

Check Point Survey Report

FEMA Region 3 - Virginia/West Virginia LiDAR Mapping Project

Contract # G16PC00020
Task Order Number: G16PD01238

Prepared for:
USGS – United States Geological Survey



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	Including: a) Point Documentation Report & Photos of Survey Points	
	b) Final Coordinate List in Excel Format	
	c) NGS Data Sheets for Project Controls	

1. INTRODUCTION

1.1 *Project Summary*

Dewberry Consultants LLC is under contract to USGS United States Geological Survey to provide 309 Check Points in the States of Virginia and West Virginia. Under the above referenced USGS Task Order, Dewberry is tasked to complete the quality assurance of mapping products. As part of this work Dewberry staff will complete Check Point surveys that will be used to evaluate the mapping accuracy. The ground survey was conducted between the dates of November 18th and December 21st, 2016.

Existing NGS Control Points were located and surveyed to check the accuracy of the RTK/GPS survey equipment with the results shown in Section 2.4 of this Report.

As an internal QA/QC procedure and to verify that the Check Points meet the 95% confidence level approximately 50% of the points were re-observed and are shown in Section 5 of this report.

Final horizontal coordinates are referenced to UTM Zone 17, NAD83 (2011) in meters. Final Vertical elevations are referenced to NAVD88 in meters using Geoid model 2012B (Geoid12B).

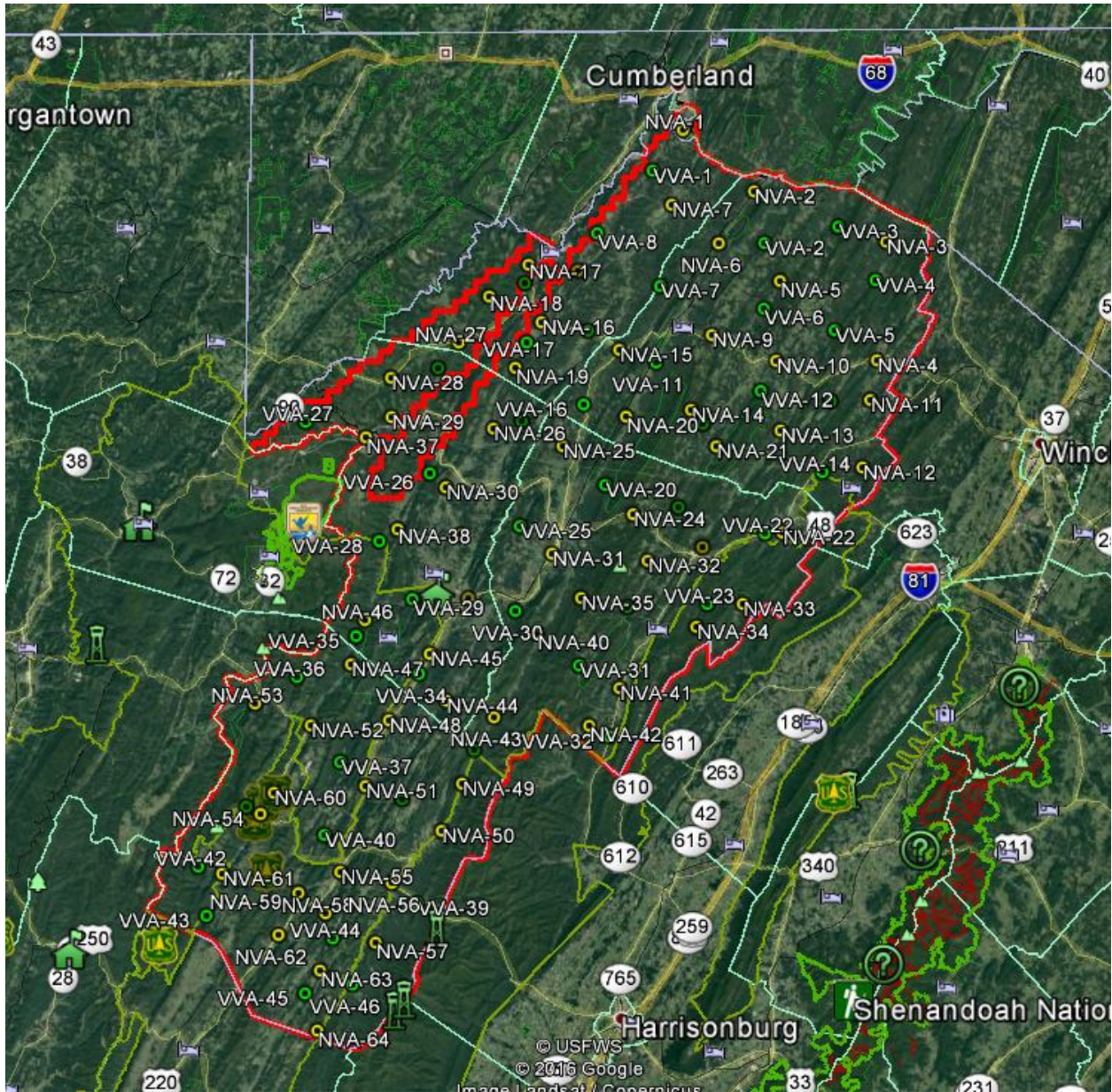
1.2 *Points of Contact*

Questions regarding the technical aspects of this report should be addressed to:

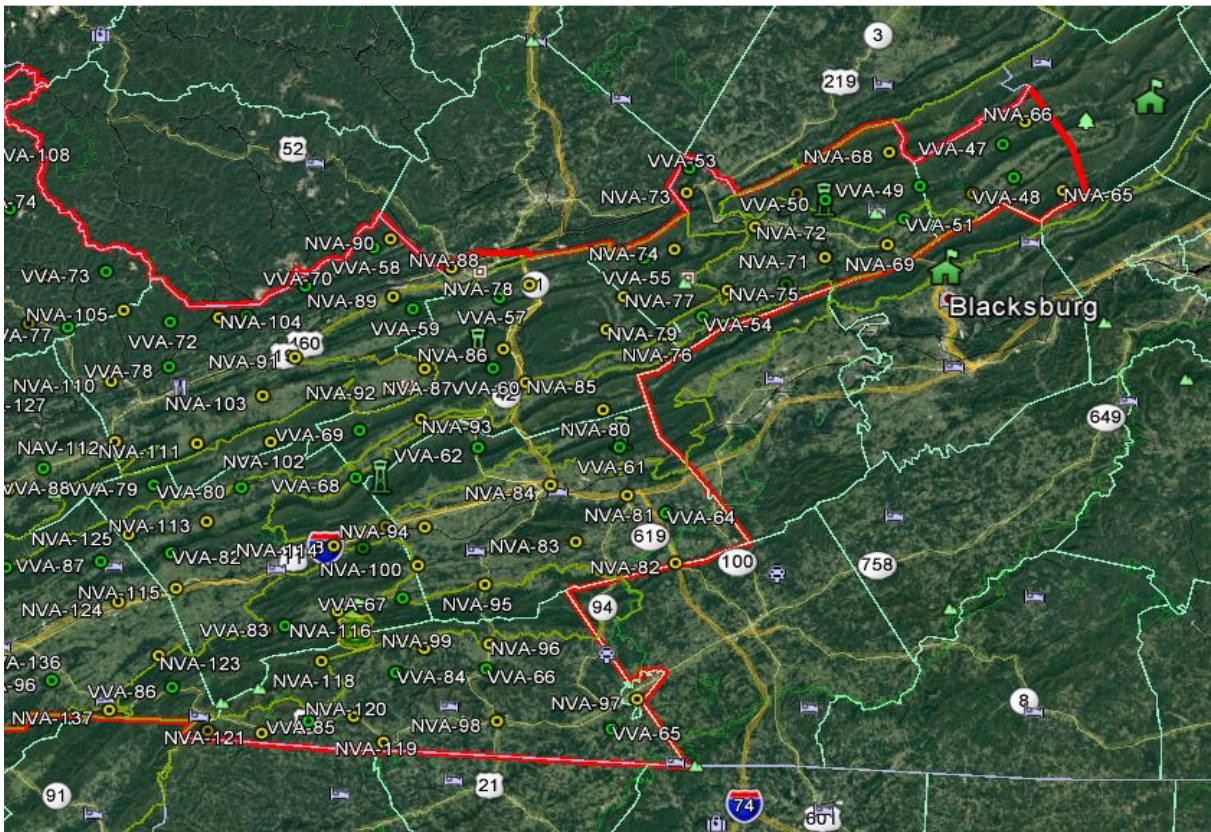
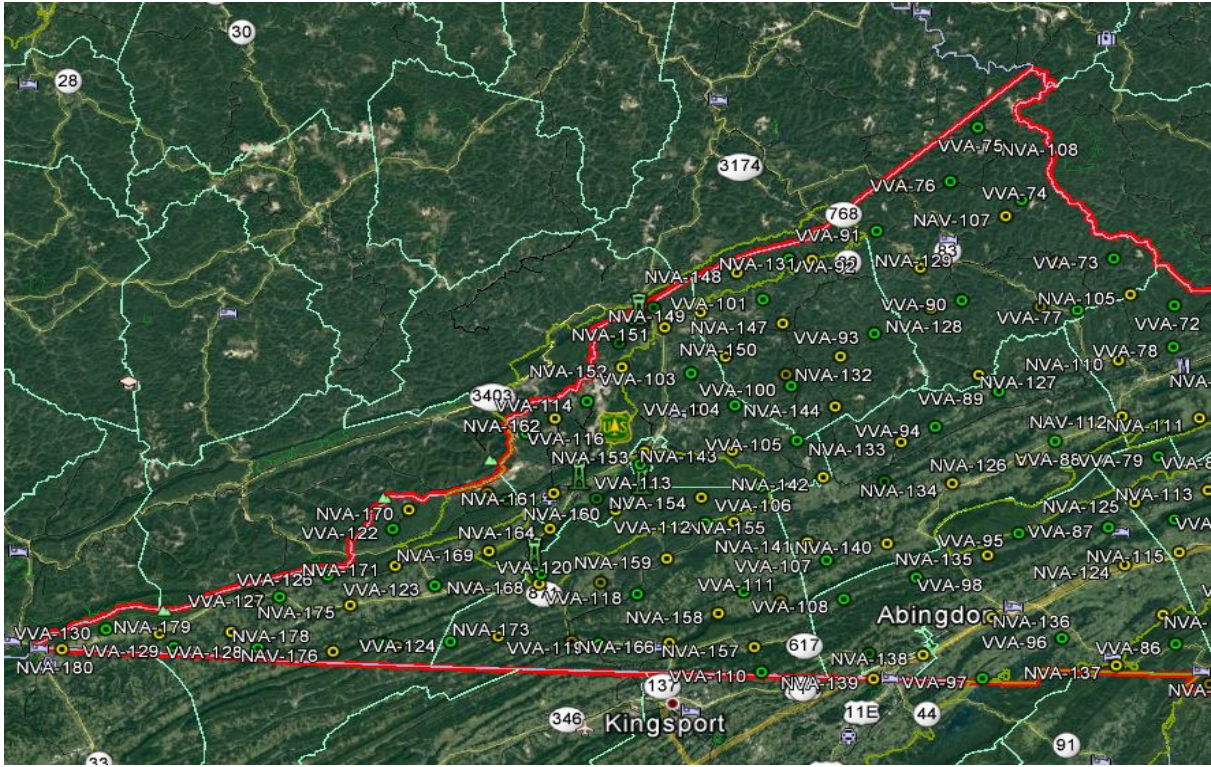
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1.3 Project Areas



