Cover Sheet (NOAA Form 76-35A)

NOAA FORM 76-35A							
U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL OCEAN SERVICE							
Horizontal & Vertical Control Report							
Type of Survey HYDROGRAPHIC							
Field No OPR-K977-FU-08							
Registry No. H11804, H11805, H11806, H11807							
LOCALITY							
State LOUISIANA							
General Locality GULF OF MEXICO							
Sublocality VICINITY OF CAMINADA PASS TO VICINITY OF GRAND BAYOU PASS							
2009							
CHIEF OF PARTY							
ANDREW ORTHMANN							
LIBRARY & ARCHIVES							
DATE							

U.S. GOV. PRINTING OFFICE: 1985-566-054

Title Sheet (NOAA Form 77-28)

NOAA FORM 77-28U.S. DEPARTMENT OF COMMERCE(11-72)NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTER NO.
	H11804, H11805, H11806, H11807
HYDROGRAPHIC TITLE SHEET	
INSTRUCTIONS – The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office	FIELD NO.
State LOUISIANA	
General Locality GULF OF MEXICO	
Locality VICINITY OF CAMINADA PASS TO VICINITY OF GRAND BAYO	U PASS
Scale <u>1:10000</u> Date of Survey <u>0</u>	8/16/2008 - 04/05/2009
Instructions dated <u>MAY 28, 2008</u> Project No. <u>OPR-</u>	K977-FU-08
Vessel <u>R/V LOCATOR (CF-4540-NB) and R/V CHINOOK (AK-1437-K)</u>	
Chief of party ANDREW ORTHMANN	
Surveyed by BRIGGS, POECKERT, ORTHMANN, GILL, FARLEY, MOUNT,	ROYKTA, GOSS, HOLLY, ET AL
Soundings taken by echo sounder, hand lead, pole <u>ODOM DF3200 SBES (HULL</u> <u>SEABAT 8101 MBES (LOCATOR - POLE MOUNT)</u>	MOUNTED BOTH VESSELS), RESON
Graphic record scaled by FUGRO PELAGOS, INC. PERSONNEL	
Graphic record checked by FUGRO PELAGOS, INC. PERSONNEL	
Protracted by <u>N/A</u> Automated plot by	<u>N/A</u>
Verification by	
Soundings in METERS at MLLW	
<u>REMARKS</u> : The purpose of this work is to provide NOAA with a modern hydrog	graphic and debris mapping survey in the Gulf
of Mexico in the vicinity of Caminada Pass to vicinity of Grand Bayou Pass	
ALL TIMES ARE RECORDED IN UTC.	
FUGRO PELAGOS INC.	
3738 RUFFIN ROAD SAN DIEGO, CA 92123	



A-Vertical Control

All sounding data were initially reduced to MLLW using observed tidal data from the tidal station located on Grand Isle, LA. During times of outage the nearby station at Port Fourchon, LA, was used. Both stations were owned and operated by the NOAA's National Ocean Service through the National Water Level Observation Program.

Gauge	Model	Gauge Type	Location	Latitude	Longitude	Operational
8761724	AquaTrak	Acoustic	Grand Isle, LA	29-15.8 N	89-57.4 W	N/A
8762075	AquaTrak	Acoustic	Port Fourchon, LA	29-06.8 N	90-11.9 W	N/A

Table 1 - Tide Gauges

Zone	Gauge	Primary or Secondary	Time Offset	Range Ratio
CGM364	8761724	PRIM	-36	1.27
CGM369	8761724	PRIM	-42	1.27
CGM376	8761724	PRIM	-18	0.99
CGM377	8761724	PRIM	-30	0.99
CGM378	8761724	PRIM	-36	0.99
CGM380	8761724	PRIM	-24	1.08
CGM381	8761724	PRIM	-30	1.08
CGM382	8761724	PRIM	-42	1.08
CGM384	8761724	PRIM	-30	1.18
CGM385	8761724	PRIM	-36	1.18
CGM386	8761724	PRIM	-42	1.18
CGM389	8761724	PRIM	-36	1.27
CGM390	8761724	PRIM	-36	1.27
CGM391	8761724	PRIM	-42	1.32
CGM394	8761724	PRIM	-30	1.27
CGM400	8761724	PRIM	-24	1.18
CGM406	8761724	PRIM	-12	0.99
CGM364	8762075	SEC	-6	1.09
CGM369	8762075	SEC	-6	1.09
CGM376	8762075	SEC	12	0.85
CGM377	8762075	SEC	6	0.85
CGM378	8762075	SEC	-6	0.85
CGM380	8762075	SEC	6	0.93
CGM381	8762075	SEC	0	0.93
CGM382	8762075	SEC	-6	0.93
CGM384	8762075	SEC	6	1.01
CGM385	8762075	SEC	-6	1.01
CGM386	8762075	SEC	-12	1.01

Table 2 - Final Tide Zones



Zone	Gauge	Primary or Secondary	Time Offset	Range Ratio
CGM389	8762075	SEC	0	1.09
CGM390	8762075	SEC	-6	1.09
CGM391	8762075	SEC	-12	1.13
CGM394	8762075	SEC	0	1.09
CGM400	8762075	SEC	6	1.01
CGM406	8762075	SEC	18	0.85

Observed tidal data was assembled from the National Water Level Observation Program accessed through the NOAA tides and currents website (<u>http://tidesandcurrents.noaa.gov/</u>). A cumulative file for the gauge in use was updated daily by appending the new data as it became available.

On April 12, 2009, verified tide data was acquired from the National Water Level Observation Program accessed through the NOAA tides and currents website (<u>http://tidesandcurrents.noaa.gov/</u>). The verified data was smoothed and applied to all sounding data in CARIS HIPS using tidal zones provided by NOAA¹. All sounding data was then remerged. The Grand Isle, LA (8761724) was used as the primary tidal station while Port Fourchon (8762075) was used as the secondary tidal station. Verified tidal data were used for all final Navigation Base Surfaces, soundings, and S-57 Feature files.

Unusual Tidal Conditions Encountered

Frequent issues were encountered with the Grand Isle tide station during this survey. During field operations recurrent outages were apparent in the observed data from this gauge, requiring the use of Port Fourchon tide station for preliminary and final tidal corrections during these periods. Outages were reported to COOPS through the COTR. On November 6th, 2008, zoning was provided by NOAA for Port Fourchon tide station to provide tide corrections during periods of downtime for the primary Grand Isle gauge.

The verified data for Grand Isle tide station downloaded from the NOAA tides and currents website on April 12, 2009 still contains three major outages that occurred within the time extents of this project. They are as follows (times are UTC):

- 09/05/2008 07:18 to 09/10/2008 16:48 (5.4 days)²
- 11/04/2008 09:00 to 11/08/2008 18:36 (4.4 days)
- 11/16/2008 01:06 to 11/22/2008 00:48 (6.0 days)

Note that the verified tidal data for both gauges shows extreme values due to storm surge from 9/1/2008 through 9/14/2008 due to hurricanes Gustav and Ike. However, this has no

¹ Tidal zone files provided by NOAA were modified slightly; see discussion concerning tidal zones.

 $^{^{2}}$ The 9/5 to 9/10 outage had no effect on the survey data as operations were shutdown during this period due to Hurricanes Gustav and Ike



effect on the survey data as operations were shutdown during this period (shutdown date 8/28/2009, restart date 9/19/08).

Tidal Zones

To facilitate the application of tidal corrections in CARIS HIPS holding Grand Isle as the primary tidal station and Port Fourchon as backup (to be used when outages occur in the primary), the zone files provided by NOAA for each gauge were merged and Port Fourchon marked as secondary tidal station.

Some crosslines extended past the edge of the tide zones. Therefore, the original zone file provided by NOAA for Grand Isle tide station had to be slightly modified to include the full extent of the crosslines. Zones CGM384, 406, 376, and 377 received minor modifications to their northern extents as follows:



Figure 1 Tide Zone Modifications

Refer to Appendix I for tidal station descriptions.



Dated: 1st June, 2009



Figure 2 Tide Zoning



B-Horizontal Control

The horizontal control datum for this survey was the North American Datum of 1983 (NAD83). All real-time positioning as well as post-processed positioning was done on NAD83.

Vessel position was determined in real time using a Trimble Zephyr dual-frequency GPS antenna, which was connected to a Trimble BD950 dual-frequency GPS card in the POSMV. The POSMV was setup to accept USCG differential corrections, which were output from a CSI MBX-3S Coast Guard beacon receiver. Note: Though the POSMV collects uncorrected position data based on the WGS84 ellipsoid, the pseudorange corrections received by the POSMV are based on the NAD83 position of the reference station antenna position therefore all real-time positions were NAD 83. The USCG DGPS stations used are show in the table below.

Station	ID	Latitude	Longitude	Frequency	Tx. Rate
Mobile Point	813	30°13.7 N	88°01.4' W	300 kHz	100 bps
English Turn	814	29-52.7 N	89-56.5 W	293 kHz	200 bps

Table 3 – USCG DGPS Stations

Real-time positions were replaced in processing with a post-processed kinematic (PPK) solution of higher accuracy (also on NAD83). For this purpose Fugro Pelagos, Inc. established two GPS base stations and logged dual-frequency GPS data continuously during survey operations. The control data was then used in conjunction with the raw GPS data logged aboard each vessel to create the PPK solution. Refer to the Data Acquisition and Processing report for more information concerning procedures used.

The base stations were mobilized at the Fugro Pelagos office in Grand Isle, LA on August 16^{th} , 2008. The stations were demobbed on August 28^{th} due to approaching hurricane Gustav. On September 16^{th} they were restarted at a temporary office location in Empire, LA, where they were operated until October 2^{nd} when they were moved back to Grand Isle. They remained there until project completion. Therefore, there are three surveyed coordinate sets for the base stations that were used in processing. These are listed below.

Grand Isle, LA, 08/16/2008 to 08/28/2008									
Station	ID	Latitude	Longitude	Height	Rec. Rate	Model			
Receiver 0001	0001	29-12-57.82998 N	90-01-41.18961 W	-20.724	1 hz	Novatel DL4			
Receiver 0004	0004	-20.793	1 hz	Novatel DL4					
		Empire, LA	A, 09/16/2008 to 10/0	2/2008					
Station	ID	Latitude	Longitude	Height	Rec. Rate	Model			
Receiver 0001	0001	29-23-07.309362 N	89-36-06.748158 W	-16.074 m	1 hz	Novatel DL4			
Receiver 0004 0004 29-23-07.33599 N 89-36-06.717244 W -16.067 m 1 hz Novatel DL4									
Grand Isle, LA, 10/03/2008 to 04/06/2009									



Station	ID	Latitude	Longitude	Height	Rec. Rate	Model
Receiver 0001	0001	29-12-57.77185 N	90-01-41.12387 W	-20.777 m	1 hz	Novatel DL4
Receiver 0004	0004	29-12-57.83000 N	90-01-41.18976 W	-20.714 m	1 hz	Novatel DL4

The base station final positions were derived by uploading 24 hour sets of base station data to NGS' Online Positioning User Service (OPUS) and averaging the results of two or more OPUS position reports. The final positions were periodically checked throughout the survey against additional OPUS uploads to ensure the GPS antenna positions had not changed. OPUS reports and base station descriptions are available in Appendix II.

