

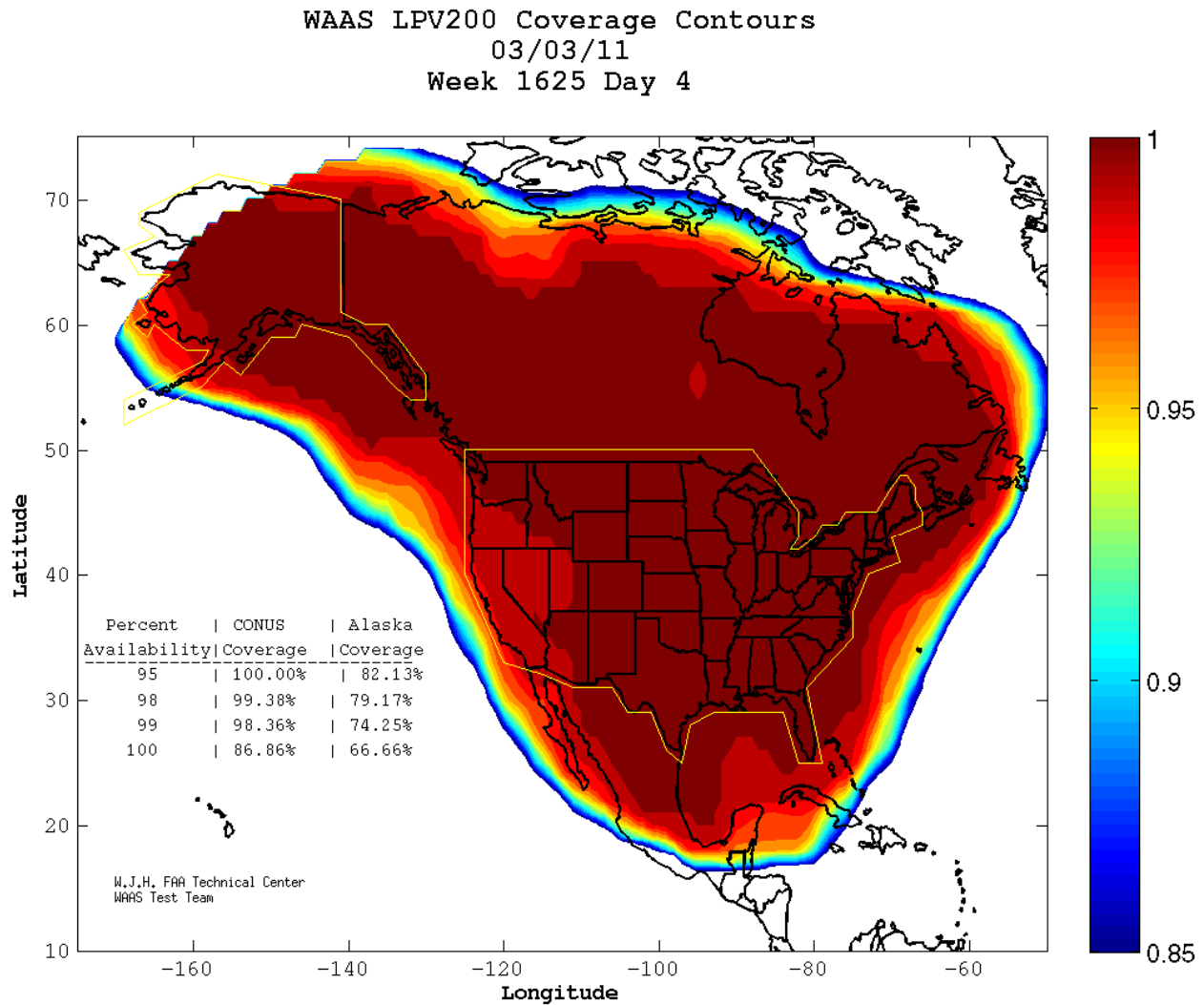
**WAAS Technical Memorandum**  
**William J. Hughes Technical Center**  
**Pomona, New Jersey**  
**3/15/11**  
*Author(s): Noah Rosen*

**DR #: Elevated UDREs on Several Satellites caused CONUS LPV200 drop**  
**GPS Week/Day: Week 1625 Day 4 (3/3/11)**

**Discussion:**

On March 3, 2011, there was an unexpected LPV200 outage in CONUS. LPV200 coverage at 100% availability was reduced to 86.86% for the day. The LPV200 coverage at 99% availability was 98.36%. The LPV200 outage took place in western CONUS and included the WAAS reference stations of Los Angeles, CA, Oakland, CA, and Salt Lake City, UT.