West Virginia



Virginia

PROJECT DETAILS

2.1 *Survey Equipment*

In performing the GPS observations Trimble R-10 GNSS receiver/antenna attached to a two meter fixed height pole with a Trimble TSC3 Data Collector to collect GPS raw data were used to perform the field surveys.

2.2 *Survey Point Detail*

The 309 Check Points were well distributed throughout the project area.

A sketch was made for each location and a nail was set at the point where possible or at an identifiable point. The Check Point locations are detailed on the “Check Point Documentation Report” sheets attached to this report.

2.3 *Network Design*

The GPS survey performed by Dewberry Consultants LLC office located in Lanham, MD was tied to a Real Time Network operated by KEYNET GPS, Inc. The network is a series of “real-time” continuously operating, high precision GPS reference stations. All of the reference stations have been linked together using Trimble GPSNet software, creating a Virtual Reference Station System (VRS).

The Trimble NetR5 Reference Station is a multi-channel, multi-frequency GNSS (Global Navigation Satellite System) receiver designed for use as a stand-alone reference station or as part of a GNSS infrastructure solution. Trimble R-Track technology in the NetR5 receiver supports the modernized GPS L2C and L5 signals as well as GLONASS L1/L2 signals.

2.4 Field Survey Procedures and Analysis

Dewberry field surveyors used Trimble R-10 GNSS receivers, which is a geodetic quality dual frequency GPS receiver, to collect data at each surveyed location.

All locations were occupied once with approximately 50% of the locations being re-observed. All re-observations matched the initially derived station positions within the allowable tolerance of $\pm 5\text{cm}$ or within the 95% confidence level. Each occupation which utilized the VRS network was occupied for approximately three (3) minutes in duration and measured to 180 epochs.

Each occupation which utilized OPUS (if used) was occupied between 20 and 30 minutes.

Field GPS observations are detailed on the “Check Point Documentation Reports” submitted as part of this report.

Six (6) existing NGS monument listed in the NSRS database were located for the West Virginia area as an additional QA/QC method to check the horizontal and vertical accuracy of the VRS network as well as being the primary project control monuments designated as HW1425, AJ8002AI6316, HW1435, HW3473 and JW0308. The results are as follows:

NGS PT. ID	As Surveyed (m)			Published (m)			Differences (m)		
	Northing(m)	Easting(m)	Elev.(m)	Northing(m)	Easting(m)	Elev.(m)	ΔN	ΔE	$\Delta \text{Elev.}$
C 17	4280008.583	645293.262	559.310	4280008.677	645293.111	559.324	N/A	N/A	0.014
FARM	4385420.644	694290.260	205.475	4385420.647	694290.261	205.515	0.003	0.001	0.040
J 13 020	4385919.734	691987.082	185.478	4385919.727	691987.091	185.510	0.007	0.009	0.032
J 17	4297844.385	650850.877	416.156	4297844.444	650850.809	416.152	N/A	N/A	0.004
MIDWAY	4297842.676	650855.348	416.474	4297842.731	650855.284	416.490	N/A	N/A	0.016
W 17	4324270.781	675063.172	250.386	4324270.786	675063.186	250.310	0.005	0.014	N/A

Nine (9) existing NGS monument listed in the NSRS database were located for the Virginia area as an additional QA/QC method to check the horizontal and vertical accuracy of the VRS network as well as being the primary project control monuments designated as GA3309, FZ1073, GX2101, FZ1351, FZ1078, GA1151, GX0591, FZ2792 and GA1485. The results are as follows:

NGS PT. ID	As Surveyed (m)			Published (m)			Differences (m)		
	Northing(m)	Easting(m)	Elev.(m)	Northing(m)	Easting(m)	Elev.(m)	ΔN	ΔE	$\Delta \text{Elev.}$
BRISTOL 2	4050563.133	395032.096	541.690	4050563.127	395032.117	541.617	0.006	0.021	N/A
C 37	4056680.922	429294.989	613.329	4056680.906	429295.016	613.300	0.016	0.027	0.029
GAP AZ MK	4102118.210	433131.972	716.535	4102118.208	433131.971	716.562	0.002	0.001	0.027
Y-505	4089549.569	492361.648	705.700	4089549.578	492361.658	705.682	0.009	0.010	0.018
GLADE	4070966.547	430427.710	665.413	4070966.563	430427.733	665.418	0.016	0.023	0.005
K 424	4095791.999	358276.344	691.917	4095791.996	358276.350	691.881	0.003	0.006	0.036
ORCHARD	4130126.302	536571.799	633.474	4130126.407	536571.876	633.472	N/A	N/A	0.002

SNOW	4048910.733	509987.447	791.030	4048910.880	509987.327	791.020	N/A	N/A	0.010
TON	4070193.650	320400.715	421.537	4070193.739	320400.670	421.530	N/A	N/A	0.007

The above results indicate that the VRS network is providing positional values within the 5cm parameters for this survey.

2.5 Adjustment

The survey data was collected using Virtual Reference Stations (VRS) methodology within a Virtual Reference System (VRS).

The system is designed to provide a true Network RTK performance, the RTKNet software enables high-accuracy positioning in real time across a geographic region. The RTKNet software package uses real-time data streams from KEYNET GPS, Inc system user and generates correction models for high-accuracy RTK GPS corrections throughout the network. Therefore, corrections were applied to the points as they were being collected, thus negating the need for a post process adjustment.

2.6 Data Processing Procedures

After field data is collected the information is downloaded from the data collectors into the office software. The Software program used is called TBC or Trimble Business Center.

Downloaded data is run through the TBC program to obtain the following reports; points report, point comparison report and a point detail report. The reports are reviewed for point accuracy and precision.

After review of the point data an “ASCII” or “txt” file which is the industry standard is created. Point files are loaded into our CADD program (Carlson Survey 2014) to make a visual check of the point data (Pt. #, Coordinates, Elev. and Description). The data can now be imported into the final product.

