

**WAAS Technical Report**  
**William J. Hughes Technical Center**  
**Pomona, New Jersey**  
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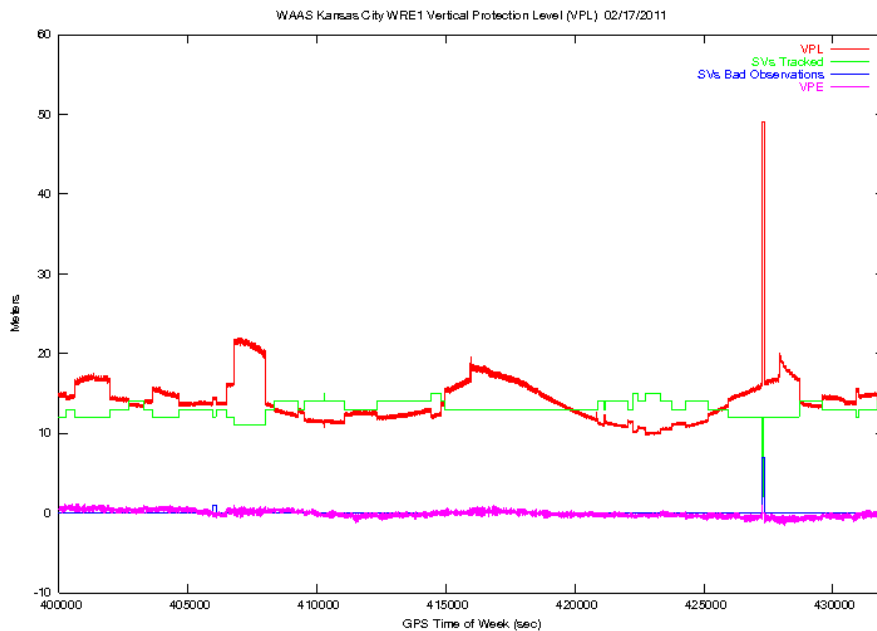
***DR# 100: WAAS Reference receiver at Kansas City experienced 18 db signal drop on both L1 and L2 caused by Radio Frequency Interference (RFI)***

***GPS Week/Day: Week 1623 Day 4 (02/17/2011)***

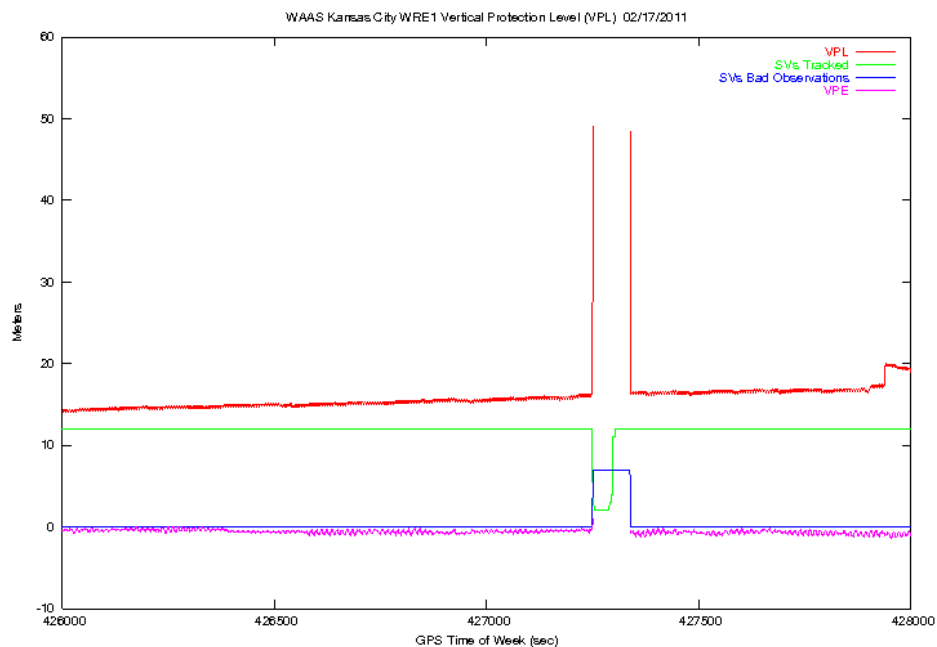
**Discussion:**

On GPS Week 1623 Day 4, an unexpected 18 db signal drop on L1 and L2 frequencies occurred at Kansas City WRS on all three treads. There was no GPS satellite or WAAS GEO satellite navigation signal problems at this time. The number of satellites tracked by WAAS reference receiver WRE-A dropped suddenly from 12 to 2, and the vertical protection level (VPL) jumped in response from 16.3m to “Unavailable” at 427249 GPS time of week (22:40 GMT) as shown in figure 1. Loss of satellite tracking prevented GPS/WAAS navigation solution from being calculated as shown on figure 2 (4 SV required for valid navigation).