Figure 1 shows the Daily LPV200 Coverage Plot for March 3, 2011.



**Figure 1: Daily LPV200 Coverage Plot**

### **LPV200 Outage at Los Angeles,CA**

There was an LPV200 outage at the Los Angeles,CA reference station, which occurred from 21:01:34 GMT until 21:06:01 GMT.

The outage was caused by an increased UDRE on PRN 14. This elevated UDRE raised the vertical protection level to above 35m. Table 1 shows the UDRE changes on PRN 14 as broadcast from CRE near the time of the LPV200 outage in Los Angeles.

**Table 1: PRN 14 UDRE**

Previous UDREi	Current UDREi	Previous UDRE	Current UDRE	Previous Time	Current Time
5	6	3	3.75	20:52:39	20:52:45
6	7	3.75	4.5	20:54:21	20:54:27
7	8	4.5	5.25	20:56:21	20:56:27
8	9	5.25	6	20:58:27	20:58:33
9	10	6	7.5	21:01:27	21:01:33
10	5	7.5	3	21:05:57	21:06:03

### **LPV200 outage at Salt Lake City, UT**

The LPV200 outage at the Salt Lake City, UT reference station occurred from 21:05:13 GMT to 21:05:51 GMT.

The outage was caused by elevated UDREs on PRN 138. The elevated UDREs raised the vertical protection levels at Salt Lake City to just above 35m for a short time. Table 2 shows the UDRE changes on PRN 138 as broadcast from CRE around the time of the LPV200 outage in Salt Lake City.

**Table 2: PRN 138 UDRE**

Previous UDREi	Current UDREi	Previous UDRE	Current UDRE	Previous Time	Current Time
10	11	7.5	15	21:04:08	21:04:14
11	10	15	7.5	21:04:14	21:04:20
10	11	7.5	15	21:04:20	21:04:26
11	10	15	7.5	21:05:56	21:06:02

### **LPV200 outage at Oakland,CA**

There was also an unexpected LPV200 outage in Oakland,CA that occurred from 21:00:01 to 21:06:01. The outage was due to elevated UDREs on PRNs 14, 18, and 22..During the time of the LPV200 outage, the UDRE of PRN 14 was 6m, the UDRE of PRN 18 was between 5.25m and 6m, and the UDRE of PRN 22 was between 6m and 7.5m. These higher UDREs elevated the vertical protection levels at Oakland and caused the LPV200 outage. On March 2, 2011, the UDRE of these three satellites was 3m and the vertical protection levels at the same time of day was 26.1.