3. *FINAL COORDINATES*

West Virginia

POINT ID	NORTHING (m)	EASTING (m)	ELEV. (m)
NVA CHECK POINTS			
NVA-001	4385322.529	692710.070	202.000
NVA-002	4376801.591	703286.184	181.167
NVA-003	4369841.440	721813.647	191.714
NVA-004	4352833.915	721327.362	248.726
NVA-005	4363958.846	707217.698	249.554
NVA-006	4369240.587	698346.304	225.017
NVA-007	4374659.813	691460.816	183.823
NVA-008	4365052.296	677761.663	259.076
NVA-009	4356062.278	697544.831	439.016
NVA-010	4352508.053	706828.614	320.315
NVA-011	4347137.510	720454.565	271.186
NVA-012	4337463.880	719483.139	414.954
NVA-013	4342539.110	707618.371	290.892
NVA-014	4345264.771	694695.375	600.926
NVA-015	4353717.711	684277.725	239.375
NVA-016	4357454.493	673030.777	318.548
NVA-017	4365638.032	671035.698	341.668
NVA-018	4360983.785	665477.177	942.975
NVA-019	4350872.749	669383.111	319.026
NVA-020	4344173.031	685393.837	227.088
NVA-021	4340125.171	698413.881	501.066
NVA-022	4327963.002	708115.684	308.401
NVA-023	4325684.159	696679.359	390.099
NVA-024	4330214.652	686638.286	656.746
NVA-025	4339914.759	676467.904	334.851
NVA-026	4341173.598	668444.157	355.347
NVA-027	4354323.679	661227.021	831.602
NVA-028	4349094.519	651623.334	867.182
NVA-029	4343490.361	651776.965	869.097
NVA-030	4335312.806	661240.304	426.512
NVA-031	4324392.827	675084.610	249.455
NVA-032	4323617.089	688826.579	510.195
NVA-033	4317662.690	702599.495	521.036
NVA-034	4314282.043	695990.183	582.551
NVA-035	4318150.640	679430.939	509.180

NVA-036	4326946.815	661955.782	339.338
NVA-037	4341148.560	648868.444	1011.580
NVA-038	4327503.347	652910.893	511.782
NVA-039	4317846.026	663186.728	283.245
NVA-040	4312933.227	673128.658	299.422
NVA-041	4305340.580	685090.547	466.535
NVA-042	4299905.960	680838.485	521.509
NVA-043	4300898.558	667165.980	346.372
NVA-044	4303135.162	660244.045	381.887
NVA-045	4309919.602	657884.436	321.112
NVA-046	4314465.272	648432.387	356.498
NVA-047	4308119.311	646532.808	406.989
NVA-048	4300195.456	652088.242	389.781
NVA-049	4291354.082	662745.500	438.985
NVA-050	4284315.529	659539.777	486.985
NVA-051	4291052.248	648815.865	454.664
NVA-052	4299309.489	640921.062	479.877
NVA-053	4302315.918	632909.148	619.193
NVA-054	4286541.183	633917.008	592.050
NVA-055	4278422.910	645474.014	514.724
NVA-056	4276986.659	652865.208	481.080
NVA-057	4268417.906	650683.787	562.212
NVA-058	4272472.295	643446.154	566.039
NVA-059	4275340.889	639515.038	632.725
NVA-060	4289602.254	635773.150	543.191
NVA-061	4281589.889	631115.337	632.067
NVA-062	4269330.788	636764.329	615.603
NVA-063	4264302.522	642781.252	673.928
NVA-064	4255692.445	642506.098	646.458
VVA CHECK POINTS			
VVA-001	4379446.246	688471.667	278.348
VVA-002	4368288.794	705646.852	328.808
VVA-003	4372029.472	715552.117	332.859
VVA-004	4364649.736	722193.075	210.782
VVA-005	4356892.522	715607.949	257.403
VVA-006	4359487.750	703904.886	290.528
VVA-007	4363018.836	689981.477	417.447
VVA-008	4370365.277	680784.642	276.043
VVA-009	4363040.788	670535.004	305.434

VVA-010	4356341.875	679701.019	224.018
VVA-011	4351317.143	689372.670	227.623
VVA-012	4348127.687	704664.538	401.123
VVA-013	4346153.247	714719.487	325.472
VVA-014	4339433.723	714428.171	267.567
VVA-015	4343313.892	696419.186	561.283
VVA-016	4345771.701	679223.619	283.431
VVA-017	4353278.989	670034.174	349.196
VVA-018	4350550.985	658281.794	857.634
VVA-019	4343379.062	670411.094	271.846
VVA-020	4337789.425	682791.881	311.624
VVA-021	4331364.382	693062.064	556.150
VVA-022	4327096.498	705167.780	319.498
VVA-023	4316805.581	696791.816	507.374
VVA-024	4316930.058	685976.278	492.786
VVA-025	4328285.969	670431.805	422.780
VVA-026	4335571.733	657384.295	601.337
VVA-027	4346303.065	638514.287	777.810
VVA-028	4325156.784	649567.948	766.789
VVA-029	4314632.829	652793.226	506.938
VVA-030	4315992.321	669872.374	300.116
VVA-031	4307726.577	679392.373	638.641
VVA-032	4298425.024	683707.121	531.858
VVA-033	4295347.427	664158.362	385.143
VVA-034	4306624.335	656082.457	336.583
VVA-035	4310113.397	646447.986	393.916
VVA-036	4305052.814	638297.276	664.159
VVA-037	4292258.760	645689.244	536.365
VVA-038	4288947.029	654155.307	795.638
VVA-039	4274151.025	656545.514	579.265
VVA-040	4283668.388	643093.923	693.327
VVA-041	4287558.429	631870.192	906.086
VVA-042	4278887.338	625106.943	990.316
VVA-043	4271935.294	626437.431	728.238
VVA-044	4269266.987	644726.786	736.494
VVA-045	4261711.584	641044.043	742.531
VVA-046	4262367.190	647618.604	594.341

Virginia

POINT ID	NORTHING (m)	EASTING (m)	ELEV. (m)
NVA CHECK POINTS			
NVA-065	4138058.716	568717.177	457.226
NVA-066	4148854.224	562962.158	568.663
NVA-067	4137304.653	555367.920	748.514
NVA-068	4143629.396	542874.069	818.402
NVA-069	4129041.525	542873.221	575.861
NVA-070	4136880.719	529434.256	541.363
NVA-071	4126876.067	533709.789	521.828
NVA-072	4131521.874	523334.083	543.432
NVA-073	4136765.222	513141.441	509.032
NVA-074	4128640.921	512990.630	491.673
NVA-075	4121462.002	519408.396	736.688
NVA-076	4114172.240	510250.062	638.351
NVA-077	4120160.338	504111.690	682.190
NVA-078	4121832.992	490189.021	616.962
NVA-079	4114941.019	501639.443	645.946
NVA-080	4102174.524	501164.063	685.450
NVA-081	4088823.665	505132.986	632.624
NVA-082	4078252.321	512417.839	622.880
NVA-083	4081373.274	497680.937	707.431
NVA-084	4090276.589	493821.618	720.067
NVA-085	4106402.651	489895.984	760.412
NVA-086	4111625.760	486533.924	668.457
NVA-087	4108336.315	475031.795	961.623
NVA-088	4124321.204	478724.134	772.937
NVA-089	4119626.269	470187.202	758.660
NVA-090	4128755.382	469669.561	707.737
NVA-091	4109829.525	455906.039	739.582
NVA-092	4105127.099	470176.404	942.595
NVA-093	4100420.550	474587.088	829.465
NVA-094	4083323.266	475420.541	776.120
NVA-095	4074420.727	484409.390	702.023
NVA-096	4065026.025	485236.222	796.176
NVA-097	4056662.830	507092.570	718.010
NVA-098	4052895.357	486526.771	821.126
NVA-099	4064197.372	475459.117	932.763
NVA-100	4077278.068	474503.616	800.089

NVA-101	4083372.373	469717.797	758.354
NVA-102	13439669.836	1484683.539	2110.189
NVA-103	4103596.823	451198.671	841.419
NVA-104	4115921.626	444634.235	521.352
NVA-105	4116886.165	430481.116	910.264
NVA-106	4122168.128	418863.744	479.602
NVA-107	4129907.039	410841.482	404.940
NVA-108	4141956.475	409841.557	295.313
NVA-109	4114544.692	416444.738	499.363
NVA-110	4105628.752	428818.366	591.358
NVA-111	4095988.958	441638.568	715.281
NVA-112	4096113.726	429524.183	689.402
NVA-113	4083680.008	443232.591	625.496
NVA-114	4080169.221	462082.029	700.502
NVA-115	4073057.560	438884.876	624.088
NVA-116	4069903.363	462826.449	791.573
NVA-117	4066769.065	452191.398	748.936
NVA-118	4062150.360	460254.078	939.957
NVA-119	4049412.805	469843.728	763.730
NVA-120	4056325.448	463752.483	857.732
NVA-121	4050418.168	451930.758	969.122
NVA-122	4050657.181	443944.817	1090.464
NVA-123	4062376.609	436499.908	696.735
NVA-124	4070672.909	430339.350	664.573
NVA-125	4081446.947	431730.525	520.226
NVA-126	4087924.129	413238.216	684.256
NVA-127	4102817.777	407024.358	634.655
NVA-128	4114042.378	399439.052	572.580
NVA-129	4120928.700	397657.525	654.829
NVA-130	4134889.886	394458.038	282.676
NVA-131	4121969.337	380795.110	378.348
NVA-132	4105591.146	385436.799	478.286
NVA-133	4091191.331	395114.556	473.598
NVA-134	4084282.433	403214.801	631.874
NVA-135	4072117.409	408919.890	459.663
NVA-136	4061488.872	409807.916	642.649
NVA-137	4053630.932	429331.129	599.277
NVA-138	4054984.005	399188.495	560.752
NVA-139	4050745.521	391545.571	523.602