***Figure 1 WAAS WRE-A VPL and Satellites Tracked Wide View***

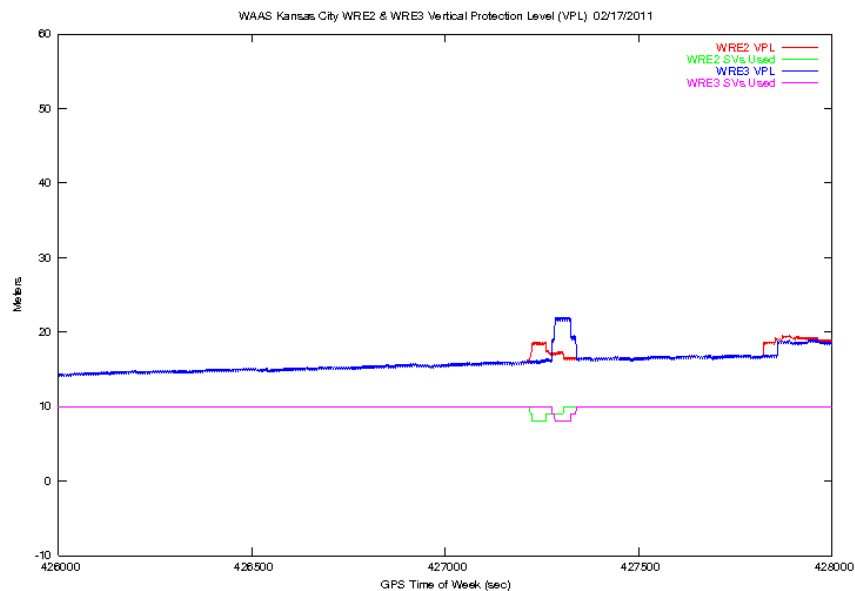


**Figure 2 WAAS WRE-A VPL and Satellites Tracked Zoom View**



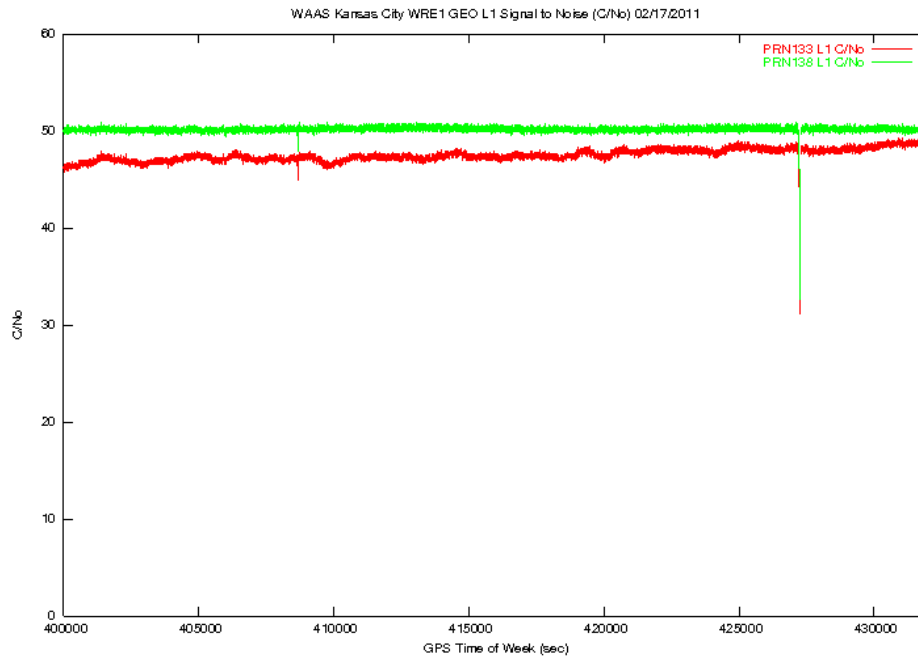
WRE-B and WRE-C tracked all 12 satellites with 18 db drop in signal to noise (C/No) on L1 and L2 frequencies; however, two satellites PRN11 and PRN 12 were removed from the navigation solution due to invalid L2 measurements (see figure 3).