Positioning system confidence checks were conducted on a daily basis using the POS MV controller software. The controller software had numerous real time displays that were monitored throughout the survey to ensure the positional accuracies specified in the NOS Hydrographic Surveys Specifications and Deliverables (version May 2008) were achieved. These include, but are not limited to the following: GPS Status, Position Accuracy, Receiver Status (which included HDOP) and Satellite Status.

Since final positions were derived using the PPK process, as an independent check positions from a sample of lines were compared to positions of the same lines determined in real time using DGPS (USCG). Agreement was well within specifications.

C-Approval Sheet

Approval Sheet

For

H11804, H11805, H11806, and H11807

Standard field surveying and processing procedures were followed in producing this survey in accordance with the following documents:

OPR-K977-FU-08 Statement of Work NOS Hydrographic Surveys Specifications and Deliverables (May 2008) Fugro Pelagos, Inc. Acquisition Procedures (2008-NOAA-AcquisitionProcedures); Fugro Pelagos, Inc. Processing Procedures (2008-NOAA-ProcessingProcedures);

The data were reviewed daily during acquisition and processing.

This report has been reviewed and approved. All records are forwarded for final review and processing to the Chief, Atlantic Hydrographic Branch.

Approved and forwarded,

Andrew Orthmann, ACSM Certified Lead Hydrographer Fugro Pelagos, Inc. Survey Party



Appendix I -Tides and Water Levels

Tide Station: 8761724

Grand Isle, LA

Latitude: 29° 15.8' N Longitude: 89° 57.4' W Established: Nov 9 1979 Present Installation: Mar 30 1990 NOAA Chart #: 11358 Time Meridian: 90 W

Mean Range: **1.04 ft.** Diurnal Range: **1.06 ft.**

TIDAL DATUMS

Tidal datums at GRAND ISLE, EAST POINT based on:

LENGTH OF SERIES:	5 YEARS
TIME PERIOD:	January 2002 - December 2006
TIDAL EPOCH:	1983-2001
CONTROL TIDE STATION:	

Elevations of tidal datums referred to Mean Lower Low Water (MLLW), in METERS:

HIGHEST OBSERVED WATER LEVEL (08/29/2005)	=	1.705
MEAN HIGHER HIGH WATER (MHHW)	=	0.322
MEAN HIGH WATER (MHW)	=	0.320
MEAN SEA LEVEL (MSL)	=	0.163
MEAN TIDE LEVEL (MTL)	=	0.161
MEAN LOW WATER (MLW)	=	0.003
MEAN LOWER LOW WATER (MLLW)	=	0.000
LOWEST OBSERVED WATER LEVEL (12/24/1989)	= -	-0.671
Bench Mark Elevation Information In MET	ERS	above:
Stamping or Designation MLLW		MHW
10 0.993		0.673
13 1975 1.018		0.698
11 1.018		0.698
1724 F 1992 1.137		0.817

1724 G 1992

1.185

0.865



Tide Station 874-1533

Port Fourchon, LA

Latitude: 29° 6.8' N Longitude: 90° 11.9' W Established: Jul 19 2003 Present Installation: Jul 18 2003 NOAA Chart #: 11357 Mean Range: 1.21 ft. Diurnal Range: 1.23 ft.

Note that tidal datums information was not available at time of reporting from <u>http://tidesandcurrents.noaa.gov</u>.

Note: All information provided by NOAA' s Center for Operational Oceanographic Products and Services at <u>http://tidesandcurrents.noaa.gov</u>.



Appendix II – Horizontal Control

Six control points were established during the survey for the purpose of collecting dualfrequency GPS data for final post-processed kinematic (PPK) positions.

To establish the position of each control point, a site was selected that had minimal to no GPS masking above 10 degrees. A dual-frequency GPS antenna attached to a Novatel DL4 GPS receiver was setup and the data logged. 24-hour sets of data from each position was then uploaded to NGS' Online Positioning Users Service (OPUS) and the OPUS reports were then examined for quality by examining the RMS error values. Additional days were then uploaded and the results averaged, using at least two OPUS solutions in the final average position that was used in processing.

Antenna height and type were not used in processing or inputted into OPUS as the antenna phase center itself was used for the control point position.

Grand Isle, LA, 08/16/2008 to 08/28/2008

OPUS Solution for Receiver 0001									
Latitude (NAD83) Longitude (NAD83)									
Julian Day	Ant Type	Ant Height	Deg	Min	Sec	Deg	Min	Sec	Ellip. Height(m)
235	None	None	29	12	57.82999	90	1	41.18959	-20.730
236	None	None	29	12	57.82999	90	1	41.18962	-20.719
237	None	None	29	12	57.82997	90	1	41.18962	-20.722
Average			20	12	E7 02000222	00	1	41 19061	20 724

Three OPUS solutions were used for the Receiver 0001:

Three OPUS solutions were used for the Receiver 0004:

	OPUS Solution for Reciever 0004										
Iulia	n				Latitude	e (NAD83)	L	ongitud	le (NAD83)		
Day		Ant Type	Ant Height	Deg	Min	Sec	Deg	Min	Sec	Ellip. Height (m)	
	235	None	None	29	12	57.77184	90	1	41.12385	-20.794	
	236	None	None	29	12	57.77184	90	1	41.12393	-20.791	
	237	None	None	29	12	57.77182	90	1	41.12385	-20.793	
Average	2			29	12	57.77183333	90	1	41.12387667	-20.793	



Dated: 1st June, 2009

NGS OPUS SOL	UTION REPORT	===:				
All computed For addition	d coordinate hal informatio	accuracie: on: www.n	s are list gs.noaa.go	ed as peak-to- pv/OPUS/Using_O	peak values. PUS.html#acc	uracy
USER: RINEX FILE:	dbriggs@fugr 00012350.08o	o.⊂om		DATE: TIME:	August 23, 18:25:53 UT	2008 C
SOFTWARE: EPHEMERIS: NAV FILE: ANT NAME: ARP HEIGHT:	page5 0612. igr14935.eph brdc2350.08n NONE 0.0	06 master: [rapid] NONE	10.pl	START: STOP: OBS USED: # FIXED AMB: OVERALL RMS:	2008/08/22 2008/08/22 56168 / 602 200 / 2 0.022(m)	00:36:00 23:54:00 20 : 93% 21 : 90%
REF FRAME:	NAD_83(CORS9	6)(EPOCH:	2002.0000)) IT	RFOO (EPOCH:	2008.6408)
×: Y: Z:	2733- 5571169- 3094814	.110(m) .756(m) .527(m)	0.020(m) 0.020(m) 0.009(m)	-2 -5571: 3094	733.797(m) 168.252(m) 814.322(m)	0.020(m) 0.020(m) 0.009(m)
LAT: E LON: W LON: EL HGT: ORTHO HGT:	29 12 57.8 269 58 18.8 90 1 41.1 -20 3	2999 1041 8959 .730(m) .193(m)	0.006(m) 0.020(m) 0.020(m) 0.019(m) 0.074(m)	29 12 5 269 58 1 90 1 4 [NAVD88 (Compu	7.84802 8.78495 1.21505 -22.142(m) ted using GE	0.006(m) 0.020(m) 0.020(m) 0.019(m) 0ID03)]
Northing (Y) Easting (X) Convergence Point Scale Combined Fac) [meters] [meters] [degrees] tor	UTM COORD: UTM (Zon 3235583 788926 1.4516 1.0006 1.0006	INATES e 15) .587 .349 0036 3023 3349	STATE PLANE CO SPC (1702 80096.89 1126913.97 0.6526291 1.0000188 1.0000220	ORDINATES LA S) 9 0 2 3 8	

US NATIONAL GRID DESIGNATOR: 15RYN8892635584(NAD 83)

		BASE STATIONS	5 USED		
PID	DESIGNATION		LATITUDE	LONGITUDE DIS	STANCE(m)
DF5771	LMCN LUMCON CORS ARP		N291517.904	W0903940.652	61706.8
DH7121	GRIS GRAND ISLE CORS	ARP	N291555.883	W0895726.262	8800.0
DE8091	BVHS BOOTHVILLE CORS	ARP	N292012.489	W0892423.010	61881.4
	NEAREST NGS	5 PUBLISHED CONT	FROL POINT		
AU1292	Н 155		N291257.	W0900123.	491.6

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

2008-235 Results for Receiver 0001



T

Dated: 1st June, 2009

NGS OPUS SOLUTION REPORT

All compute For addition	d coordinate acc nal information:	turacies are lis www.ngs.noaa.g	ted as peak-to-p pv/OPUS/Using_OP	oeak values. PUS.html#acc	uracy
USER: RINEX FILE:	dbriggs@fugro.c 00012360.08o	com	DATE: TIME:	August 25, 14:11:02 UT	2008 C
SOFTWARE: EPHEMERIS: NAV FILE: ANT NAME: ARP HEIGHT:	page5 0612.06 igr14936.eph [r brdc2360.08n NONE 0.0	master12.pl apid] NONE	START: STOP: OBS USED: # FIXED AMB: OVERALL RMS:	2008/08/23 2008/08/23 56833 / 599 212 / 2 0.020(m)	00:13:00 23:23:30 04 : 95% 37 : 89%
REF FRAME:	NAD_83(CORS96)((EPOCH:2002.0000)) IT	RF00 (EPOCH:	2008.6435)
X: Y: Z:	-2733.11 -5571169.76 3094814.53	1(m) 0.015(m) 55(m) 0.011(m) 32(m) 0.011(m)	-2: -5571: 3094	733.798(m) L68.261(m) 314.327(m)	0.015(m) 0.011(m) 0.011(m)
LAT: E LON: W LON: EL HGT: ORTHO HGT:	29 12 57.8299 269 58 18.8103 90 1 41.1896 -20.71 3.20	99 0.004 (m) 88 0.015 (m) 52 0.015 (m) 19 (m) 0.015 (m) 04 (m) 0.073 (m)	29 12 5 269 58 10 90 1 4 NAVD88 (Comput	7.84802 3.78491 L.21509 -22.132(m) ted using GE	0.004(m) 0.015(m) 0.015(m) 0.015(m) 0ID03)]
Northing (Y) Easting (X) Convergence Point Scale Combined Fa	UTM UT] [meters] 3 [meters] [degrees] ctor	1 COORDINATES 7M (Zone 15) 8235583.587 788926.348 1.45160036 1.00063023 1.00063349	STATE PLANE COO SPC (1702 L 80096.899 1126913.969 0.65262912 1.00001883 1.00002200	DRDINATES LA S) 9 9 2 3 3 3	

US NATIONAL GRID DESIGNATOR: 15RYN8892635584(NAD 83)