NVA-140	4073905.064	393210.231	634.847
NVA-141	4074083.045	380894.327	669.020
NVA-142	4085022.299	383111.890	452.876
NVA-143	4089332.368	368879.192	606.412
NVA-144	4097070.145	384751.214	545.681
NVA-145	4096255.318	363233.028	774.164
NVA-146	4102406.850	377009.463	737.299
NVA-147	4111085.867	376378.800	659.471
NVA-148	4119602.558	369126.019	556.619
NVA-149	4113245.210	364198.182	463.253
NVA-150	4105290.032	367542.635	459.195
NVA-151	4110144.323	358077.446	482.472
NVA-152	4103225.216	351508.880	718.825
NVA-153	4088904.570	355181.889	649.481
NVA-154	4081280.111	364198.345	847.883
NVA-155	4077164.363	369323.886	412.552
NVA-156	4063827.767	376846.949	531.996
NVA-157	4055911.905	372897.362	401.734
NVA-158	4061569.306	367203.022	485.022
NVA-159	4070783.449	359015.362	386.478
NVA-160	4078976.961	350881.297	973.622
NVA-161	4081693.295	341267.483	448.021
NVA-162	4091299.424	341425.324	574.873
NVA-163	4081553.102	331006.254	644.971
NVA-164	4075636.996	340775.506	586.149
NVA-165	4066602.492	348788.593	466.339
NVA-166	4056413.225	359675.921	411.919
NVA-167	4056439.996	344479.680	410.062
NVA-168	4066108.768	339164.737	414.728
NVA-169	4071630.521	331385.325	457.401
NVA-170	4078363.317	318647.577	527.179
NVA-171	4068891.524	316861.867	434.473
NVA-172	4065415.938	329233.494	565.724
NVA-173	4057125.263	333058.613	372.976
NVA-174	4055160.189	317373.089	383.603
NVA-175	4062076.597	309981.018	437.183
NVA-176	4054105.343	307412.202	426.736
NVA-177	4063137.755	295379.546	433.421
NVA-178	4057169.507	291528.562	427.725

NVA-179	4056685.962	280309.880	419.628
NVA-180	4053722.300	265092.667	369.857
VVA			
VVA-047	4145196.383	559722.582	535.466
VVA-048	4139778.119	562526.101	757.912
VVA-049	4138416.566	547561.065	620.999
VVA-050	4135901.310	533863.502	1265.326
VVA-051	4133799.811	546050.066	701.632
VVA-052	4122026.598	528766.225	579.295
VVA-053	4140680.248	513618.984	453.721
VVA-054	4117185.122	515717.498	597.731
VVA-055	4125877.015	506617.632	523.123
VVA-056	4114319.702	506564.424	631.437
VVA-057	4120885.347	489361.285	620.818
VVA-058	4127246.521	467313.082	769.508
VVA-059	4118862.825	474755.974	1103.243
VVA-060	4108551.118	485064.145	952.839
VVA-061	4096370.620	503890.297	679.881
VVA-062	4096035.863	483068.790	713.778
VVA-063	4080664.506	490183.019	812.320
VVA-064	4086140.571	510881.080	642.634
VVA-065	4049571.930	501853.721	763.605
VVA-066	4061124.979	484818.997	815.913
VVA-067	4072074.545	472350.459	812.797
VVA-068	4090992.417	465169.154	809.788
VVA-069	4098419.714	465611.797	721.218
VVA-070	4121148.017	456175.314	657.252
VVA-071	4116354.663	448613.911	704.733
VVA-072	4115134.246	437396.857	689.928
VVA-073	4122212.941	428162.477	803.257
VVA-074	4131832.810	413555.206	511.454
VVA-075	4145029.345	406311.279	280.220
VVA-076	4135702.732	402179.108	397.679
VVA-077	4114001.186	422176.273	831.570
VVA-078	4108008.835	437445.421	639.441
VVA-079	4089336.491	435347.070	1224.106
VVA-080	4089741.627	448575.316	593.395
VVA-081	4079863.692	466399.994	812.672
VVA-082	4078620.462	437990.797	722.178

VVA-083	4067420.910	455110.555	781.847
VVA-084	4060107.408	471691.039	862.972
VVA-085	4052386.347	458798.697	972.077
VVA-086	4056831.477	438318.545	925.678
VVA-087	4077130.672	427744.113	608.511
VVA-088	4091631.002	419110.733	723.175
VVA-089	4100037.688	410195.307	666.585
VVA-090	4115509.421	404285.020	450.448
VVA-091	4127089.424	390682.009	635.545
VVA-092	4122077.661	377204.271	534.848
VVA-093	4109586.643	390687.933	406.776
VVA-094	4092756.688	402490.703	475.169
VVA-095	4076306.477	414175.500	523.468
VVA-096	4058226.561	420777.039	574.556
VVA-097	4051134.642	408479.202	534.205
VVA-098	4068152.071	397854.470	438.218
VVA-099	4084436.088	392650.368	542.875
VVA-100	4100478.650	377864.543	500.829
VVA-101	4115108.464	373278.527	535.241
VVA-102	4113426.923	356287.066	629.649
VVA-103	4102358.735	362287.555	495.363
VVA-104	4095685.828	369624.258	797.243
VVA-105	4091104.613	378719.774	857.703
VVA-106	4083220.198	373343.985	585.846
VVA-107	4070872.097	383838.465	540.918
VVA-108	4064277.116	386639.000	423.854
VVA-109	4055089.543	390801.451	616.383
VVA-110	4051673.347	374066.176	493.282
VVA-111	4065352.449	371065.067	602.410
VVA-112	4076947.154	364929.278	436.772
VVA-113	4086712.841	354588.996	968.501
VVA-114	4097526.676	346254.781	653.673
VVA-115	4106855.071	350531.856	505.494
VVA-116	4092098.582	336762.438	599.090
VVA-117	4080791.564	347875.019	503.674
VVA-118	4064645.276	354448.511	460.088
VVA-119	4056114.960	348748.204	491.610
VVA-120	4067855.477	339553.642	429.186
VVA-122	4075174.568	316401.019	466.998

VVA-123	4065644.052	323065.397	477.637
VVA-124	4056086.160	325628.985	445.872
VVA-125	4055662.729	315079.079	431.951
VVA-126	4067054.799	306408.004	486.725
VVA-127	4063315.896	298953.317	500.715
VVA-128	4054509.531	295682.925	404.660
VVA-129	4054483.093	282638.475	467.836
VVA-130	4057340.982	271750.810	444.156

4. GPS OBSERVATIONS

West Virginia

POINT ID	OBSERV. DATE	JULIAN DATE	TIME OF DAY	RE-OBSERV. DATE	RE-OBSERV. TIME
NVA-001	11/18/2016	323	15:00	12/2/2016	9:53
NVA-002	11/19/2016	324	10:35	12/1/2016	12:30
NVA-003	11/19/2016	324	14:00	12/1/2016	10:18
NVA-004	11/20/2016	325	8:20	N/A	N/A
NVA-005	11/20/2016	325	10:30	N/A	N/A
NVA-006	11/19/2016	324	10:00	12/1/2016	12:55
NVA-007	11/19/2016	324	9:15	12/2/2016	10:02
NVA-008	11/20/2016	325	15:30	11/21/2016	15:45
NVA-009	11/21/2016	326	14:30	12/1/2016	14:40
NVA-010	11/21/2016	326	15:15	12/1/2016	16:07
NVA-011	12/1/2016	336	17:00	N/A	N/A
NVA-012	11/23/2016	328	15:45	N/A	N/A
NVA-013	11/21/2016	326	16:30	12/3/2016	10:03
NVA-014	11/23/2016	328	11:45	11/23/2016	11:50
NVA-015	11/20/2016	325	14:00	12/2/2016	17:05
NVA-016	11/20/2016	325	15:00	12/2/2016	11:18
NVA-017	11/20/2016	325	16:25	N/A	N/A
NVA-018	11/21/2016	326	10:30	12/2/2016	13:23
NVA-019	11/21/2016	326	12:45	12/2/2016	15:30
NVA-020	11/22/2016	327	14:20	12/3/2016	8:42
NVA-021	11/23/2016	328	11:00	11/23/2016	11:10
NVA-022	12/3/2016	338	12:00	N/A	N/A
NVA-023	11/23/2016	328	9:50	11/23/2016	9:55
NVA-024	11/22/2016	327	13:20	12/3/2016	13:36
NVA-025	11/22/2016	327	11:57	11/22/2016	12:10
NVA-026	11/22/2016	327	11:05	11/22/2016	11:10
NVA-027	11/21/2016	326	11:40	12/2/2016	14:27
NVA-028	11/22/2016	327	9:25	N/A	N/A
NVA-029	11/22/2016	327	10:00	11/22/2016	10:15
NVA-030	12/3/2016	338	15:50	11/22/2016	15:55
NVA-031	12/2/2016	337	15:55	12/3/2016	9:03
NVA-032	11/23/2016	328	9:30	11/23/2016	9:40
NVA-033	11/23/2016	328	14:15	11/23/2016	14:30
NVA-034	12/1/2016	336	9:22	12/1/2016	15:06
NVA-035	12/2/2016	337	11:38	12/3/2016	9:43
NVA-036	12/3/2016	338	14:35	12/4/2016	8:40