**Figure 3 WAAS WRE-B and WRE-C VPL and Satellites Tracked Zoom View**



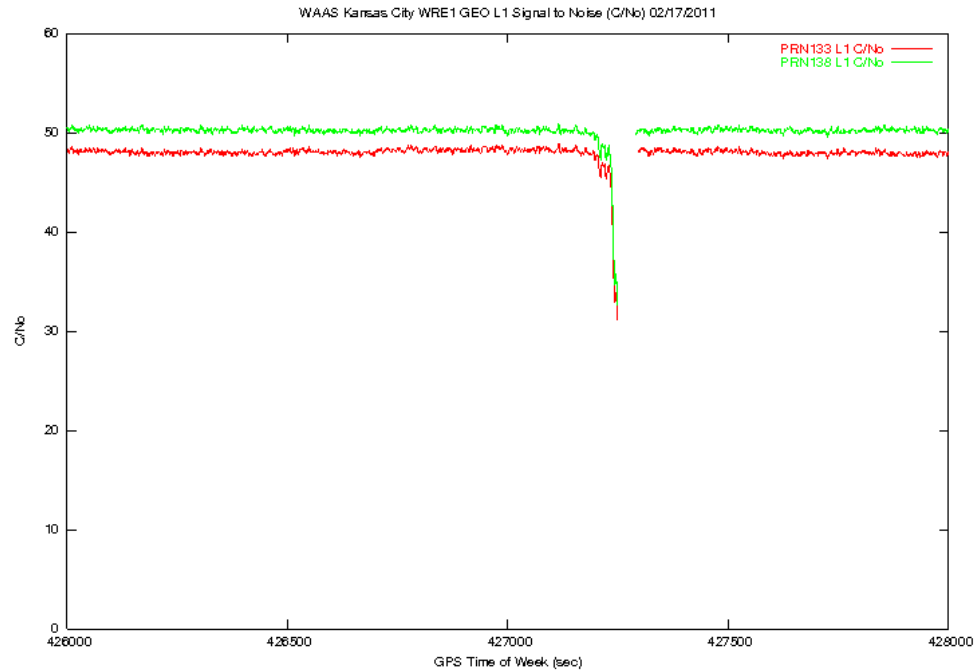
The receiver L1 frequency signal to noise ratios (C/No) for WAAS GEO satellites PRN133 and PRN138 were analyzed and the drop in the received signal levels were observed (see figure 4) to correlate with loss of receiver satellite tracking at 427249 GPS time of week.