		BASE STAT	IONS USED		
PID	DESIGNATION		LATITUDE	LONGITUDE	DISTANCE(m)
DF5771	LMCN LUMCON CORS ARP		N291517.904	W0903940.652	61706.8
DH7121	GRIS GRAND ISLE CORS	ARP	N291555.883	W0895726.262	8800.0
DE8091	BVHS BOOTHVILLE CORS	ARP	N292012.489	W0892423.010	61881.4
	NEAREST NGS	5 PUBLISHED (CONTROL POINT		
AU1292	Н 155		N291257.	W0900123.	491.6

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

2008-236 Results for Receiver 0001



Horizontal and Vertical Control Report

Dated: 1st June, 2009

NGS OPUS SOLUTION REPORT

All computed coordinate accuracies are listed as peak-to-peak values. For additional information: www.ngs.noaa.gov/OPUS/Using_OPUS.html#accuracy USER: dbriggs@fugro.com RINEX FILE: 0001237b.08o DATE: August 25, 2008 TIME: 20:25:14 UTC SOFTWARE: page5 0612.06 master2.pl EPHEMERIS: igr14940.eph [rapid] START: 2008/08/24 01:26:00 STOP: 2008/08/24 23:37:30 OBS USED: 55416 / 58031 TIXED AMB: 155 / 165 NAV FILE: brdc2370.08n : 95% ANT NAME: NONE # FIXED AMB: 94% NONE ARP HEIGHT: 0.0 OVERALL RMS: 0.016(m) REF FRAME: NAD_83(CORS96)(EPOCH:2002.0000) ITRF00 (EPOCH:2008.6463) -2733.798(m) -2733.111(m) 0.012(m)0.012(m)×: Υ: -5571169.763(m) 0.011(m) -5571168.259(m) 0.011(m) 3094814.325(m) z: 3094814.530(m) 0.009(m)0.009(m) 29 12 57.82997 29 12 57.84800 LAT: 0.005(m) 0.005(m) 269 58 18.81038 269 58 18.78491 E LON: 0.012(m)0.012(m) W LON: 90 1 41.18962 0.012(m) 90 1 41.21509 0.012(m) -20.722(m) -22.134(m) 0.013(m) 0.013(m)EL HGT: 0.072(m) [NAVD88 (Computed using GEOID03)] ORTHO HGT: 3.201(m) UTM COORDINATES STATE PLANE COORDINATES UTM (Zone 15) 3235583.586 SPC (1702 LA S) Northing (Y) Easting (X) 80096.898 [meters] 788926.348 1126913.969 [meters] Convergence [degrees] 1.45160036 0.65262912 Point Scale 1.00063023 1.00001883 Combined Factor 1.00063349 1.00002208 US NATIONAL GRID DESIGNATOR: 15RYN8892635584(NAD 83) BASE STATIONS USED PID DESIGNATION LATITUDE LONGITUDE DISTANCE(m) DF5771 LMCN LUMCON CORS ARP N291517.904 W0903940.652 61706.8 DH7121 GRIS GRAND ISLE CORS ARP N291555.883 W0895726.262 8800.0 DE8091 BVHS BOOTHVILLE CORS ARP N292012.489 W0892423.010 61881.4 NEAREST NGS PUBLISHED CONTROL POINT AU1292 Н 155 N291257. W0900123. 491.6 This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

2008-237 Results for Receiver 0001



Horizontal and Vertical Control Report

Dated: 1st June, 2009

NGS OPUS SOL	LUTION REPORT	====							
All computed For addition	d coordinate hal informatio	accuracies on: www.ng	s are list gs.noaa.go	ed as pe: v/opus/u	ak-to- sing_0	peak valu PUS.html#	es. accura	сy	
USER: RINEX FILE:	dbriggs@fugr 00042350.08o	o.⊂om			DATE: TIME:	August 2 18:29:41	3, 2008 UTC	8	
SOFTWARE: EPHEMERIS: NAV FILE: ANT NAME: ARP HEIGHT:	page5 0612. igr14935.eph brdc2350.08n NONE 0.0	06 master1 [rapid] NONE	L1.pl	OBS # FI×E OVERAL	START: STOP: USED: D AMB: L RMS:	2008/08/ 2008/08/ 56203 / 188 / 0.022(m)	22 00 22 23 59847 215	:35:) :54:) :	00 00 94% 87%
REF FRAME:	NAD_83 (CORS9	6)(EPOCH:2	2002.0000))	IT	RFOO (EPO	сн:2008	8.64	08)
×: Y: Z:	2731- 5571170- 3094812	.335(m) .575(m) .933(m)	0.022(m) 0.031(m) 0.018(m)		-2 -5571 3094	732.022(m 169.071(m 812.728(m	$ \begin{array}{c} 0 & 0.0 \\ 0 & 0.0 \\ 0 & 0.0 \end{array} $	022() 031() 018()	m) m) m)
LAT: E LON: W LON: EL HGT: ORTHO HGT:	29 12 57.7 269 58 18.8 90 1 41.1 -20 3	7184 7615 2385 .794(m) .129(m)	0.006(m) 0.022(m) 0.022(m) 0.036(m) 0.036(m) 0.080(m)	2 26 9 [NAVD88	9 12 5 9 58 1 0 1 4 (⊂ompu	7.78987 8.85068 1.14932 -22.206(m ted using	0.(0.(0.() 0.(GEOID	006() 022() 022() 022() 036() 03)]	n) m) m) m)
Northing (Y) Easting (X) Convergence Point Scale Combined Fac) [meters] [meters] [degrees] ctor	UTM COORDJ UTM (Zona 3235581. 788928. 1.45160 1.00063 1.00063	NATES 15) 841 170 0856 024 3351	STATE PL SPC 80 1126 0.6 1.0 1.0	ANE CO (1702 095.12 915.76 526382 000188 000221	ORDINATES LA S) 8 6 5 3 0			
US NATIONAL	GRID DESIGNA	TOR: 15RYN	1889283558	32(NAD 83)				

		BASE STAT	IONS USED		
PID	DESIGNATION		LATITUDE	LONGITUDE	DISTANCE(m)
DF5771	LMCN LUMCON CORS ARP		N291517.904	W0903940.652	61708.7
DH7121	GRIS GRAND ISLE CORS	ARP	N291555.883	W0895726.262	8799.7
DE8091	BVHS BOOTHVILLE CORS	ARP	N292012.489	W0892423.010	61880.0
	NEAREST NG	5 PUBLISHED (CONTROL POINT		
AU1292	Н 155		N291257.	W0900123.	489.7

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

2008-235 Results for Receiver 0004





Dated: 1st June, 2009

NGS OPUS SOLUTION REPORT ------

All computed For addition	d coordinate nal informat	accuracie ion: www.n	s are list gs.noaa.go	ed as peak: v/opus/usi	-to-p ng_op	peak value: PUS.html#a	s. ccuracy	
USER: RINEX FILE:	dbriggs@fug 00042360.08	ro.com D		D T	ATE: IME:	August 25 14:11:35	, 2008 UTC	
SOFTWARE: EPHEMERIS: NAV FILE: ANT NAME: ARP HEIGHT:	page5 0612 igr14936.ep brdc2360.08 NONE 0.0	.06 master: h [rapid] h NONE	10.pl	ST S OBS U # FIXED OVERALL	ART: TOP: ISED: AMB: RMS:	2008/08/2 2008/08/2 56919 / 5 207 / 0.019(m)	3 00:13 3 23:24 9598 : 225 :	:00 :00 96% 92%
REF FRAME:	NAD_83(CORS	96)(EPOCH:	2002.0000))	ITF	RFOO (EPOCI	н:2008.0	i435)
×: Y: Z:	-273: -557117 309481	1.337(m) 0.577(m) 2.934(m)	0.014(m) 0.005(m) 0.006(m)	-	-27 55711 30948	732.024(m) L69.073(m) 312.729(m)	0.014 0.005 0.006	(m) 5(m) 5(m)
LAT: E LON: W LON: EL HGT: ORTHO HGT:	29 12 57. 269 58 18. 90 1 41. -2	77184 87607 12393 0.791(m) 3.132(m)	0.003(m) 0.014(m) 0.014(m) 0.007(m) 0.071(m)	29 269 90 [NAVD88 (C	12 57 58 18 1 41 comput	7.78986 3.85061 L.14939 -22.204(m) ted using (0.003 0.014 0.014 0.007 GEOID03	;(m) ;(m) ;(m) ?(m))]
Northing (Y) Easting (X) Convergence Point Scale Combined Fac) [meters] [meters] [degrees] ctor	UTM COORD UTM (ZON 3235581 788928 1.4516 1.0006 1.0006	INATES e 15) .841 .168 0855 3024 3351	STATE PLAN SPC (1 8009 112691 0.652 1.000 1.000	IE COC .702 L .5.128 .5.764 .63824 .01883 .02210	DRDINATES LA S) 3 4 4 3 0		

US NATIONAL GRID DESIGNATOR: 15RYN8892835582(NAD 83)

		BASE STATIO	NS USED		
PID	DESIGNATION		LATITUDE	LONGITUDE	DISTANCE(m)
DF5771	LMCN LUMCON CORS ARP		N291517.904	W0903940.652	61708.7
DH7121	GRIS GRAND ISLE CORS	ARP	N291555.883	W0895726.262	8799.7
DE8091	BVHS BOOTHVILLE CORS	ARP	N292012.489	W0892423.010	61880.0
	NEAREST NG	5 PUBLISHED CO	NTROL POINT		
AU1292	Н 155		N291257.	W0900123.	489.7

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

2008-236 Results for Receiver 0004



T

Dated: 1st June, 2009

NGS OPUS SOLUTION REPORT

All computed For addition	d coordinate nal informat	accuracie ion: www.n	s are list gs.noaa.go	ed as peak v/opus/usi	-to-p ng_OF	eak values vUS.html#ac	curacy	
USER: RINEX FILE:	dbriggs@fug 0004237b.08	ro.com D		D/ T:	ATE: IME:	August 25, 20:29:30 U	2008 ITC	
SOFTWARE: EPHEMERIS: NAV FILE: ANT NAME: ARP HEIGHT:	page5 0612 igr14940.ep brdc2370.08 NONE 0.0	.06 master h [rapid] h NONE	30.pl	ST/ S OBS U FIXED / OVERALL I	ART: TOP: SED: AMB: RMS:	2008/08/24 2008/08/24 55082 / 57 145 / 0.016(m)	01:26: 23:37: 678 : 154 :	00 30 95% 94%
REF FRAME:	NAD_83(CORS	96)(EPOCH:	2002.0000])	ITF	F00 (EPOCH	:2008.64	63)
×: Y: Z:	-273: -557117 3094813	1.335(m) 0.576(m) 2.933(m)	0.012(m) 0.012(m) 0.002(m)	-!	-27 55711 30948	32.022(m) 69.072(m) 12.728(m)	0.012() 0.012() 0.002()	n) m) m)
LAT: E LON: W LON: EL HGT: ORTHO HGT:	29 12 57. 269 58 18. 90 1 41. -2	77182 87615 12385 0.793(m) 3.130(m)	0.005(m) 0.012(m) 0.012(m) 0.012(m) 0.072(m)	29 2 269 9 90 [NAVD88 (Co	12 57 58 18 1 41 omput	2.78985 3.85068 14932 22.205(m) ed using G	0.005() 0.012() 0.012() 0.012() 0.012() EOID03)]	n) n) m) m)
Northing (Y) Easting (X) Convergence Point Scale Combined Fa) [meters] [meters] [degrees] ctor	UTM COORD UTM (Zon 3235581 788928 1.4516 1.0006 1.0006	INATES e 15) .841 .170 0856 3024 3351	STATE PLAN SPC (1) 8009 112691 0.6520 1.000 1.000	E COC 702 L 5.128 5.766 63825 01883 02210	RDINATES .A S) 		