NVA-037	12/3/2016	338	17:00	12/4/2016	11:12
NVA-038	12/3/2016	338	15:15	12/3/2016	15:20
NVA-039	12/4/2016	339	14:26	12/5/2016	9:38
NVA-040	12/2/2016	337	12:22	12/3/2016	11:20
NVA-041	12/1/2016	336	13:47	12/2/2016	8:12
NVA-042	12/1/2016	336	11:57	N/A	N/A
NVA-043	12/3/2016	338	12:40	12/4/2016	8:20
NVA-044	12/7/2016	342	12:42	12/8/2016	11:15
NVA-045	12/7/2016	342	13:47	N/A	N/A
NVA-046	12/4/2016	339	16:35	12/5/2016	7:26
NVA-047	12/5/2016	340	10:25	12/6/2016	9:03
NVA-048	12/8/2016	343	8:05	12/8/2016	12:40
NVA-049	12/3/2016	338	13:50	12/4/2016	9:28
NVA-050	12/3/2016	338	15:29	12/4/2016	10:56
NVA-051	12/7/2016	342	15:59	N/A	N/A
NVA-052	12/5/2016	340	12:43	12/6/2016	10:15
NVA-053	12/5/2016	340	13:23	12/6/2016	10:53
NVA-054	12/6/2016	341	16:25	12/7/2016	14:03
NVA-055	12/5/2016	340	12:43	N/A	N/A
NVA-056	12/3/2016	338	16:09	12/4/2016	11:33
NVA-057	12/5/2016	340	11:20	12/5/2016	17:25
NVA-058	12/6/2016	341	9:00	12/6/2016	13:50
NVA-059	12/7/2016	342	15:30	12/8/2016	9:07
NVA-060	12/6/2016	341	15:48	12/7/2016	14:18
NVA-061	12/7/2016	342	11:30	12/7/2016	17:15
NVA-062	12/7/2016	342	10:17	12/7/2016	15:06
NVA-063	12/6/2016	341	11:36	12/6/2016	16:05
NVA-064	12/5/2016	340	9:58	N/A	N/A
VVA-001	11/19/2016	324	8:50	12/2/2016	9:35
VVA-002	11/19/2016	324	10:30	12/1/2016	13:33
VVA-003	11/19/2016	324	12:50	12/1/2016	11:30
VVA-004	11/20/2016	325	14:00	11/9/2016	14:10
VVA-005	11/20/2016	325	8:45	11/20/2016	9:00
VVA-006	11/20/2016	325	9:50	12/1/2016	2:51
VVA-007	11/20/2016	325	12:20	11/20/2016	12:30
VVA-008	11/20/2016	325	15:45	12/2/2016	10:36
VVA-009	11/20/2016	325	16:45	12/2/2016	12:45
VVA-010	11/20/2016	325	14:20	12/2/2016	16:45
VVA-011	11/21/2016	324	13:50	N/A	N/A
VVA-012	11/21/2016	324	15:40	N/A	N/A
VVA-013	11/21/2016	326	17:10	12/3/2016	10:32

VVA-014	12/3/2016	338	11:40	N/A	N/A
VVA-015	11/23/2016	328	11:25	11/23/2016	11:30
VVA-016	11/21/2016	324	13:20	12/3/2016	8:05
VVA-017	11/21/2016	324	12:20	11/21/2016	12:30
VVA-018	11/22/2016	327	8:50	12/2/2016	12:02
VVA-019	11/22/2016	327	11:30	12/2/2016	16:16
VVA-020	11/22/2016	327	13:50	11/22/2016	14:00
VVA-021	11/23/2016	328	10:30	11/23/2016	10:40
VVA-022	11/23/2016	328	13:00	12/3/2016	12:26
VVA-023	11/23/2016	328	14:50	11/23/2016	15:00
VVA-024	12/1/2016	336	10:20	12/1/2016	15:31
VVA-025	12/2/2016	337	16:37	N/A	N/A
VVA-026	12/3/2016	338	16:15	12/4/2016	9:10
VVA-027	12/4/2016	339	13:17	N/A	N/A
VVA-028	12/4/2016	339	10:08	12/5/2016	8:18
VVA-029	12/4/2016	339	16:10	12/4/2016	16:00
VVA-030	12/2/2016	337	14:36	N/A	N/A
VVA-031	12/1/2016	336	11:12	12/2/2016	10:43
VVA-032	12/1/2016	336	13:11	12/2/2016	8:46
VVA-033	12/3/2016	338	13:17	N/A	N/A
VVA-034	12/7/2016	342	14:18	12/8/2016	8:19
VVA-035	12/5/2016	340	10:48	N/A	N/A
VVA-036	12/5/2016	340	14:51	N/A	N/A
VVA-037	12/5/2016	340	16:20	N/A	N/A
VVA-038	12/7/2016	342	11:09	12/8/2016	9:39
VVA-039	12/3/2016	338	16:42	12/4/2016	12:04
VVA-040	12/4/2016	339	15:42	12/5/2016	12:54
VVA-041	12/6/2016	341	16:44	12/7/2016	13:47
VVA-042	12/7/2016	342	12:12	12/8/2016	10:36
VVA-043	12/7/2016	342	9:57	N/A	N/A
VVA-044	12/6/2016	341	10:11	N/A	N/A
VVA-045	12/6/2016	341	12:18	12/7/2016	8:55
VVA-046	12/5/2016	340	10:37	12/5/2016	16:45

Virginia

POINT ID	OBSERV. DATE	JULIAN DATE	TIME OF DAY	RE-OBSERV. DATE	RE-OBSERV. TIME
NVA's					
NVA-065	11/7/2016	312	18:35	11/18/2016	7:32
NVA-066	11/8/2016	313	13:01	11/9/2016	10:07

NVA-067	11/7/2016	312	17:03	11/8/2016	9:33
NVA-068	11/8/2016	313	14:14	11/9/2016	11:13
NVA-069	11/8/2016	313	7:58	12/18/2016	15:02
NVA-070	11/8/2016	313	15:30	N/A	N/A
NVA-071	11/8/2016	313	9:45	12/18/2016	15:45
NVA-072	11/8/2016	313	16:10	N/A	N/A
NVA-073	11/9/2016	314	14:52	12/21/2016	8:00
NVA-074	11/9/2016	314	16:15	N/A	N/A
NVA-075	11/8/2016	313	11:07	12/21/2016	15:27
NVA-076	11/8/2016	313	13:30	12/21/2016	14:48
NVA-077	11/8/2016	313	16:16	12/21/2016	14:03
NVA-078	11/10/2016	315	8:45	N/A	N/A
NVA-079	11/8/2016	313	15:22	12/21/2016	1:45
NVA-080	11/9/2016	314	9:40	N/A	N/A
NVA-081	11/9/2016	314	12:35	12/21/2016	14:54
NVA-082	11/9/2016	314	14:20	12/21/2016	13:02
NVA-083	11/10/2016	315	14:34	12/21/2016	12:24
NVA-084	11/10/2016	315	12:28	12/21/2016	15:16
NVA-085	11/9/2016	314	15:22	12/21/2016	12:45
NVA-086	11/9/2016	314	16:37	12/21/2016	11:42
NVA-087	11/12/2016	317	11:20	12/20/2016	16:22
NVA-088	11/10/2016	315	12:01	12/20/2016	17:00
NVA-089	11/10/2016	315	11:30	12/21/2016	10:25
NVA-090	11/10/2016	315	12:50	12/20/2016	16:30
NVA-091	11/11/2016	316	11:00	N/A	N/A
NVA-092	11/12/2016	317	10:51	12/20/2016	16:41
NVA-093	11/12/2016	317	10:03	12/20/2016	17:17
NVA-094	11/12/2016	317	16:01	12/20/2016	13:22
NVA-095	11/10/2016	315	16:30	11/11/2016	8:25
NVA-096	11/13/2016	318	11:00	11/14/2016	7:55
NVA-097	11/13/2016	318	15:48	N/A	N/A
NVA-098	11/13/2016	318	12:19	11/14/2016	10:06
NVA-099	11/14/2016	319	15:20	11/15/2016	9:15
NVA-100	11/12/2016	317	15:37	12/20/2016	12:10
NVA-101	11/12/2016	317	16:24	12/20/2016	13:06
NVA-102	11/11/2016	316	15:52	11/12/2016	8:04
NVA-103	11/11/2016	316	12:50	12/20/2016	13:30
NVA-104	11/10/2016	315	15:50	11/10/2016	16:00
NVA-105	11/18/2016	323	13:23	12/19/2016	9:28