***Figure 4 WAAS WRE-A GEO Satellites Signal to Noise Wide View***



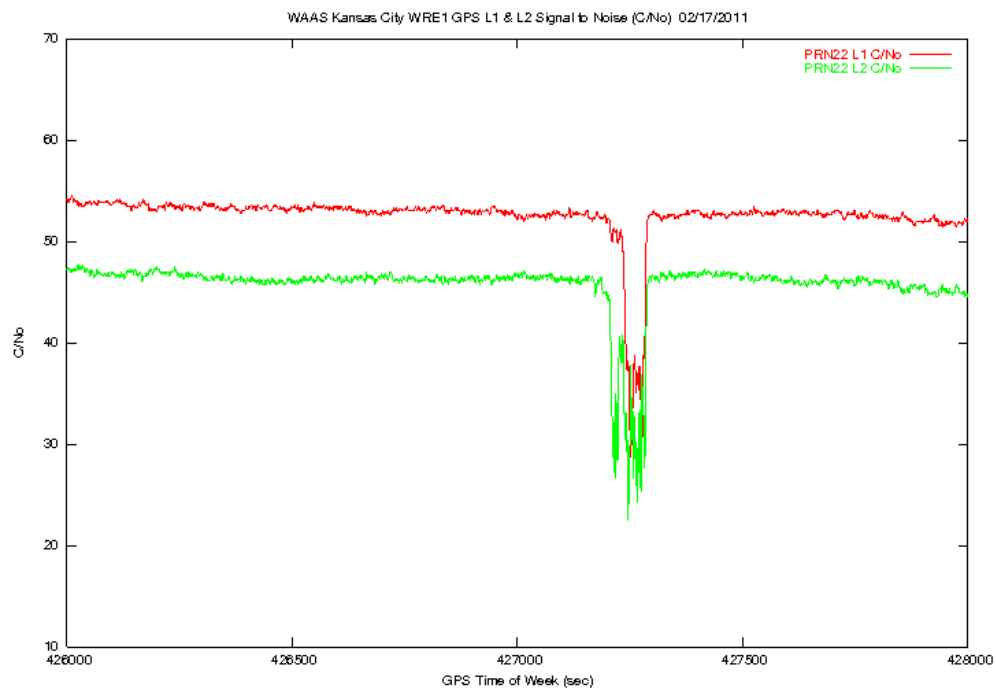
The C/No for GEO's PRN133 & PRN138 for receiver 1 (WRE-A) in figure 5 shows a decreasing signal to noise from 48-50 db Hz until the receiver lost track over a period of 42 seconds as L1 radio frequency interference (RFI) increased in the local environment.

**Figure 5 WAAS WRE-A GEO Satellites Signal to Noise Zoom View**



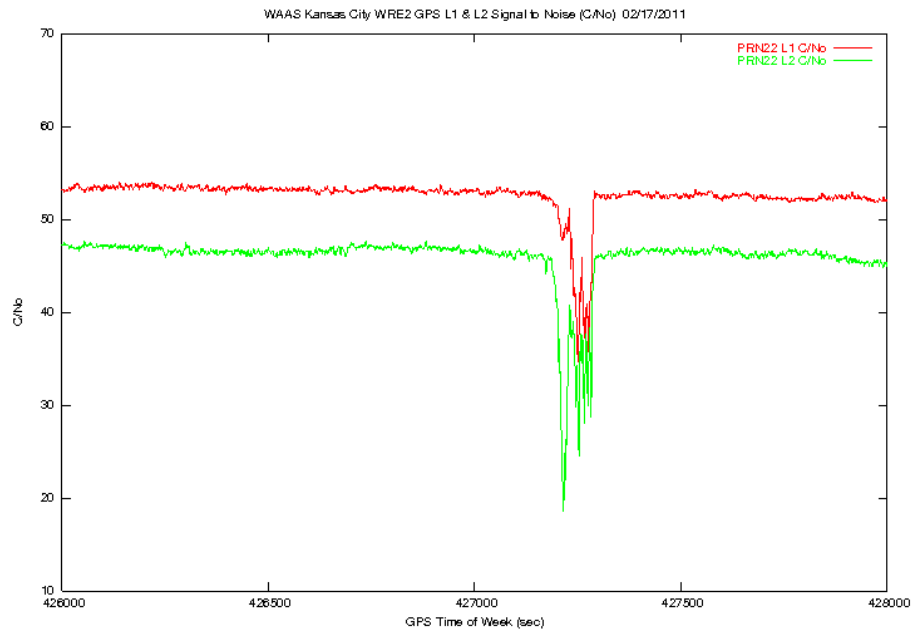
The RFI reduced the L1 and L2 signals by 18 db Hz on PRN22 which was one of the two GPS satellites that the receiver 1 (WRE-A) was able to continue tracking.

**Figure 6 WAAS WRE-A GPS Satellite PRN22 Signal to Noise Zoom**



Similar behavior of L1 & L2 Signal was observed for the same PRN22 on WRE-B (figure 7)

***Figure 7 WAAS WRE-B GPS Satellite PRN22 Signal to Noise Zoom***



### **Conclusion:**

The local RFI in the vicinity of Kansas City WAAS Reference Site affected the receiver ability to maintain track on WRE-A of GEO and GPS satellites for 136 seconds preventing WAAS navigation solution from being calculated, and causing 18 db Hz drop in signal (C/No) on L1 & L2 frequencies on all three threads. Since WAAS reference receiver WRE-B was selected for evaluation, there was no LPV or LPV200 outage at that time.