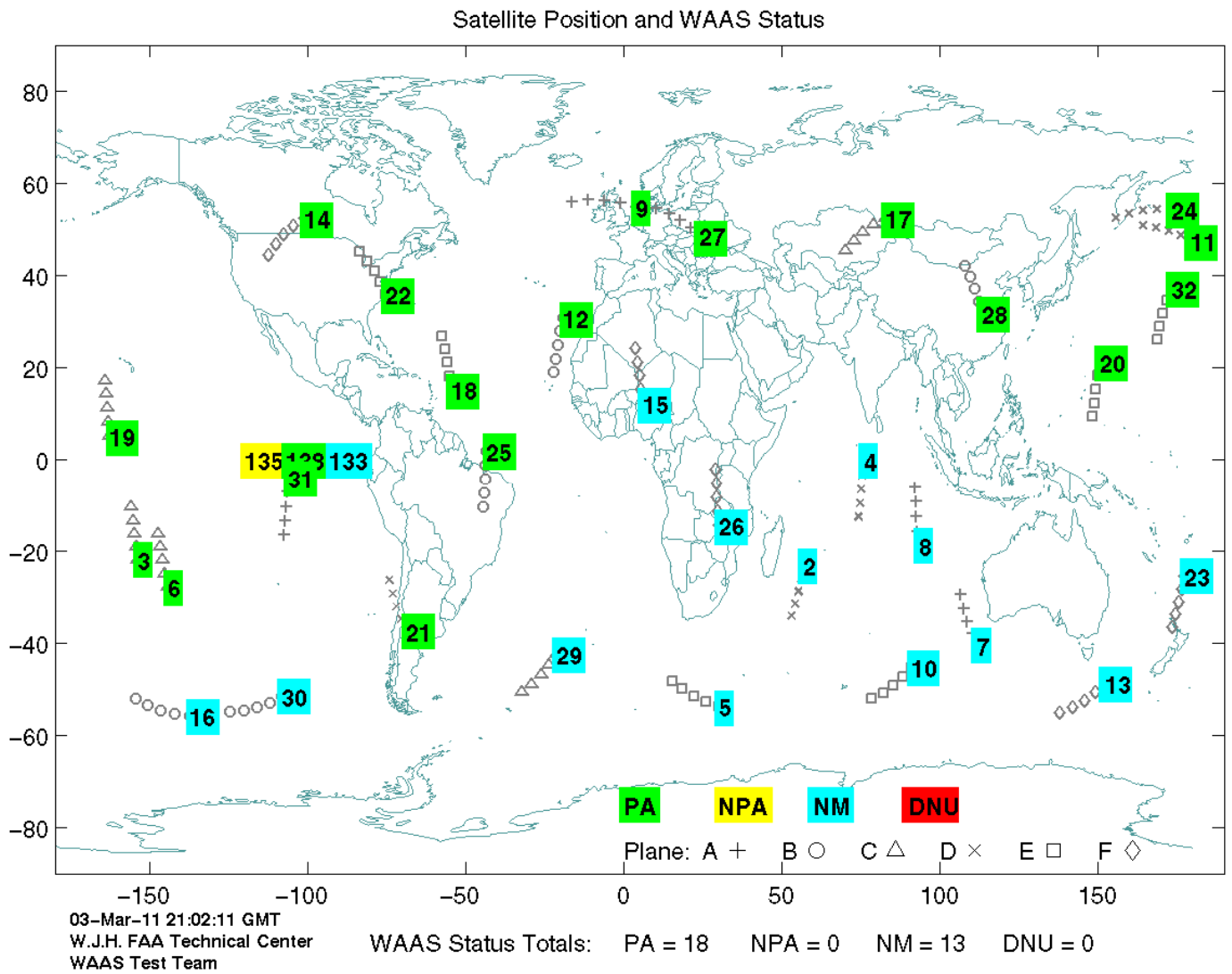
Table 3 shows the UDREs as broadcast from CRE around the time of the LPV200 outage at Oakland for PRN 18. Table 4 shows the UDREs as broadcast from CRE around the time of the LPV200 outage at Oakland for PRN 22. Figure 2 shows a snapshot of satellite locations near the time of the LPV200 outage.

**Table 3: PRN 18 UDRE**

Previous UDREi	Current UDREi	Previous UDRE	Current UDRE	Previous Time	Current Time
5	6	3	3.75	20:54:25	20:54:31
6	7	3.75	4.5	20:56:01	20:56:07
7	8	4.5	5.25	20:57:49	20:57:55
8	9	5.25	6	21:00:19	21:00:25
9	8	6	5.25	21:02:49	21:02:55
8	9	5.25	6	21:04:31	21:04:37
9	8	6	5.25	21:04:37	21:04:43
8	9	5.25	6	21:04:43	21:04:49
9	8	6	5.25	21:04:49	21:04:55
8	9	5.25	6	21:04:55	22:05:01
9	5	6	3	21:05:55	21:06:01

**Table 4: PRN 22 UDRE**

Previous UDREi	Current UDREi	Previous UDRE	Current UDRE	Previous Time	Current Time
5	6	3	3.75	20:52:13	20:52:19
6	7	3.75	4.5	20:53:49	20:53:55
7	8	4.5	5.25	20:55:55	20:56:01
8	9	5.25	6	20:57:55	20:58:01
9	10	6	7.5	21:00:37	21:00:43
10	5	7.5	3	21:05:55	21:06:01



**Figure 2: Satellite Position and WAAS Status on March 3, 21:02 GMT**

### Conclusion:

The UDRE of several satellites increased unexpectedly. This increase in UDRE led to a short LPV200 outage on western CONUS, which included the WAAS reference stations of Los Angeles, CA, Oakland, CA, and Salt Lake City, UT.