NVA-106	11/18/2016	323	15:23	11/19/2016	8:00
NVA-107	12/19/2016	354	10:45	12/20/2016	12:55
NVA-108	12/19/2016	354	9:59	N/A	N/A
NVA-109	12/18/2016	353	13:41	N/A	N/A
NVA-110	11/17/2016	322	15:08	12/19/2016	11:08
NVA-111	11/11/2016	316	14:52	11/12/2016	9:25
NVA-112	11/12/2016	317	11:00	N/A	N/A
NVA-113	11/17/2016	322	10:20	12/19/2016	13:40
NVA-114	11/14/2016	319	17:30	12/20/2016	12:48
NVA-115	11/16/2016	321	15:31	12/19/2016	16:31
NVA-116	11/14/2016	319	16:31	12/20/2016	10:37
NVA-117	11/16/2016	321	7:37	11/16/2016	13:55
NVA-118	11/14/2016	319	13:51	11/15/2016	7:19
NVA-119	11/14/2016	319	10:55	11/15/2016	10:14
NVA-120	11/14/2016	319	11:41	11/15/2016	10:49
NVA-121	11/15/2016	320	12:27	11/16/2016	11:12
NVA-122	11/15/2016	320	13:43	11/16/2016	9:58
NVA-123	11/15/2016	320	16:30	12/20/2016	9:28
NVA-124	11/18/2016	323	7:33	12/19/2016	17:18
NVA-125	11/17/2016	322	9:22	12/19/2016	14:18
NVA-126	12/15/2016	350	13:54	N/A	N/A
NVA-127	12/16/2016	351	16:00	12/17/2016	11:38
NVA-128	12/17/2016	352	13:04	N/A	N/A
NVA-129	12/17/2016	352	14:32	N/A	N/A
NVA-130	12/18/2016	353	15:17	N/A	N/A
NVA-131	12/18/2016	353	12:34	12/19/2016	13:42
NVA-132	12/17/2016	352	16:25	12/18/2016	9:53
NVA-133	12/15/2016	350	16:15	N/A	N/A
NVA-134	12/14/2016	349	16:30	N/A	N/A
NVA-135	12/14/2016	349	14:45	N/A	N/A
NVA-136	12/13/2016	348	12:10	12/14/2016	15:59
NVA-137	12/15/2016	350	8:25	12/16/2016	8:43
NVA-138	12/13/2016	348	11:28	12/14/2016	12:48
NVA-139	12/13/2016	348	10:24	12/14/2016	10:30
NVA-140	12/14/2016	349	16:32	N/A	N/A
NVA-141	12/14/2016	349	15:41	N/A	N/A
NVA-142	12/15/2016	350	15:16	12/17/2016	15:18
NVA-143	12/16/2016	351	9:14	12/18/2016	9:08
NVA-144	12/17/2016	352	17:10	12/18/2016	9:09

NVA-145	12/17/2016	352	12:55	12/18/2016	15:44
NVA-146	12/18/2016	353	15:22	12/19/2016	12:10
NVA-147	12/17/2016	352	15:11	N/A	N/A
NVA-148	12/18/2016	353	11:05	12/19/2016	12:12
NVA-149	12/17/2016	352	16:49	N/A	N/A
NVA-150	12/17/2016	352	13:45	12/19/2016	13:45
NVA-151	12/17/2016	352	17:58	12/19/2016	9:36
NVA-152	12/16/2016	351	15:29	N/A	N/A
NVA-153	12/16/2016	351	10:00	N/A	N/A
NVA-154	12/15/2016	350	13:15	N/A	N/A
NVA-155	12/15/2016	350	12:18	12/17/2016	12:24
NVA-156	12/14/2016	349	13:02	N/A	N/A
NVA-157	12/14/2016	345	16:40	N/A	N/A
NVA-158	12/14/2016	349	12:23	12/15/2016	10:51
NVA-159	12/15/2016	350	10:18	12/17/2016	10:35
NVA-160	12/12/2016	347	15:58	12/16/2016	16:38
NVA-161	12/12/2016	347	14:13	N/A	N/A
NVA-162	12/16/2016	351	13:08	N/A	N/A
NVA-163	12/12/2016	347	13:22	N/A	N/A
NVA-164	12/12/2016	347	16:56	N/A	N/A
NVA-165	12/15/2016	350	9:36	12/17/2016	9:54
NVA-166	12/10/2016	345	15:20	12/12/2016	10:19
NVA-167	12/10/2016	345	13:55	12/12/2016	9:35
NVA-168	12/10/2016	346	16:43	12/12/2016	15:32
NVA-169	12/12/2016	347	9:22	12/13/2016	14:53
NVA-170	12/12/2016	347	11:34	12/16/2016	12:37
NVA-171	12/11/2016	346	13:00	12/13/2016	1:28
NVA-172	12/11/2016	346	15:00	N/A	N/A
NVA-173	12/10/2016	345	10:29	N/A	N/A
NVA-174	12/19/2016	354	16:45	N/A	N/A
NVA-175	12/11/2016	346	10:16	12/13/2016	9:53
NVA-176	12/9/2016	344	14:05	12/11/2016	12:49
NVA-177	12/9/2016	344	9:35	12/10/2016	16:42
NVA-178	12/9/2016	344	10:33	12/10/2016	15:17
NVA-179	12/8/2016	343	14:43	12/10/2016	13:26
NVA-180	12/8/2016	343	12:47	12/10/2016	12:47
VVA's					
VVA-47	11/8/2016	313	12:22	N/A	N/A

VVA-48	11/7/2016	312	16:23	12/20/2016	4:32
VVA-49	11/8/2016	313	11:03	N/A	N/A
VVA-50	11/9/2016	314	17:35	11/10/2016	11:00
VVA-51	11/8/2016	313	7:01	12/18/2016	14:21
VVA-52	11/8/2016	313	10:24	12/18/2016	16:15
VVA-53	11/9/2016	314	15:30	12/21/2016	8:34
VVA-54	11/8/2016	313	12:24	11/9/2016	8:27
VVA-55	11/10/2016	315	7:26	11/11/2016	7:30
VVA-56	11/8/2016	313	14:17	12/21/2016	2:26
VVA-57	11/10/2016	315	10:18	12/21/2016	11:05
VVA-58	11/10/2016	315	14:00	12/20/2016	15:35
VVA-59	11/11/2016	316	11:02	N/A	N/A
VVA-60	11/9/2016	314	15:57	12/21/2016	12:15
VVA-61	11/9/2016	314	11:50	N/A	N/A
VVA-62	11/10/2016	315	10:47	12/20/2016	13:52
VVA-63	11/10/2016	315	15:21	12/21/2016	11:46
VVA-64	11/9/2016	314	13:10	12/21/2016	14:08
VVA-65	11/13/2016	318	13:54	11/14/2016	9:20
VVA-66	11/13/2016	318	11:35	11/14/2016	8:26
VVA-67	11/12/2016	317	14:45	12/20/2016	11:25
VVA-68	11/11/2016	316	15:41	11/12/2016	8:15
VVA-69	11/12/2016	317	9:09	11/13/2016	7:25
VVA-70	11/10/2016	315	14:56	11/11/2016	9:40
VVA-71	11/10/2016	315	16:45	12/20/2016	14:25
VVA-72	11/18/2016	323	12:31	11/19/2016	11:11
VVA-73	11/18/2016	323	14:39	11/19/2016	8:58
VVA-74	12/18/2016	353	17:00	12/20/2016	12:00
VVA-75	12/19/2016	354	8:55	N/A	N/A
VVA-76	12/18/2016	353	16:01	12/20/2016	9:39
VVA-77	11/19/2016	324	6:59	N/A	N/A
VVA-78	11/18/2016	323	11:03	N/A	N/A
VVA-79	11/17/2016	322	12:29	11/17/2018	12:42
VVA-80	12/19/2016	354	12:30	N/A	N/A
VVA-81	11/14/2016	319	17:04	12/20/2016	12:53
VVA-82	11/17/2016	322	7:54	12/19/2016	16:05
VVA-83	11/16/2016	321	6:59	11/16/2016	2:32
VVA-84	12/20/2016	355	9:42	12/21/2016	7:09
VVA-85	11/14/2016	319	12:26	11/15/2016	11:29
VVA-86	11/16/2016	321	14:46	12/20/2016	8:03