US NATIONAL GRID DESIGNATOR: 15RYN8892835582(NAD 83)

		BASE STATIONS	5 USED		
PID	DESIGNATION		LATITUDE	LONGITUDE	DISTANCE(m)
DF5771	LMCN LUMCON CORS ARP		N291517.904	W0903940.652	61708.7
DH7121	GRIS GRAND ISLE CORS	ARP	N291555.883	W0895726.262	8799.7
DE8091	BVHS BOOTHVILLE CORS	ARP	N292012.489	W0892423.010	61880.0
	NEAREST NG	5 PUBLISHED CONT	ROL POINT		
AU1292	н 155		N291257.	W0900123.	489.7

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

2008-237 Results for Receiver 0004



Empire, LA, 09/16/2008 to 10/02/2008

Five OPUS solutions were used for the Receiver 0001:

	OPUS Solution for Reciever 0001										
Latitude (NAD83) Longitude (NAD83)											
Juliai Day	n	Ant Type	Ant Height	Deg	Min	Sec	Deg	Min	Sec	Ellip. Height(m)	
	261	None	None	29	23	7.30979	89	36	6.7487	-16.073	
	262	None	None	29	23	7.30955	89	36	6.74814	-16.072	
	263	None	None	29	23	7.30919	89	36	6.74822	-16.060	
	264	None	None	29	23	7.30942	89	36	6.74777	-16.079	
	265	None	None	29	23	7.30886	89	36	6.74796	-16.085	
Average				29	23	7.309362	89	36	6.748158	-16.074	

Five OPUS solutions were used for the Receiver 0004:

1	lian	Ant	Ant	Lat	itude (I	NAD83)	Lor	ngitude	(NAD83)	
Da	ау	Туре	Height	Deg	Min	Sec	Deg	Min	Sec	Ellip. Height(m)
	261	None	None	29	23	7.33606	89	36	6.71744	-16.064
	262	None	None	29	23	7.33599	89	36	6.71715	-16.069
	263	None	None	29	23	7.33578	89	36	6.71734	-16.053
	264	None	None	29	23	7.33625	89	36	6.717	-16.069
	265	None	None	29	23	7.33587	89	36	6.71729	-16.079
Avera	age			29	23	7.33599	89	36	6.717244	-16.067

OPUS Solution for Reciever 0004



FILE: 00012610.080 000435902

			-			~~			
1009 WARI 1009 pat 1009 wil 1000	NING! No anter tern will be ap l be returned f	na type pplied. for the a	was selec Coordinat antenna ph	ted. No a es with re ase center	anten educed 7.	na offse d accura	ts or .cy	1	
1009 1008 NOTI 1008 retu	E: Antenna off urned will be f	⁼sets sup For the a	oplied by antenna re	the user w ference po	vere : pint (zero. C (ARP).	oordi	nates	
1000		NGS	OPUS SOLU	JTION REPOR	RТ ==				
All compute For addition	d coordinate ac nal informatior	curacies n: www.ng	s are list gs.noaa.go	ed as peak v/opus/usi	(-to-p ing_OP	peak val PUS.html	ues. #accu	uracy	
USER: RINEX FILE:	amount@fugro.c 0001261c.08o	com		C T	DATE: FIME:	Septemb 22:21:1	ier 22 .4 UTC	2008 :	3
SOFTWARE: EPHEMERIS: NAV FILE: ANT NAME: ARP HEIGHT:	page5 0612.00 igr14973.eph brdc2610.08n NONE 0.0	6 master: [rapid] NONE	29.pl	ST 9 OBS L # FIXED OVERALL	FART: STOP: JSED: AMB: RMS:	2008/09 2008/09 51396 / 165 / 0.016(m	1/17 1/17 5449 1/17	02:03: 23:15: 5 : 7 :	:00 :00 94% 93%
REF FRAME:	NAD_83(CORS96))(EPOCH:2	2002.0000)	1	IT	RFOO (EP	юсн:2	2008.71	L19)
×: Y: Z:	38647.7 -5561856.6 3111181.3	730(m) 515(m) 307(m)	0.018(m) 0.013(m) 0.001(m)	-	389 -55618 31111	547.041(355.111(L81.103(m) m) m)	0.0180 0.0130 0.0010	(m) (m) (m)
LAT: E LON: W LON: EL HGT: ORTHO HGT:	29 23 7.309 270 23 53.251 89 36 6.748 -16.0 8.1	979 L30 370)73(m) L20(m)	0.008(m) 0.018(m) 0.018(m) 0.011(m) 0.072(m)	29 270 89 [NAVD88 (0	23 5 23 5 36 6	7.32806 3.22614 5.77386 -17.488(ted usin	m) Ig GEC	0.008(0.018(0.018(0.011(0.011()ID03)]	(m) (m) (m) (m)]
Northing (Y) Easting (X) Convergence Point Scale Combined Fa	טז ו [meters] [degrees] ctor	TM COORD JTM (Zone 3253496, 247477, -1.27739 1.00038 1.00038	INATES ≥ 16) .492 .950 5784 3691 3944	STATE PLAN SPC (1 994(116807 0.865 0.999 0.999	NE COO L702 L 29.248 72.622 575132 998303 998555	DRDINATE _A S) 3 L 2 3 5	.5		
US NATIONAL	GRID DESIGNATO	R: 16RB	г474785349	96(NAD 83)					
PID DI	ESIGNATION	BASE	E STATIONS	5 USED LATITUDE	ΞI	ONGITUD	E DIS		(m)
DH9599 NOLA DK3577 ENG5 DE8091 BVHS	LOYOLA UNIVERS ENGLISH TURN S BOOTHVILLE COR	SITY CORS 5 CORS AF 85 ARP	5 ARP RP	N295603.73 N295244.24 N292012.48	32 W09 46 W08 39 W08	900712.6 395630.1 392423.0	46 .97 10	78874. 63848. 19729.	. 5 . 0 . 4
	NEADEST N	ICS DUBLT		DOL DOTNE					

NEAREST NGS PUBLISHED CONTROL POINT AT1109 EMPIRE MUNICIPAL TANK N292316.216 W0893554.391 432.1

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

2008-261 Results for Receiver 0001



FILE: 00012620.080 000435910

1009 WARI 1009 pati 1009 wil	NING! No antenna tern will be appli l be returned for	type was selec ed. Coordinat the antenna ph	ted. No anter es with reduce ase center.	nna offsets or ed accuracy	2
1009 1008 NOTH 1008 retu	E: Antenna offset urned will be for	s supplied by the antenna re	the user were eference point	zero. Coord (ARP).	inates
1008		NGS OPUS SOLU	JTION REPORT		
All compute For additio	d coordinate accur nal information: w	acies are list ww.ngs.noaa.go	ed as peak-to- v/OPUS/Using_C	-peak values. DPUS.html#accu	uracy
USER: RINEX FILE:	amount@fugro.com 0001262a.08o		DATE: TIME:	: September 22 : 22:22:50 UTC	2, 2008 -
SOFTWARE: EPHEMERIS: NAV FILE: ANT NAME: ARP HEIGHT:	page5 0612.06 ma igr14974.eph [rap brdc2620.08n NONE N 0.0	ster10.pl id] ONE	START: STOP: OBS USED: # FIXED AMB: OVERALL RMS:	: 2008/09/18 : 2008/09/18 : 53538 / 5642 : 186 / 19 : 0.018(m)	00:14:00 21:53:00 25 : 95% 94 : 96%
REF FRAME:	NAD_83(COR596)(EP	осн:2002.0000)	ים (TRFOO (EPOCH:	2008.7144)
×: Y: Z:	38647.745(-5561856.619(3111181.301(m) 0.022(m) m) 0.018(m) m) 0.004(m)	38 -5561 3111	8647.056(m) 1855.115(m) 1181.097(m)	0.022(m) 0.018(m) 0.004(m)
LAT: E LON: W LON: EL HGT: ORTHO HGT:	29 23 7.30955 270 23 53.25186 89 36 6.74814 -16.072(8.121(0.010(m) 0.022(m) 0.022(m) m) 0.016(m) m) 0.073(m)	29 23 270 23 9 89 36 [NAVD88 (Compu	7.32782 53.22670 6.77330 –17.487(m) uted using GEG	0.010(m) 0.022(m) 0.022(m) 0.016(m) DID03)]
Northing (Y Easting (X) Convergence Point Scale Combined Fa	UTM C UTM) [meters] 325 [meters] 24 [degrees] -1. 1. ctor 1.	OORDINATES (Zone 16) 3496.484 7477.965 27736777 00038691 00038944	STATE PLANE CC SPC (1702 99409.24 1168072.63 0.8657514 0.9999830 0.9999855	DORDINATES LA S) 41 36 40 03 55	
US NATIONAL	GRID DESIGNATOR:	16RBT474785349	96(NAD 83)		
PID DI DH9599 NOLA DK3577 ENG5 DE8091 BVHS	ESIGNATION LOYOLA UNIVERSITY ENGLISH TURN 5 CO BOOTHVILLE CORS A	BASE STATIONS CORS ARP RS ARP RP	5 USED LATITUDE N295603.732 W(N295244.246 W(N292012.489 W(LONGITUDE DIS 0900712.646 0895630.197 0892423.010	5TANCE(m) 78874.6 63848.0 19729.4
AT1109	NEAREST NGS EMPIRE MUNICIPAL	PUBLISHED CONT TANK	ROL POINT N292316.216 W(0893554.391	432.1
This positi	on and the above v	oston componer	te wono comput	tod without or	o) /

