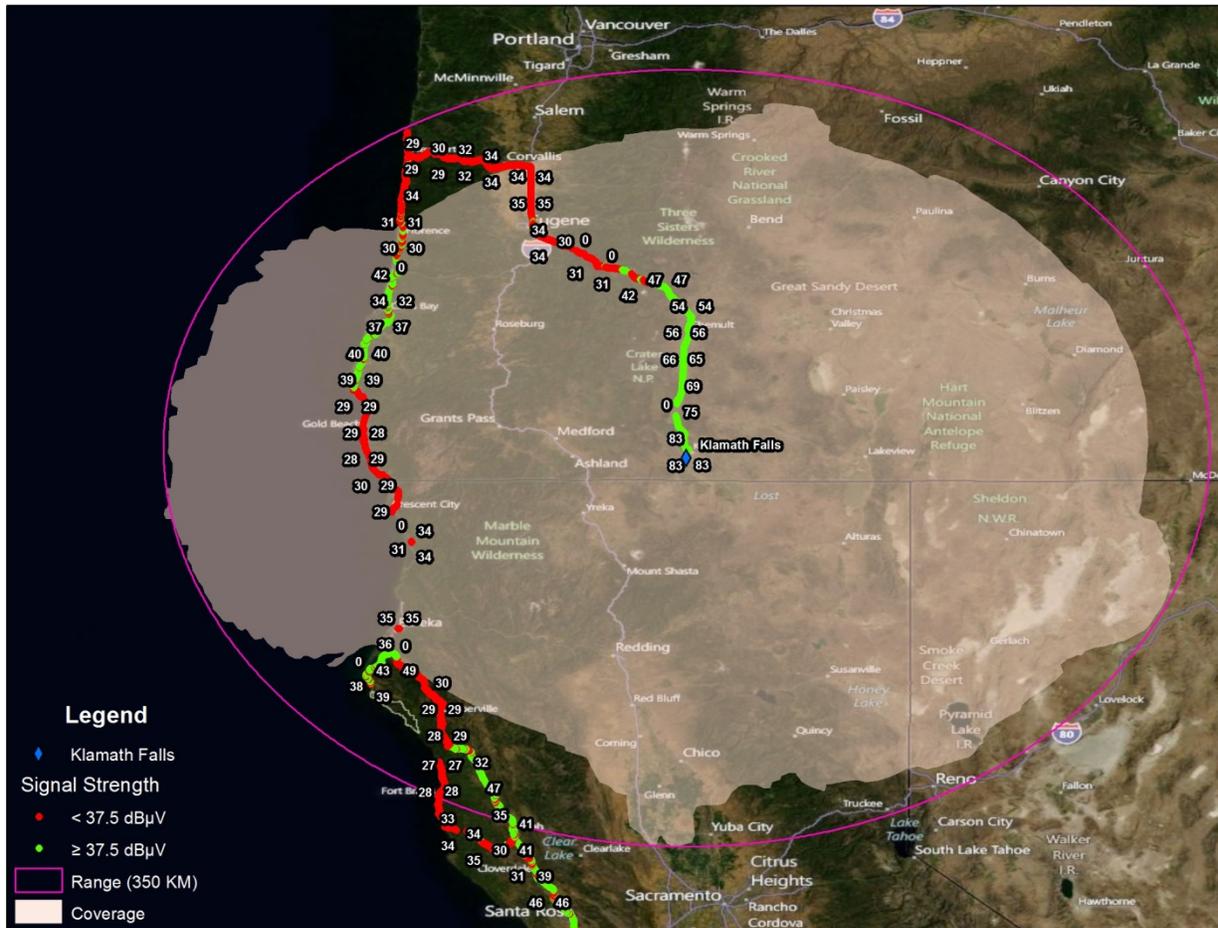


Figure 1.

**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 the Commandant Instruction Manual 16577.1 DGPS Broadcast Standard schedule for RTCM messages. Type 5 messages were not scheduled or received. Chart 1 below displays the message verification results:

Side A

<b>Message Type</b>	<b>Received</b>
<i>Type 3</i>	Y
<i>Type 5 (ensure message is not being transmitted)</i>	N
<i>Type 7</i>	Y
<i>Type 9</i>	Y
<i>Type 16</i>	Y

Side B

<b>Message Type</b>	<b>Received</b>
<i>Type 3</i>	Y
<i>Type 5 (ensure message is not being transmitted)</i>	N
<i>Type 7</i>	Y
<i>Type 9</i>	Y
<i>Type 16</i>	Y

Chart 1

**Accuracy Validation:**

Positional data was collected for 20 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 1.14 meters, at a bearing of 352.9°, from the monument while Side B was 0.92 meters, at bearing of 347.81° from the monument. In both cases the differences in position were within the advertised accuracy requirements.

<b>NGS Monument ID:</b>	QE2736
Monument LAT:	44° 49' 49.18173" N
Monument LON:	124° 3' 56.23153" W

Side A

<b>Averaged LAT:</b>	44° 49.82031' N
<b>Averaged LON:</b>	-124° 3' 56.23153' W
<b>Distance from DGPS Site:</b>	342.2km
<b>Distance from Monument:</b>	1.148m (3.7664042 feet)
<b>Bearing from Monument:</b>	352.9°

Side B

<b>Averaged LAT:</b>	44° 49.820181' N
<b>Averaged LON:</b>	-124° 03.93734' W
<b>Distance from DGPS Site:</b>	342.2km
<b>Distance from Monument:</b>	0.9205m (3.02001312 feet)
<b>Bearing from Monument:</b>	347.81°

**Summary:** The Operational Assessment of the Klamath Falls DGPS site revealed that the provided coverage is not consistent with the predicted coverage plot and the required specifications of the current OP ORDER. There were myriad pockets of inadequate signal strength throughout the coverage area, particularly in the northern and southwest portions of the coverage area. A review of the output/reflected power and near-field signal strength levels was conducted and found to be satisfactory. All RTCM messages were verified and evaluated and are consistent with the requirements. Finally, accuracy measurements and analysis proved that at a distance of approximately 342 Km from the broadcast site, the horizontal accuracy is within the accuracy requirements.