VVA-87	11/17/2016	322	8:37	N/A	N/A
VVA-88	11/15/2016	350	14:30	N/A	N/A
VVA-89	12/15/2016	350	15:17	12/16/2017	11:57
VVA-90	12/17/2016	352	13:51	12/18/2016	12:21
VVA-91	12/18/2016	353	13:38	N/A	N/A
VVA-92	12/18/2016	353	11:51	N/A	N/A
VVA-93	12/7/2016	342	15:34	12/18/2016	10:47
VVA-94	12/15/2016	350	12:50	N/A	N/A
VVA-95	12/14/2016	349	15:30	12/15/2016	12:18
VVA-96	12/13/2016	348	13:54	N/A	N/A
VVA-97	12/13/2016	348	17:23	N/A	N/A
VVA-98	12/13/2016	348	13:32	N/A	N/A
VVA-99	12/15/2016	350	16:36	12/17/2016	16:33
VVA-100	12/18/2016	353	16:06	N/A	N/A
VVA-101	12/17/2016	352	16:00	N/A	N/A
VVA-102	12/19/2016	354	10:09	N/A	N/A
VVA-103	1/10/2016	10	7:52	N/A	N/A
VVA-104	12/19/2016	354	10:37	N/A	N/A
VVA-105	12/19/2016	354	9:54	12/20/2016	10:20
VVA-106	12/15/2016	350	14:16	12/17/2016	14:12
VVA-107	12/14/2016	349	15:01	N/A	N/A
VVA-108	12/13/2016	348	14:33	N/A	N/A
VVA-109	12/13/2016	348	9:14	12/14/2016	11:40
VVA-110	12/10/2016	345	17:19	12/12/2016	13:33
VVA-111	12/14/2016	349	14:16	12/15/2016	12:12
VVA-112	12/15/2016	350	11:40	N/A	N/A
VVA-113	12/16/2016	351	10:39	N/A	N/A
VVA-114	12/16/2016	351	14:14	12/18/2016	13:56
VVA-115	1/10/2016	10	9:32	N/A	N/A
VVA-116	12/16/2016	351	12:12	N/A	N/A
VVA-117	12/12/2016	347	14:56	12/16/2016	15:54
VVA-118	12/15/2016	350	8:55	N/A	N/A
VVA-119	12/10/2016	345	14:37	N/A	N/A
VVA-120	12/11/2016	346	17:19	N/A	N/A
VVA-122	12/12/2016	347	10:58	12/16/2016	12:04
VVA-123	12/11/2016	346	14:23	N/A	N/A
VVA-124	12/10/2016	345	9:48	N/A	N/A
VVA-125	12/9/2016	344	14:52	N/A	N/A
VVA-126	12/11/2016	346	12:18	12/13/2016	11:47

VVA-127	12/11/2016	346	10:57	12/13/2016	10:31
VVA-128	12/9/2016	344	12:03	N/A	N/A
VVA-129	12/8/2016	343	15:53	N/A	N/A
VVA-130	1/10/2016	10	14:40	N/A	N/A

5. POINT COMPARISON

West Virginia

POINT ID	POINT CK	DELTA NORTH (m)	DELTA EAST (m)	VERT. DIFF (m)
NVA's				
NVA-001	NVA-001CK	0.005	0.001	0.013
NVA-002	NVA-002CK	0.002	0.006	0.029
NVA-003	NVA-003CK	0.002	0.009	0.037
NVA-006	NVA-006CK	0.019	0.006	0.013
NVA-007	NVA-007CK	0.003	0.004	0.005
NVA-008	NVA-008CK	0.010	0.012	0.008
NVA-009	NVA-009CK	0.000	0.009	0.000
NVA-010	NVA-010CK	0.021	0.002	0.035
NVA-013	NVA-013CK	0.035	0.004	0.014
NVA-014	NVA-014CK	0.002	0.006	0.001
NVA-015	NVA-015CK	0.004	0.006	0.023
NVA-016	NVA-016CK	0.001	0.010	0.020
NVA-018	NVA-018CK	0.024	0.004	0.003
NVA-019	NVA-019CK	0.001	0.018	0.003
NVA-020	NVA-020CK	0.011	0.020	0.011
NVA-021	NVA-021CK	0.003	0.007	0.003
NVA-023	NVA-023CK	0.001	0.005	0.012
NVA-024	NVA-024CK	0.004	0.005	0.000
NVA-025	NVA-025CK	0.002	0.006	0.006
NVA-026	NVA-026CK	0.002	0.001	0.011
NVA-027	NVA-027CK	0.009	0.006	0.003
NVA-029	NVA-029CK	0.005	0.002	0.001
NVA-030	NVA-030CK	0.002	0.004	0.000
NVA-031	NVA-031CK	0.003	0.014	0.028
NVA-032	NVA-032CK	0.000	0.000	0.006
NVA-033	NVA-033CK	0.002	0.003	0.037
NVA-034	NVA-034CK	0.001	0.011	0.003
NVA-035	NVA-035CK	0.008	0.030	0.018
NVA-036	NVA-036CK	0.005	0.004	0.007
NVA-037	NVA-037CK	0.003	0.006	0.021
NVA-038	NVA-038CK	0.009	0.002	0.010
NVA-039	NVA-039CK	0.017	0.001	0.010
NVA-040	NVA-040CK	0.003	0.004	0.030
NVA-041	NVA-041CK	0.005	0.003	0.016

NVA-043	NVA-043CK	0.005	0.007	0.002
NVA-044	NVA-044CK	0.002	0.008	0.031
NVA-046	NVA-046CK	0.008	0.001	0.020
NVA-047	NVA-047CK	0.012	0.002	0.007
NVA-048	NVA-048CK	0.002	0.015	0.021
NVA-049	NVA-049CK	0.002	0.000	0.040
NVA-050	NVA-050CK	0.017	0.001	0.002
NVA-052	NVA-052CK	0.004	0.002	0.023
NVA-053	NVA-053CK	0.021	0.010	0.041
NVA-054	NVA-054CK	0.011	0.013	0.041
NVA-056	NVA-056CK	0.001	0.004	0.028
NVA-057	NVA-057CK	0.000	0.001	0.010
NVA-058	NVA-058CK	0.007	0.017	0.114
NVA-059	NVA-059CK	0.009	0.010	0.008
NVA-060	NVA-060CK	0.007	0.013	0.003
NVA-061	NVA-061CK	0.003	0.012	0.012
NVA-062	NVA-062CK	0.001	0.008	0.004
NVA-063	NVA-063CK	0.006	0.010	0.023
VVA's				
VVA-001	VVA-001CK	0.000	0.009	0.011
VVA-002	VVA-002CK	0.006	0.013	0.013
VVA-003	VVA-003CK	0.017	0.001	0.028
VVA-004	VVA-004CK	0.011	0.006	0.021
VVA-005	VVA-005CK	0.008	0.001	0.008
VVA-006	VVA-006CK	0.033	0.034	0.030
VVA-007	VVA-007CK	0.001	0.003	0.000
VVA-008	VVA-008CK	0.027	0.019	0.025
VVA-009	VVA-009CK	0.010	0.014	0.009
VVA-010	VVA-010CK	0.004	0.014	0.035
VVA-013	VVA-013CK	0.015	0.002	0.019
VVA-015	VVA-015CK	0.017	0.031	0.041
VVA-016	VVA-016CK	0.025	0.002	0.004
VVA-017	VVA-017CK	0.008	0.007	0.000
VVA-018	VVA-018CK	0.029	0.022	0.034
VVA-019	VVA-019CK	0.009	0.009	0.005
VVA-020	VVA-020CK	0.001	0.003	0.004
VVA-021	VVA-021CK	0.002	0.010	0.018
VVA-022	VVA-022CK	0.027	0.000	0.029

VVA-023	VVA-023CK	0.000	0.002	0.019
VVA-024	VVA-024CK	0.008	0.010	0.006
VVA-026	VVA-026CK	0.009	0.003	0.009
VVA-028	VVA-028CK	0.047	0.002	0.050
VVA-029	VVA-029CK	0.006	0.010	0.013
VVA-031	VVA-031CK	0.005	0.001	0.029
VVA-032	VVA-032CK	0.009	0.012	0.024
VVA-034	VVA-034CK	0.026	0.017	0.025
VVA-038	VVA-038CK	0.005	0.021	0.001
VVA-039	VVA-039CK	0.018	0.009	0.011
VVA-040	VVA-040CK	0.008	0.019	0.031
VVA-041	VVA-041CK	0.001	0.001	0.020
VVA-042	VVA-042CK	0.031	0.006	0.042
VVA-045	VVA-045CK	0.011	0.028	0.012
VVA-046	VVA-046CK	0.004	0.006	0.003