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

2008-262 Results for Receiver 0001



FILE: 00012630.080 000435913

1009 WAR 1009 pat 1009 wil 1009 wil	NING! No ante tern will be a l be returned	enna type upplied. for the a	was selec Coordinat antenna pł	ted. No ant es with redu ase center.	enna offsets ced accuracy	or
1008 NOT 1008 ret 1008 ret	E: Antenna of urned will be	fsets sup for the a	oplied by antenna re	the user wer eference poin	e zero. Coor t (ARP).	dinates
1000		NGS ====	OPUS SOLU	JTION REPORT		
All compute For additio	d coordinate a nal informatio	occuracies	s are list gs.noaa.go	ed as peak-t v/OPUS/Using	o-peak values _opus.html#ac	curacy
USER: RINEX FILE:	amount@fugro. 0001263p.08o	com		DAT TIM	E: September E: 22:23:51 U	22, 2008 TC
SOFTWARE: EPHEMERIS: NAV FILE: ANT NAME: ARP HEIGHT:	page5 0612.0 igr14975.eph brdc2630.08n NONE 0.0	06 master: [rapid] NONE	23.pl	STAR STO OBS USE # FIXED AM OVERALL RM	T: 2008/09/19 P: 2008/09/19 D: 21016 / 22 B: 62 / S: 0.018(m)	15:46:00 23:29:30 034 : 95% 71 : 87%
REF FRAME:	NAD_83(CORS96	б)(ЕРОСН:2	2002.0000))	ITRFOO (EPOCH	:2008.7180)
×: Y: Z:	38647. -5561856. 3111181.	743(m) 635(m) 297(m)	0.024(m) 0.038(m) 0.017(m)	-55 31:	38647.054(m) 61855.131(m) 11181.093(m)	0.024(m) 0.038(m) 0.017(m)
LAT: E LON: W LON: EL HGT: ORTHO HGT:	29 23 7.30 270 23 53.29 89 36 6.74 -16. 8.)919)178)822 060(m) 133(m)	0.008(m) 0.024(m) 0.024(m) 0.041(m) 0.082(m)	29 23 270 23 89 36 [NAVD88 (Com	7.32746 53.22662 6.77338 –17.475(m) puted using G	0.008(m) 0.024(m) 0.024(m) 0.041(m) EOID03)]
Northing (Y Easting (X) Convergence Point Scale Combined Fa	l [meters] [degrees] ctor	JTM COORD UTM (Zone 3253496, 247477, -1.27736 1.00038 1.00038	INATES e 16) .473 .963 6777 8691 8944	STATE PLANE SPC (170 99409. 1168072. 0.86575: 0.99998 0.99998	COORDINATES 2 LA S) 230 634 139 303 555	
US NATIONAL	GRID DESIGNAT	OR: 16RB	т474785349	96(NAD 83)		
PID D DH9599 NOLA DK3577 ENG5 DE8091 BVHS	ESIGNATION LOYOLA UNIVER ENGLISH TURN BOOTHVILLE CO	BASE SITY CORS 5 CORS AF DRS ARP	E STATIONS 5 ARP RP	5 USED LATITUDE N295603.732 ' N295244.246 ' N292012.489 '	LONGITUDE D W0900712.646 W0895630.197 W0892423.010	ISTANCE(m) 78874.6 63848.0 19729.4
AT1109	NEAREST EMPIRE MUNICI	NGS PUBLI PAL TANK	ISHED CONT	ROL POINT N292316.216	w0893554.391	432.1

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

2008-263 Results for Receiver 0001



FILE: 00012640.080 000435922

1009 WAR 1009 pat 1009 wil 1009 1008 NOT 1008 ret 1008 ret	NING! No anto tern will be a l be returned E: Antenna of urned will be	enna type applied. for the a ffsets sup for the a	was selec Coordinat antenna ph oplied by antenna re	ted. No ant es with redu ase center. the user wer ference poir	enna iced a e zer it (AR	offsets o ccuracy o. Coord P).	r inates			
		NGS ====	OPUS SOLU	JTION REPORT						
All compute For additio	All computed coordinate accuracies are listed as peak-to-peak values. For additional information: www.ngs.noaa.gov/OPUS/Using_OPUS.html#accuracy									
USER: RINEX FILE:	amount@fugro 00012641.08o	. ⊂om		DAT TIM	E: Se E: 22	ptember 2 :31:07 UT	2, 200 C	8		
SOFTWARE: EPHEMERIS: NAV FILE: ANT NAME: ARP HEIGHT:	page5 0612.0 igr14976.eph brdc2640.08n NONE 0.0	06 master. [rapid] NONE	.p]	STAR STC OBS USE # FIXED AM OVERALL RM	T: 20 P: 20 D: 58 B: S: 0.	08/09/20 08/09/21 314 / 614 170 / 2 026(m)	11:15 11:18 13 : 01 :	:00 :00 95% 85%		
REF FRAME:	NAD_83(CORS9	5)(EPOCH:2	2002.0000))	ITRFO	0 (EPOCH:	2008.7	212)		
×: Y: Z:	38647. -5561856. 3111181.	.755(m) .615(m) .294(m)	0.022(m) 0.011(m) 0.003(m)	-55 31	38647 61855 11181	.066(m) .111(m) .090(m)	0.022 0.011 0.003	(m) (m) (m)		
LAT: E LON: W LON: EL HGT: ORTHO HGT:	29 23 7.30 270 23 53.23 89 36 6.74 -16 8	0942 5223 4777 .079(m) .114(m)	0.006(m) 0.022(m) 0.022(m) 0.009(m) 0.072(m)	29 23 270 23 89 36 [NAVD88 (Com	7.3 53.2 6.7 –17 iputed	2769 2707 7293 .494(m) using GE	0.006 0.022 0.022 0.009 0.009	(m) (m) (m) (m)]		
Northing (Y) Easting (X) Convergence Point Scale Combined Fa) [meters] [meters] [degrees] ctor	JTM COORDI UTM (Zone 3253496, 247477, -1.27736 1.00038 1.00038	INATES ≥ 16) .480 .975 5771 3691 3944	STATE PLANE SPC (170 99409. 1168072. 0.86575 0.99998 0.99998	COORD 22 LA 237 646 145 3303 3555	INATES S)				
US NATIONAL	GRID DESIGNA	FOR: 16RBT	r474785349	96(NAD 83)						
		BASE	- STATIONS	S USED						
PID DI DJ9603 LWES DH9599 NOLA DK3577 ENG5	ESIGNATION LAKEWOOD ELMU LOYOLA UNIVEN ENGLISH TURN	ENTRY CORS RSITY CORS 5 CORS AF	5 ARP 5 ARP 5 ARP RP	LATITUDE N295401.295 N295603.732 N295244.246	LON W0902 W0900 W0895	GITUDE DI 057.833 712.646 630.197	STANCE 92183 78874 63848	(m) .1 .6 .0		
AT1109	NEAREST EMPIRE MUNIC:	NGS PUBLI IPAL TANK	SHED CONT	ROL POINT N292316.216	W0893	554.391	432	.1		
	1 . 1 . 1					• • • •				

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

2008-264 Results for Receiver 0001



FILE: 00012650.080 000435923

1009 WARI 1009 pati 1009 wil	NING! NO ant tern will be l be returned	enna type applied. for the a	was selec Coordinat antenna ph	ted. No an es with red ase center.	tenna of uced acc	fsets o uracy	r	
1009 1008 NOTE 1008 rete	E: Antenna o urned will be	ffsets sup for the a	oplied by antenna re	the user we ference poi	re zero. nt (ARP)	. Coord	inates	
1008		NGS ====	OPUS SOLU	JTION REPORT				
All compute For additio	d coordinate nal informati	accuracies on: www.ng	s are list gs.noaa.go	ed as peak- v/opus/usin	to-peak g_opus.h	values. tml#acc	uracy	
USER: RINEX FILE:	amount@fugro 00012651.08o	.com		DA TI	TE: Sept ME: 22:3	ember 2 5:15 UT	2, 2008 C	
SOFTWARE: EPHEMERIS: NAV FILE: ANT NAME: ARP HEIGHT:	page5 0612. igr14980.eph brdc2650.08n NONE 0.0	06 master2 [rapid] NONE	23.pl	STA STI OBS US # FIXED AI OVERALL RI	RT: 2008 OP: 2008 ED: 3202 MB: 9 MS: 0.01	/09/21 /09/21 6 / 335 4 / 8(m)	11:31: 23:59: 27 : 99 :	00 00 96% 95%
REF FRAME:	NAD_83(CORS9	6)(EPOCH:2	2002.0000))	ITRF00	(EPOCH:	2008.72	33)
×: Y: Z:	38647 5561856- 3111181	.750(m) .618(m) .276(m)	0.024(m) 0.029(m) 0.042(m)	-5 3:	38647.0 561855.1 111181.0	61(m) 14(m) 72(m)	0.024(0.029(0.042(m) m) m)
LAT: E LON: W LON: EL HGT: ORTHO HGT:	29 23 7.3 270 23 53.2 89 36 6.7 -16 8	0886 5204 4796 .085(m) .108(m)	0.023(m) 0.024(m) 0.024(m) 0.046(m) 0.085(m)	29 2 270 2 89 3 [NAVD88 (Co	3 7.327 3 53.226 6 6.773 –17.5 mputed u	13 88 12 00(m) sing GE	0.023(0.024(0.024(0.024(0.046(0ID03)]	m) m) m) m)
Northing (Y) Easting (X) Convergence Point Scale Combined Fac) [meters] [meters] [degrees] ctor	UTM COORD UTM (Zone 3253496, 247477, -1.27736 1.00038 1.00038	[NATES ≥ 16) 463 970 5773 3691 3944	STATE PLANE SPC (17 99409 1168072 0.8657 0.9999 0.9999	COORDIN 02 LA S) .220 .641 5142 8303 8555	ATES		
US NATIONAL	GRID DESIGNA	TOR: 16RBT	474785349	96(NAD 83)				
PID DI DJ2347 VIC5 DK3577 ENG5 AF9559 MOB1	ESIGNATION VICKSBURG 5 ENGLISH TURN MOBILE POINT	BASE CORS ARP 5 CORS AF 1 CORS AF	E STATIONS RP RP	5 USED LATITUDE N321953.087 N295244.246 N301339.046	LONGI W090551 W089563 W088012	TUDE DI 1.222 0.197 6.752	STANCE(350044. 63848. 178818.	m) 6 0 2

