

## C. Vertical and Horizontal Control

Refer to the OPR-Q191-KR-11 Horizontal and Vertical Control Report for a detailed description of the horizontal and vertical control used on this survey. No deviations from the report occurred. A summary of the project's horizontal and vertical control follows.

### Horizontal Control

The horizontal control datum for this survey was the North American Datum of 1983 (NAD83).

For real-time DGPS corrections, a CSI MBX-3 unit was tuned to the Cold Bay, Alaska USCG DGPS site. The unit output differentially corrected positions at 1 Hz to the (POS MV) 320 V4 where it was integrated with inertial data and a position for the top-center of the IMU was generated. This position was logged concurrently with the bathymetry from WinFrog and the POS file with Fugro Pelagos PosMvLogger. It was later corrected for offsets to the multibeam echosounder (MBES) by CARIS HIPS in post processing.

Final positioning was done using post-processed kinematic (PPK) methods. Applanix POSPac v5.4 software was used in conjunction with the POS files and local 1Hz base station data to generate a higher accuracy position which was applied in processing, replacing the real-time position records.

See OPR-Q191-KR-11 Horizontal and Vertical Control Report for a more detailed description of PPK positioning methods used.

### Vertical Control

All sounding data was reduced to MLLW initially using observed tidal data from three John Oswald and Associates (JOA) tide stations located in Akun Bay, Surf Bay and Trident Bay, AK, and one NOAA COOPS tide station located in Unalaska, AK. Tidal data for a twenty-four hour period UTC, (Alaska Daylight Time to UTC was +8 hours) was assembled by JOA and uploaded to their ftp site at the end of every Julian Day. A cumulative file for the gauges was updated each day by appending the new data. It should be noted that these unverified tides were used in the field for preliminary processing only. The NOAA supplied tidal zoning was modified by JOA, providing a more elaborate zoning scheme than those zones issued in the Statement of Work.

On November 14, 2011, JOA issued verified tidal data and final zoning for OPR-Q191-KR-11. All sounding data was then re-merged using CARIS HIPS and SIPS tide routine. Verified tidal data were used for all final Navigation BASE surfaces and S57 Feature files.



For additional information, refer to the OPR-Q191-KR-11 Horizontal and Vertical Control Report.

**Table 1 Tide Gauges**

<b>Gauge</b>	<b>Model</b>	<b>Gauge Type</b>	<b>Location</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Operational</b>
946-2711	H350XL/355	Digital Bubbler	Surf Bay, AK	54°08'58"N	165°36'58" W	July - Sep
946-2719	H350XL/355	Digital Bubbler	Akun Cove, AK	54°14'20"N	165°32'28" W	July - Sep
946-2721	H350XL/355	Digital Bubbler	Trident Bay, AK	54°08'20"N	165°31'34" W	July - Sep
946-2620	NOAA CO-OPS Gauge	Aqua Trak	Unalaska, AK	53°52'48"N	165°32'12" W	July 1989 - Present