Virginia

POINT ID	POINT CK	DELTA NORTH (m)	DELTA EAST (m)	VERT. DIFF (m)
NVA				
NVA-065	NVA-065CK	0.000	0.007	0.015
NVA-066	NVA-066CK	0.015	0.024	0.007
NVA-067	NVA-067CK	0.014	0.003	0.013
NVA-068	NVA-068CK	0.009	0.003	0.006
NVA-069	NVA-069CK	0.023	0.029	0.002
NVA-071	NVA-071CK	0.013	0.020	0.012
NVA-073	NVA-073CK	0.002	0.002	0.008
NVA-075	NVA-075CK	0.017	0.012	0.008
NVA-076	NVA-076CK	0.013	0.012	0.004
NVA-077	NVA-077CK	0.003	0.011	0.036
NVA-079	NVA-079CK	0.006	0.015	0.040
NVA-081	NVA-081CK	0.002	0.002	0.003
NVA-082	NVA-082CK	0.006	0.002	0.025
NVA-083	NVA-083CK	0.004	0.012	0.047
NVA-084	NVA-084CK	0.007	0.000	0.045
NVA-085	NVA-085CK	0.006	0.008	0.035
NVA-086	NVA-086CK	0.012	0.017	0.008
NVA-087	NVA-087CK	0.022	0.013	0.024
NVA-088	NVA-088CK	0.016	0.003	0.019
NVA-089	NVA-089CK	0.013	0.004	0.033

NVA-090	NVA-090CK	0.004	0.005	0.027
NVA-092	NVA-092CK	0.007	0.005	0.016
NVA-093	NVA-093CK	0.006	0.012	0.015
NVA-094	NVA-094CK	0.009	0.017	0.004
NVA-095	NVA-095CK	0.004	0.001	0.004
NVA-096	NVA-096CK	0.002	0.008	0.009
NVA-098	NVA-098 CK	0.007	0.012	0.040
NVA-099	NVA-099 CK	0.008	0.001	0.036
NVA-100	NVA-100CK	0.011	0.017	0.038
NVA-101	NVA-101CK	0.016	0.003	0.024
NVA-102	NVA-102CK	0.017	0.002	0.003
NVA-103	NVA-103CK	0.000	0.002	0.002
NVA-104	NVA-104CK	0.004	0.003	0.047
NVA-105	NVA-105CK	0.001	0.004	0.006
NVA-106	NVA-106CK	0.004	0.000	0.002
NVA-107	NVA-107CK	0.021	0.005	0.005
NVA-110	NVA-110CK	0.007	0.002	0.030
NVA-111	NVA-111CK	0.007	0.005	0.049
NVA-113	NVA-113CK	0.004	0.006	0.004
NVA-114	NVA-114CK	0.006	0.005	0.035
NVA-115	NVA-115CK	0.018	0.025	0.034
NVA-116	NVA-116CK	0.010	0.001	0.022
NVA-117	NVA-117CK	0.009	0.007	0.006
NVA-118	NVA-118CK	0.012	0.005	0.025
NVA-119	NVA-119CK	0.001	0.001	0.014
NVA-120	NVA-120CK	0.002	0.011	0.007
NVA-121	NVA-121CK	0.002	0.012	0.027
NVA-122	NVA-122CK	0.009	0.002	0.043
NVA-123	NVA-123CK	0.009	0.020	0.035
NVA-124	NVA-124CK	0.030	0.003	0.006
NVA-125	NVA-125CK	0.012	0.014	0.016
NVA-127	NVA-127CK	0.031	0.017	0.038
NVA-131	NVA-131CK	0.008	0.001	0.037
NVA-132	NVA-132CK	0.002	0.002	0.028
NVA-136	NVA-136CK	0.001	0.011	0.023
NVA-137	NVA-137CK	0.015	0.021	0.005
NVA-138	NVA-138CK	0.007	0.017	0.021
NVA-139	NVA-139CK	0.013	0.004	0.034
NVA-142	NVA-142CK	0.027	0.013	0.037

NVA-143	NVA-143CK	0.005	0.014	0.012
NVA-144	NVA-144CK	0.010	0.013	0.042
NVA-145	NVA-145CK	0.002	0.012	0.027
NVA-146	NVA-146CK	0.020	0.011	0.006
NVA-148	NVA-148CK	0.001	0.010	0.001
NVA-150	NVA-150CK	0.009	0.019	0.033
NVA-151	NVA-151CK	0.006	0.003	0.020
NVA-155	NVA-155CK	0.021	0.018	0.030
NVA-158	NVA-158CK	0.014	0.002	0.002
NVA-159	NVA-159CK	0.031	0.009	0.018
NVA-160	NVA-160CK	0.002	0.016	0.014
NVA-165	NVA-165CK	0.030	0.011	0.037
NVA-166	NVA-166CK	0.013	0.014	0.035
NVA-167	NVA-167CK	0.002	0.003	0.008
NVA-168	NVA-168CK	0.002	0.003	0.008
NVA-169	NVA-169CK	0.011	0.005	0.024
NVA-170	NVA-170CK	0.015	0.011	0.025
NVA-171	NVA-171CK	0.008	0.001	0.044
NVA-175	NVA-175CK	0.017	0.012	0.039
NVA-176	NVA-176CK	0.017	0.012	0.039
NVA-177	NVA-177CK	0.002	0.018	0.006
NVA-178	NVA-178CK	0.020	0.007	0.030
NVA-179	NVA-179CK	0.022	0.022	0.021
NVA-180	NVA-180CK	0.007	0.015	0.044
VVA's				
VVA-048	VVA-048CK	0.000	0.021	0.039
VVA-050	VVA-050CK	0.002	0.015	0.021
VVA-051	VVA-051CK	0.011	0.015	0.013
VVA-052	VVA-052CK	0.012	0.007	0.003
VVA-053	VVA-053CK	0.013	0.013	0.013
VVA-054	VVA-054CK	0.002	0.004	0.018
VVA-055	VVA-055CK	0.001	0.004	0.048
VVA-056	VVA-056CK	0.005	0.010	0.030
VVA-057	VVA-057CK	0.002	0.028	0.037
VVA-058	VVA-058CK	0.008	0.019	0.016
VVA-060	VVA-060CK	0.007	0.002	0.011
VVA-062	VVA-062CK	0.014	0.015	0.005
VVA-063	VVA-063CK	0.001	0.009	0.025

VVA-064	VVA-064CK	0.005	0.024	0.019
VVA-065	VVA-065CK	0.010	0.005	0.032
VVA-066	VVA-066CK	0.011	0.004	0.029
VVA-067	VVA-067CK	0.002	0.002	0.016
VVA-068	VVA-068CK	0.016	0.001	0.011
VVA-069	VVA-069CK	0.010	0.024	0.013
VVA-070	VVA-070CK	0.012	0.048	0.022
VVA-071	VVA-071CK	0.005	0.013	0.027
VVA-072	VVA-072CK	0.018	0.005	0.010
VVA-073	VVA-073CK	0.012	0.008	0.017
VVA-074	VVA-074CK	0.032	0.004	0.005
VVA-076	VVA-076CK	0.020	0.015	0.047
VVA-079	VVA-079CK	0.009	0.010	0.042
VVA-081	VVA-081CK	0.029	0.013	0.001
VVA-082	VVA-082CK	0.006	0.003	0.033
VVA-083	VVA-083CK	0.004	0.016	0.014
VVA-084	VVA-084CK	0.008	0.012	0.003
VVA-085	VVA-085CK	0.016	0.006	0.049
VVA-086	VVA-086CK	0.008	0.005	0.027
VVA-089	VVA-089CK	0.003	0.006	0.043
VVA-090	VVA-090CK	0.004	0.008	0.017
VVA-093	VVA-093CK	0.007	0.010	0.004
VVA-095	VVA-095CK	0.005	0.004	0.030
VVA-099	VVA-099CK	0.008	0.002	0.030
VVA-105	VVA-105CK	0.016	0.009	0.024
VVA-106	VVA-106CK	0.018	0.028	0.048
VVA-109	VVA-109CK	0.002	0.012	0.011
VVA-110	VVA-110CK	0.017	0.008	0.038
VVA-111	VVA-111CK	0.012	0.019	0.010
VVA-114	VVA-114CK	0.023	0.008	0.049
VVA-117	VVA-117CK	0.009	0.006	0.012
VVA-122	VVA-122CK	0.006	0.012	0.030
VVA-126	VVA-126CK	0.040	0.018	0.040
VVA-127	VVA-127CK	0.009	0.009	0.045