NEAREST NGS PUBLISHED CONTROL POINT AT1109 EMPIRE MUNICIPAL TANK N292316.216 W0893554.391 432.1

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

2008-265 Results for Receiver 0001



FILE: 00042610.080 000435924

1009 1009 1009	WARN patt will	NING! ! ern wi be ret	No ant 11 be turneo	enna appli for	type ed. the a	was sele Coordina antenna pl	cted. tes wit nase ce	No an h red nter.	teni ucei	na of d acci	fsets uracy	or		
1009 1008 1008	NOTE retu	e: Anto unned wi	enna d ill be	offset e for	s sup the a	oplied by antenna r	the us eferenc	er we e poi	re : nt	zero. (ARP)	⊂oor	dina	ates	
NGS OPUS SOLUTION REPORT														
All comp For addi	outeo itior	d coord nal info	inate ormati	accur ion: w	acie: ww.ng	s are lis gs.noaa.g	ted as ov/OPUS	peak- j/Usin	to-µ g_0	peak Pus.h	values tml#ac	;. :cur;	асу	
US RINEX FI	SER: [LE:	amount(000426	₿fugro Lc.080).com				DA TI	TE: Me:	Sept: 22:3	ember 5:17 ι	22, лтс	2008	I
SOFTWA EPHEMER NAV FI ANT NA ARP HEIG	ARE: RIS: LE: AME: GHT:	page5 igr1493 brdc263 NONE 0.0	0612. 73.epH 10.08r	06 ma 1 [rap 1	ister. Did] IONE	.pl	C # FI OVER	STA STO BS US XED A ALL R	RT: OP: ED: MB: MS:	2008, 2008, 5111: 15: 0.010	/09/17 /09/17 1 / 54 3 / 6(m)	, 02 , 23 1482 164	2:03: 3:15:	00 00 94% 93%
REF FRA	WE:	NAD_83	(CORS	96)(EF	осн:	2002.0000)		IT	RF00	(EPOCH	1:200	08.71	19)
	X: Y: Z:	-51 31	38648 561859 111182	3.570(5.220(2.016([m) [m] [m]	0.019(m) 0.009(m) 0.005(m)		-5 3:	380 5618 1111	647.8 354.7 181.8	81(m) 16(m) 12(m)	0. 0. 0.	.019(.009(.005(m) m) m)
L E L W L EL H ORTHO H	LAT: LON: LON: IGT: IGT:	29 23 270 23 89 30	3 7.3 3 53.2 6 6.7 -10	33606 28256 71744 5.064(3.130([m) [m]	0.010(m) 0.019(m) 0.019(m) 0.005(m) 0.071(m)	[NAVD8	29 2 270 2 89 3 88 (⊂o	3 53 3 53 6 6 mput	7.3543 3.2573 6.7429 -17.43 ted us	33 39 61 79(m) sing G	0. 0. 0. 5E0I(.010(.019(.019(.005(.003)]	m) m) m) m)
Northing Easting Converge Point So Combined US NATIC	g (Y) (X) ence tale d Fac) [meter [meter [degro tor GRID D	rs] rs] ees] ESIGN/	UTM C UTM 325 24 -1. 1. 1.	COORD: (Zon) 3497, 7478, 27730 00031 00031 16RB	INATES e 16) .282 .811 5387 5691 8691 3943	STATE SF 11 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	PLANE 99410 .68073 .8657 .9999 .9999 83)	COC 02 1 .069 .451 5566 8303 8355	DRDIN, _A S) Ə L S S	ATES			
					BAS	E STATION								

	BA	ASE STATIONS) USED		
PID	DESIGNATION		LATITUDE	LONGITUDE DI:	STANCE(m)
DH9599	NOLA LOYOLA UNIVERSITY CO	ORS ARP	N295603.732	W0900712.646	78874.5
DK3577	ENG5 ENGLISH TURN 5 CORS	ARP	N295244.246	W0895630.197	63847.7
DE8091	BVHS BOOTHVILLE CORS ARP		N292012.489	W0892423.010	19728.8

	NEAREST NGS	PUBLISHED	CONTROL POI	NT	
AT1109	EMPIRE MUNICIPAL	TANK	N292316	.216 w0893554.391	430.9

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

2008-261 Results for Receiver 0004



FILE: 00042	620.080 000435925								
1009 WAR 1009 pat 1009 wil	NING! No antenna type tern will be applied. l be returned for the	was selec Coordinat antenna pl	tted. No anter tes with reduce hase center.	nna offsets o ed accuracy	-				
1009 1008 NOTH 1008 retu 1008	E: Antenna offsets su urned will be for the	pplied by antenna re	the user were eference point	zero. Coord (ARP).	inates				
1000	NGS ===	OPUS SOLU	JTION REPORT						
All computed coordinate accuracies are listed as peak-to-peak values. For additional information: www.ngs.noaa.gov/OPUS/Using_OPUS.html#accuracy									
USER: RINEX FILE:	amount@fugro.com 0004262a.08o		DATE TIME	: September 22 : 22:37:17 UTC	2, 2008 -				
SOFTWARE: EPHEMERIS: NAV FILE: ANT NAME: ARP HEIGHT:	page5 0612.06 master igr14974.eph [rapid] brdc2620.08n NONE NONE 0.0	10.pl	START STOP OBS USED # FIXED AMB OVERALL RMS	: 2008/09/18 : 2008/09/18 : 53869 / 5700 : 184 / 19 : 0.016(m)	00:14:00 21:53:00 05 : 94% 90 : 97%				
REF FRAME:	NAD_83(CORS96)(EPOCH:	2002.0000]) I.	TRFOO (EPOCH:	2008.7144)				
×: Y: Z:	38648.578(m) -5561856.217(m) 3111182.012(m)	0.020(m) 0.025(m) 0.004(m)	38 -5561 3111	8647.889(m) 1854.713(m) 1181.808(m)	0.020(m) 0.025(m) 0.004(m)				
LAT: E LON: W LON: EL HGT: ORTHO HGT:	29 23 7.33599 270 23 53.28285 89 36 6.71715 -16.069(m) 8.125(m)	0.012(m) 0.020(m) 0.020(m) 0.024(m) 0.075(m)	29 23 270 23 9 89 36	7.35426 53.25769 6.74231 –17.483(m) uted using GEG	0.012(m) 0.020(m) 0.020(m) 0.024(m) DID03)]				
Northing (Y) Easting (X) Convergence Point Scale Combined Fa	UTM COORD UTM (Zon)[meters] 3253497 [meters] 247478 [degrees] -1.2773 1.0003 ctor 1.0003	INATES e 16) .280 .819 6382 8691 8943	STATE PLANE CC SPC (1702 99410.00 1168073.40 0.865755 0.9999830 0.9999855	DORDINATES LA S) 68 60 70 03 55					
US NATIONAL	GRID DESIGNATOR: 16RB	т474795349	97(NAD 83)						
PID D DH9599 NOLA DK3577 ENG5 DE8091 BVHS	BAS ESIGNATION LOYOLA UNIVERSITY COR ENGLISH TURN 5 CORS A BOOTHVILLE CORS ARP	E STATIONS S ARP RP	5 USED LATITUDE N295603.732 W0 N295244.246 W0 N292012.489 W0	LONGITUDE DI: 0900712.646 0895630.197 0892423.010	5TAN⊂E(m) 78874.5 63847.7 19728.8				
AT1109	NEAREST NGS PUBL EMPIRE MUNICIPAL TANK	ISHED CONT	FROL POINT N292316.216 W(0893554.391	430.9				
This position knowledge by field operation	on and the above vecto y the National Geodeti ting procedures used.	r componer c Survey r	nts were comput regarding the (ted without an equipment or	עי				

2008-262 Results for Receiver 0004



FILE: 00042630.080 000435933

1009 WAR 1009 pat 1009 wil 1009 wil	NING! No antenna type w tern will be applied. C l be returned for the an	as selected. N oordinates with tenna phase cen	o antenr reduced ter.	na offsets or Haccuracy	
1009 1008 NOTI 1008 reti	E: Antenna offsets supp urned will be for the an	lied by the use tenna reference	r were z point (zero. Coordi (ARP).	inates
1008	NGS 0 =====	PUS SOLUTION RE	PORT		
All compute For addition	d coordinate accuracies nal information: www.ngs	are listed as p .noaa.gov/OPUS/	eak-to-p Using_OF	peak values. PUS.html#accu	unacy
USER: RINEX FILE:	amount@fugro.com 0004263p.08o		DATE: TIME:	September 22 22:48:39 UTC	2, 2008
SOFTWARE: EPHEMERIS: NAV FILE: ANT NAME: ARP HEIGHT:	page5 0612.06 master29 igr14975.eph [rapid] brdc2630.08n NONE NONE 0.0	.p] OE # FI× OVERA	START: STOP: S USED: ED AMB: LL RMS:	2008/09/19 2008/09/19 21098 / 2214 72 / 8 0.018(m)	15:45:00 23:30:00 22 : 95% 33 : 87%
REF FRAME:	NAD_83(CORS96)(EPOCH:20	02.0000)	ITF	RFOO (EPOCH:2	2008.7180)
×: Y: Z:	38648.573(m) 0 -5561856.234(m) 0 3111182.014(m) 0	.026(m) .050(m) .018(m)	386 55618- 31111	547.884(m) 354.730(m) .81.810(m)	0.026(m) 0.050(m) 0.018(m)
LAT: E LON: W LON: EL HGT: ORTHO HGT:	29 23 7.33578 0 270 23 53.28266 0 89 36 6.71734 0 -16.053(m) 0 8.141(m) 0	.011(m) .027(m) 2 .027(m) .052(m) .088(m) [NAVD88	29 23 7 70 23 53 89 36 € (⊂omput	7.35405 3.25750 5.74250 -17.468(m) :ed using GEC	0.011(m) 0.027(m) 0.027(m) 0.052(m) 01003)]
Northing (Y) Easting (X) Convergence Point Scale Combined Fa	UTM COORDIN UTM (Zone) [meters] 3253497.2 [meters] 247478.8 [degrees] -1.277363 1.000386 ctor 1.000389	ATES STATE P 16) SPC 73 9 14 116 85 0. 91 0. 43 0.	LANE COC (1702 L 9410.061 8073.455 86575567 99998303 99998555	DRDINATES .A S) 	
US NATIONAL	GRID DESIGNATOR: 16RBT4	747953497(NAD 8	3)		
PID D DH9599 NOLA DK3577 ENG5 DE8091 BVHS	BASE ESIGNATION LOYOLA UNIVERSITY CORS ENGLISH TURN 5 CORS ARP BOOTHVILLE CORS ARP	STATIONS USED LATIT ARP N295603 N295244 N292012	UDE L .732 W09 .246 W08 .489 W08	ONGITUDE DIS 00712.646 395630.197 392423.010	STANCE(m) 78874.5 63847.7 19728.8

	NEAREST NGS PUBLISH	ED CONTROL POINT	
AT1109	EMPIRE MUNICIPAL TANK	N292316.216 W0893554.391	430.9

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

2008-263 Results for Receiver 0004



FILE: 00042640.080 000435926

1009 WARNING! 1009 pattern wi	No antenna type ill be applied.	was selec Coordinat	ted. No ant es with redu	enna offsets Iced accuracy	or
1009 will be re 1009 1008 NOTE: Ant 1008 returned w	eturned for the s cenna offsets su vill be for the s	antenna pr pplied by antenna re	the user wer ference poir	e zero. Coor it (ARP).	dinates
1008	NGS ===:	OPUS SOLU	JTION REPORT		
All computed coord For additional inf	dinate accuracie: Formation: www.ng	s are list gs.noaa.go	ed as peak-t v/OPUS/Using	:o-peak values OPUS.html#ac	curacy
USER: amount RINEX FILE: 000420	©fugro.com 541.08o		DAT TIM	E: September 1E: 22:39:26 U	22, 2008 T⊂
SOFTWARE: page5 EPHEMERIS: igr149 NAV FILE: brdc20 ANT NAME: NONE ARP HEIGHT: 0.0	0612.06 master: 976.eph [rapid] 540.08n NONE	23.pl	STAR STO OBS USE # FIXED AM OVERALL RM	RT: 2008/09/20 PP: 2008/09/21 ED: 58049 / 61 IB: 169 / IS: 0.025(m)	11:15:00 11:18:00 411 : 95% 218 : 78%
REF FRAME: NAD_83	(CORS96)(EPOCH:	2002.0000))	ITRFOO (EPOCH	:2008.7212)
×: Y: -5 Z: 3	38648.582(m) 5561856.213(m) 3111182.019(m)	0.020(m) 0.001(m) 0.003(m)	-55 31	38647.893(m) 61854.709(m) 11181.815(m)	0.020(m) 0.001(m) 0.003(m)
LAT: 29 2 E LON: 270 2 W LON: 89 3 EL HGT: ORTHO HGT:	23 7.33625 23 53.28300 36 6.71700 -16.069(m) 8.125(m)	0.003(m) 0.020(m) 0.020(m) 0.003(m) 0.071(m)	29 23 270 23 89 36 [NAVD88 (Com	; 7.35452 ; 53.25784 ; 6.74216 -17.483(m) ;puted using G	0.003(m) 0.020(m) 0.020(m) 0.003(m) EOID03)]
Northing (Y) [mete Easting (X) [mete Convergence [degr Point Scale Combined Factor	UTM COORD: UTM (Zond ers] 3253497 ers] 247478 rees] -1.27730 1.00033 1.00033	INATES e 16) .288 .823 6381 8691 8943	STATE PLANE SPC (170 99410. 1168073. 0.86575 0.99998 0.99998	COORDINATES 22 LA S) 076 463 572 3303 5555	
US NATIONAL GRID D	DESIGNATOR: 16RB	т474795349	97(NAD 83)		
PID DESIGNAT DJ9603 LWES LAKEWO DH9599 NOLA LOYOLA DK3577 ENGS ENGLTS	BASI FION DOD ELMENTRY COR: A UNIVERSITY COR: SH TURN 5 COPS A	E STATIONS S ARP S ARP	5 USED LATITUDE N295401.295 N295603.732 N295244 246	LONGITUDE D W0902057.833 W0900712.646 W0895630 197	ISTANCE(m) 92183.3 78874.5 63847 7

	NEAREST NGS I	PUBLISHED CONTROL POINT	
AT1109	EMPIRE MUNICIPAL	TANK N292316.216 W0893554.391	430.9

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

2008-264 Results for Receiver 0004



FILE: 00042650.080 000435930

1009 WAR 1009 pat 1009 wil	NING! No antenna tern will be appl [:] l be returned for	type was selec ied. Coordinat the antenna ph	ted. No anten es with reduce ase center.	na offsets o d accuracy	r
1009 1008 NOT 1008 ret	E: Antenna offset urned will be for	ts supplied by the antenna re	the user were ference point	zero. Coord (ARP).	inates
1008		NGS OPUS SOLL	ITION REPORT		
All compute For additio	d coordinate accur nal information: v	racies are list www.ngs.noaa.go	ed as peak-to- w/opus/using_o	peak values. PUS.html#acc	uracy
USER: RINEX FILE:	amount@fugro.com 00042651.08o		DATE: TIME:	September 2 22:50:33 UTC	2, 2008 C
SOFTWARE: EPHEMERIS: NAV FILE: ANT NAME: ARP HEIGHT:	page5 0612.06 ma igr14980.eph [rap brdc2650.08n NONE NO.0	aster28.pl oid] NONE	START: STOP: OBS USED: # FIXED AMB: OVERALL RMS:	2008/09/21 2008/09/21 31976 / 3354 97 / 14 0.019(m)	11:31:00 23:59:00 41 : 95% 05 : 92%
REF FRAME:	NAD_83(CORS96)(EF	РО⊂Н:2002.0000)	IT	RFOO (EPOCH:	2008.7233)
X: Y: Z:	38648.5740 -5561856.2100 3111182.0040	(m) 0.021(m) (m) 0.028(m) (m) 0.041(m)	38 -5561 3111	647.885(m) 854.706(m) 181.800(m)	0.021(m) 0.028(m) 0.041(m)
LAT: E LON: W LON: EL HGT: ORTHO HGT:	29 23 7.33587 270 23 53.28271 89 36 6.71729 -16.0790 8.1150	0.022(m) 0.021(m) 0.021(m) (m) 0.045(m) (m) 0.084(m)	29 23 270 23 5 89 36 [NAVD88 (Compu	7.35415 3.25754 6.74246 –17.494(m) ted using GE	0.022(m) 0.021(m) 0.021(m) 0.045(m) 0ID03)]
Northing (Y Easting (X) Convergence Point Scale Combined Fa	UTM C UTM) [meters] 329 [meters] 24 [degrees] -1. 1. ctor 1.	COORDINATES (Zone 16) 53497.276 47478.815 .27736384 .00038691 .00038943	STATE PLANE CO SPC (1702 99410.06 1168073.45 0.8657556 0.9999830 0.9999855	ORDINATES LA S) 4 6 8 3 5	
US NATIONAL	GRID DESIGNATOR:	16RBT474795349	97(NAD 83)		
PID D DJ2347 VIC5 DK3577 ENG5 AF9559 MOB1	ESIGNATION VICKSBURG 5 CORS ENGLISH TURN 5 CC MOBILE POINT 1 CC	BASE STATIONS ARP DRS ARP DRS ARP	USED LATITUDE N321953.087 WO N295244.246 WO N301339.046 WO	LONGITUDE DI: 905511.222 895630.197 880126.752	STANCE(m) 350044.1 63847.7 178817.1
AT1109	NEAREST NGS EMPIRE MUNICIPAL	PUBLISHED CONT TANK	ROL POINT N292316.216 W0	893554.391	430.9
This positi knowledge b field opera	on and the above v y the National Geo ting procedures us	vector componer odetic Survey r sed.	nts were comput egarding the e	ed without a quipment or	ny

2008-265 Results for Receiver 0004



Grand Isle, LA, 10/03/2008 to 04/06/2009

Two OPUS solutions were used for the Receiver 0001:

OPUS Solution for Receiver 0001											
lulian	Ant	Ant	La	titude (NAD83)	Lor	ngitude	(NAD83)			
Day	Туре	Height	Deg	Min	Sec	Deg	Min	Sec	Ellip. Height(m)		
276	None	None	29	12	57.77187	90	1	41.12389	-20.777		
278	None	None	29	12	57.77183	90	1	41.12385	-20.777		
Average			29	12	57.77185	90	1	41.12387	-20.777		

Two OPUS solutions were used for the Receiver 0004:

OPUS Solution for Reciever 0004											
Latitude (NAD83) Longitude (NAD83)											
Julian Day	Ant Type	Ant Height	Deg	Min	Sec	Deg	Min	Sec	Ellip. Height (m)		
276	None	None	29	12	57.82998	90	1	41.1897	-20.718		
278	None	None	29	12	57.83001	90	1	41.18981	-20.710		
Average			29	12	57.829995	90	1	41.189755	-20.714		



FILE: 00012760.080 000445591

1009 W 1009 p 1009 w 1009 w	ARNING attern att be	! No will retur	anten be ap rned f	na type plied. or the a	was s Coord antenr	selec Hinat Na ph	ted. es wit ase ce	No ant th redu enter.	enn Iced	a of acc	fsets o uracy	r		
1008 N 1008 r	OTE: / eturned	Antenr d wil	na off 1 be f	sets sup or the a	ppliec antenr	l by na re	the us feren¢	ser wer ce poin	ez it (ero. ARP)	Coord.	inate	25	
1009				NGS ===:	OPUS	SOLU	TION F	REPORT						
All compu For addit	ted coo ional :	ordina inform	ate ac nation	curacie: : www.ne	s are gs.noa	list Ma.go	ed as v/OPUS	peak-t 5/Using	о-р [_ОР	eak US.h	values. tml#acc	unacy	/	
USE RINEX FIL	R: amou E: 0001	unt@fi L2770.	ugro.c .08o	om				DAT TIM	E:	Octo 14:4	ber 07, 1:32 UT	2008 C	3	
SOFTWAR EPHEMERI NAV FIL ANT NAM ARP HEIGH	E: page s: igri E: brde E: NONE T: 0.0	⊵5 00 L4995. c2770. Ξ	512.06 .eph [.08n	master: rapid] NONE	12.pl	0809	29 # F1 OVEF	STAR STC DBS USE IXED AM RALL RM	IT: IP: ID: IB: IS:	2008 2008 5855 18 0.01	/10/03 /10/04 4 / 617 8 / 2 5(m)	00:(00:(83 07	03:0 03:0 :)0)0 95% 91%
REF FRAM	IE: NAD	_83 (ca	OR596)	(ЕРОСН:	2002.0	0000)			ITR	F00	(EPOCH:	2008.	. 755	5)
	х: Y: z:	-2 -5571 3094	2731.3 L170.5 4812.9	36(m) 89(m) 42(m)	0.018 0.015 0.007	3(m) 5(m) 7(m)		-55 30	-27 711 948	32.0 69.0 12.7	25(m) 85(m) 37(m)	$0.01 \\ 0.01 \\ 0.00$	L8(n L5(n D7(n	1) 1) 1)
LA E LO W LO EL HG ORTHO HG	л: 29 N: 269 N: 90 л: 90 л:	9 12 9 9 58 1 0 1 4	57.771 18.876 41.123 -20.7 3.1	87 11 89 77(m) 46(m)	0.008 0.018 0.018 0.018 0.018	3(m) 3(m) 3(m) 5(m) 3(m)	[NAVD8	29 12 269 58 90 1 38 (⊂om	57 18 41 -	.789 .850 .149 22.1 ed u	90 57 43 89(m) sing GE	0.00 0.01 0.01 0.01 0.01	08(n L8(n L8(n L8(n 3)]	1) 1) 1) 1)
Northing Easting (Convergen Point Sca Combined	(Y) [m(X) [m(ce [d(le Factor	eters eters egrees	UT U] 5]	M COORD: TM (Zond 3235581, 788928, 1.45160 1.00063 1.00063	INATES e 15) .842 .169 0856 3024 3351	5	STATE SF 11 (1 1	PLANE ⊃⊂ (170 80095. 126915. 0.65263 1.00001 1.00002	COO 12 L 129 765 824 .883 209	RDIN A S)	ATES			
US NATION	AL GRI	D DESI	IGNATO	R: 15RYI	N88928	33558	2 (NAD	83)						
PID DF5771 LM	DESIG	NATION CON CO	N DRS AR	BASI	E STAT	IONS	USED LATI N29151	ITUDE 17.904	L(W09)	ONGI 0394	TUDE DI 0.652	STAN(617(IE(m 08.7	1)
DE8091 BV	HS BOOT	THVILL	LE COR	S ARP	KF'		N29201	14.240 L2.489	w08 W08	9242	3.010	6188	30.0)
AU1292	н 1	NEAF 55	REST N	GS PUBL:	ISHED	CONT	ROL PO N2912:	DINT 57.	W09	0012	3.	48	39.7	7
		1												

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

2008-276 Results for Receiver 0001



FILE: 00012780.080 000445593

1009 WAR 1009 pat 1009 wil 1009 wil	NING! No ant tern will be l be returned	enna type applied. for the a	was selec Coordinat antenna ph	ted. No ant es with redu ase center.	enna offsets c uced accuracy	pr
1008 NOTI 1008 reti	E: Antenna o urned will be	ffsets sup for the a	pplied by antenna re	the user wer eference poir	re zero. Coord nt (ARP).	linates
1009		NGS ===:	OPUS SOLU	JTION REPORT		
All compute For addition	d coordinate nal informati	accuracie: on: www.ng	s are list gs.noaa.go	ed as peak-t v/OPUS/Using	co-peak values. g_OPUS.html#acc	uracy
USER: RINEX FILE:	amount@fugro 0001278k.08o	.com		DAT TIM	TE: October 07, ME: 14:42:54 UT	2008 C
SOFTWARE: EPHEMERIS: NAV FILE: ANT NAME: ARP HEIGHT:	page5 0612. igr14996.eph brdc2780.08n NONE 0.0	06 master: [rapid] NONE	10.pl 0809	29 STAF STO OBS USE # FIXED AN OVERALL RM	RT: 2008/10/04 DP: 2008/10/05 ED: 59136 / 616 MB: 176 / 2 MS: 0.016(m)	10:55:00 10:48:00 000 : 96% 05 : 86%
REF FRAME:	NAD_83(CORS9	6)(EPOCH:	2002.0000))	ITRFOO (EPOCH:	2008.7594)
×: Y: Z:	2731- 5571170- 3094812	.335(m) .590(m) .941(m)	0.005(m) 0.009(m) 0.012(m)	-55 30	-2732.024(m) 571169.086(m) 994812.736(m)	0.005(m) 0.009(m) 0.012(m)
LAT: E LON: W LON: EL HGT: ORTHO HGT:	29 12 57.7 269 58 18.8 90 1 41.1 -20 3	7183 7615 2385 .777(m) .146(m)	0.013(m) 0.005(m) 0.005(m) 0.008(m) 0.071(m)	29 12 269 58 90 1 [NAVD88 (Com	2 57.78985 3 18.85061 L 41.14939 -22.189(m) nputed using GE	0.013(m) 0.005(m) 0.005(m) 0.008(m) cold03)]
Northing (Y) Easting (X) Convergence Point Scale Combined Fa) [meters] [meters] [degrees] ctor	UTM COORD: UTM (Zond 3235581 788928 1.45160 1.0006 1.0006	INATES e 15) .841 .170 0856 3024 3351	STATE PLANE SPC (170 80095, 1126915, 0.65263 1.00001 1.00002	COORDINATES)2 LA S) 128 766 3825 L883 2209	
US NATIONAL	GRID DESIGNA	TOR: 15RYI	N889283558	32(NAD 83)		
PID DI DG5315 HOUM DF5771 LMCN DE8091 BVHS	ESIGNATION HOUMA CORS A LUMCON CORS BOOTHVILLE C	BASI RP ARP ORS ARP	E STATIONS	5 USED LATITUDE N293532.109 N291517.904 N292012.489	LONGITUDE DI W0904324.988 W0903940.652 W0892423.010	STANCE(m) 79345.1 61708.7 61880.0
AU1292	NEAREST H 155	NGS PUBL:	ISHED CONT	ROL POINT N291257.	w0900123.	489.7

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

2008-278 Results for Receiver 0001



FILE: 00042760.080 000445635

1009 1009 1009 1009	WARN patt will	ING! ern w be r	No an ill be eturne	tenna typ applied. d for the	e was sele Coordina antenna pl	cted. No tes with r nase cente	anter educe r.	nna off ed accu	sets or racy	-	
1008	NOTE retu	: An nned י	tenna (will b	offsets s e for the	upplied by antenna ro	the user eference p	were	zero. (ARP).	Coord	inates	
1008				NG ==	S OPUS SOLI	JTION REPO	RT				
All comp For addi	uted tion	l coor al in	dinate format	accuraci ion: www.	es are lis ngs.noaa.g	ted as pea pv/OPUS/Us	ik-to-	-peak v PUS.ht	alues. ml#accu	uracy	
US RINEX FI	ER: LE:	amoun [.] 00042	t@fugr: 770.08	o.com o			DATE: TIME:	Octob 15:05	er 07, :42 UTC	2008	
SOFTWA EPHEMER NAV FI ANT NA ARP HEIG	RE: IS: IE: ME: HT:	page5 igr14 brdc2 NONE 0.0	0612 995.epi 770.08i	.06 maste n [rapid] n NONE	r3.pl 0809	291 S OBS # FIXED OVERALL	START: STOP: USED: AMB: RMS:	2008/ 2008/ 58569 198 0.016	10/03 10/04 / 6209 / 20 (m)	00:03 00:03 91 : 99 :	:00 :00 94% 95%
REF FRA	ME:	NAD_8	3 (CORS	96)(ЕРОСН	:2002.0000)	IT	RF00 (EPOCH:2	2008.75	555)
	X: Y: Z:	-	-2733 557116 3094814	3.113(m) 9.766(m) 4.532(m)	0.019(m) 0.027(m) 0.013(m)		-2 -5571 3094	733.80 168.26 814.32	2(m) 2(m) 7(m)	0.0190 0.0270 0.0130	(m) (m) (m)
L E L W L EL H ORTHO H	.AT: .ON: .ON: IGT:	29 : 269 90	12 57.3 58 18.3 1 41.3 -2	32998 31030 L8970 D.718(m) 3.205(m)	0.008(m) 0.019(m) 0.019(m) 0.030(m) 0.077(m)	29 269 90 [NAVD88 () 12 5) 58 1) 1 4 ⊂ompu	7.8480 8.7847 1.2152 -22.13 ited us	1 7 3 1(m) ing GEC	0.008 0.019 0.019 0.030 0.030 DID03)	(m) (m) (m) (m)]
Northing Easting Converge Point Sc Combined	(Y) (X) ance ale Fac	[met] [met] [degi tor	ers] ers] rees]	UTM COOR UTM (Zo 323558 78892 1.451 1.000 1.000	DINATES ne 15) 3.587 6.346 60035 63023 63349	STATE PLA SPC (800 11269 0.65 1.00 1.00	NE CC 1702 96.89 13.96 26291 00188	ORDINA LA S) 98 57 .0 33 98	TES		
US NATIO	NAL	GRID	DESIGN/	ATOR: 15R	YN88926355	84(NAD 83)	l				
DID	~~	CT CNA	TTON	ВА	SE STATION:	5 USED		LONGT			(m)
DF5771 L DK3577 E DE8091 B	MCN NG5 VHS	LUMCO ENGLI: BOOTH	N CORS SH TURI VILLE (ARP N 5 CORS LORS ARP	ARP	N291517.9 N295244.2 N292012.4	04 W0 46 W0 89 W0)903940)895630)892423	.652 .197 .010	61706. 73953. 61881.	.8 .2 .4
AU1292		н 155	NEARES	F NGS PUB	LISHED CON	FROL POINT N291257.	WC	900123		491.	.6

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

2008-276 Results for Receiver 0004



FILE: 00042780.080 000445639

1009 WARI 1009 pati 1009 wil 1009 wil	NING! No ante tern will be a l be returned	enna type applied. for the a	was selec Coordinat antenna ph	ted. No ant es with redu ase center.	tenna offsets o uced accuracy	or
1008 NOTI 1008 retu 1008 retu	E: Antenna of urned will be	fsets sup for the a	pplied by antenna re	the user wer eference poir	re zero. Coord nt (ARP).	dinates
1000		NGS ===:	OPUS SOLU	JTION REPORT		
All compute For addition	d coordinate a nal informatio	accuracies on: www.ng	s are list gs.noaa.go	ed as peak-t v/OPUS/Using	to-peak values. g_OPUS.html#acc	iunacy
USER: RINEX FILE:	amount@fugro. 0004278k.08o	com		DAT TIM	ГЕ: October 07, ИЕ: 15:07:49 UT	2008 rc
SOFTWARE: EPHEMERIS: NAV FILE: ANT NAME: ARP HEIGHT:	page5 0612.0 igr14996.eph brdc2780.08n NONE 0.0)6 master: [rapid] NONE	10.pl 0809	029 STAF STO OBS USE # FIXED AN OVERALL RM	RT: 2008/10/04 DP: 2008/10/05 ED: 59279 / 621 4B: 190 / 2 4S: 0.015(m)	10:49:00 10:48:00 L54 : 95% 209 : 91%
REF FRAME:	NAD_83(CORS96	б)(ЕРОСН:	2002.0000))	ITRF00 (EPOCH:	2008.7594)
×: Y: Z:	-2733. -5571169. 3094814.	116(m) 773(m) 537(m)	0.012(m) 0.017(m) 0.010(m)	-55 30	-2733.805(m) 571168.269(m) 094814.332(m)	0.012(m) 0.017(m) 0.010(m)
LAT: E LON: W LON: EL HGT: ORTHO HGT:	29 12 57.83 269 58 18.81 90 1 41.18 -20. 3.	3001 1019 3981 710(m) 213(m)	0.011(m) 0.012(m) 0.012(m) 0.016(m) 0.073(m)	29 12 269 58 90 1 [NAVD88 (Com	2 57.84804 3 18.78466 L 41.21534 -22.122(m) nputed using GE	0.011(m) 0.012(m) 0.012(m) 0.016(m) EOID03)]
Northing (Y Easting (X) Convergence Point Scale Combined Fa	ו [meters] [degrees] ctor	JTM COORD: UTM (Zond 3235583, 788926, 1.45160 1.0006; 1.0006;	INATES e 15) .588 .343 0033 3023 3348	STATE PLANE SP⊂ (170 80096. 1126913. 0.65262 1.00001 1.00002	COORDINATES D2 LA 5) .899 .964 2909 L883 2208	
US NATIONAL	GRID DESIGNAT	TOR: 15RY	N889263558	34(NAD 83)		
PID DI DG5315 HOUM DF5771 LMCN DE8091 BVHS	ESIGNATION HOUMA CORS AF LUMCON CORS A BOOTHVILLE CO	BASI RP ARP DRS ARP	E STATIONS	5 USED LATITUDE N293532.109 N291517.904 N292012.489	LONGITUDE DI W0904324.988 W0903940.652 W0892423.010	ISTANCE(m) 79342.6 61706.8 61881.4
AU1292	NEAREST H 155	NGS PUBL:	ISHED CONT	ROL POINT N291257.	w0900123.	491.6

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

2008-278 Results for Receiver 0004