

| | | | | | | |
|---|-------------------------------------|---|----------------------|----------------------|-----------------|------------------------|
| 9-275-1 | 10/24/08 | U.S. DEPARTMENT OF THE INTERIOR U.S. Geological Survey | | | | Meas. No. 19 |
| Station Number | | ADCP Discharge Measurement Notes | | | | Processed by SS |
| 370000099122601 | | | | | | Checked by V |
| Station Name | | MISSISSIPPI R. ABOVE CONFLUENCE | | | | |
| Date | 5-20-2011 | Party | ESS/TL | | Gage Height | Discharge |
| Width | Area/Rated Area | Velocity | Index Vel. | | | |
| 9470 | 157000 | 3.08 | | | | 483000 |
| Gage Height Change | Meas. plots | From rating | Shift | ADCP Sync'd to WT | | |
| in | hrs. | % diff | No. | at | | or N |
| ADCP Mfr / Model / Frequency | | Serial No. | Firmware | Software | | |
| SONTEK / M9 / 3MH, 1MH | | 1155 | 1.50 | 2.50 | | |
| Boat/Motors Used | | GPS Used | ADCP Depth | Diag. Test / Errors? | | |
| HOWSE WOODBRIDGE SONTEK M9 | | .25 | | Y or N | | |
| Compass Calib. & Total Error | Mag. Var | Mag/Var Method | Moving Bed? | | | |
| Y or N | M509 | -1.5 | Y or N | | | |
| Meas. Water Temp | ADCP Water Temp | Weather / Air Temp | Wind Speed / Dir. | | | |
| 18.8°F | 19.2°F | OC WARM | 0-5 ESE | | | |
| Gage Readings | | | | | | |
| Time | Inside | Outside | Max Water Depth | | Site Conditions | |
| | | | Max Water Speed | | | |
| 1017 | | | Max Boat Speed | | | |
| | | | Water Mode | | | |
| 1112 | | | Bottom Mode | | | |
| | | | Streambed material | | | |
| | | | Salinity | | | |
| | | | ppt at | | | |
| Weighted MGH | | | Checkbar found | | | |
| GH corrections | | | Checkbar changed to: | | | |
| Correct MGH | | | at | | | |
| Wading, cable, ice, boat upstr., downstr., side bridge | | ft. mi upstr., downstr. of gage | | | | |
| Measurement rated: excellent (2%), good (5%), fair (8%), poor (>8%) | | based on following conditions | | | | |
| Flow | FAIRLY EVEN - BARREL TRAFFIC | | | | | |
| Cross section: | FAIRLY EVEN | | | | | |
| Control: | CHANEL | | | | | |
| Gage operating: | Y or N | Record removed: | Y or N | Filename: | | |
| Battery voltage | V | Intakes/Orifice cleaned/purged: | | | | |
| Bubble-gage psi: | Tank | Line | Min | Bubble rate | / min | |
| Extreme-GH indicators: | Max | Ref elev. | CSG Checked | Y or N | | |
| HWM on stick | | | HWM elevation | | | |
| GH of zero flow = GH | | - depth at control | = | ft. | Rated = | |
| Sheet No. | | of | | sheets | | |

Discharge Measurement Summary

Date Measured: Friday, May 20, 2011

| Site Information | | Measurement Information | |
|------------------|------------------|-------------------------|---------------|
| Site Name | Mississippi Rv | Party | ESS/TL |
| Station Number | | Boat/Motor | MO WSC Wldrdg |
| Location | Above Confluence | Meas. Number | |

| System Information | | System Setup | | Units | |
|--------------------|-------|----------------------------|------|-------------|------|
| System Type | RS-M9 | Transducer Depth (ft) | 0.25 | Distance | ft |
| Serial Number | 1155 | Salinity (ppt) | 0.0 | Velocity | ft/s |
| Firmware Version | 1.50 | Magnetic Declination (deg) | -1.5 | Area | ft2 |
| Software Version | 2.50 | | | Discharge | cfs |
| | | | | Temperature | degF |

| Discharge Calculation Settings | | | | Discharge Results | |
|--------------------------------|---------------|-----------------|-------------|-------------------|-------------|
| Track Reference | Bottom-Track | Left Method | Sloped Bank | Width (ft) | 9,474.01 |
| Depth Reference | Vertical Beam | Right Method | Sloped Bank | Area (ft2) | 156,632.7 |
| Coordinate System | ENU | Top Fit Type | Power Fit | Mean Speed (ft/s) | 3.083 |
| | | Bottom Fit Type | Power Fit | Total Q (cfs) | 482,778.544 |

| Measurement Results | | | | | | | | | | | | | | | | | | |
|---------------------|------|-------------|---------|----------|----------|----------|----------|-----------|-------|-----------|----------|--------|-----------|------------|-----------|-------------|----------|-------|
| Tr | Time | | | Distance | | | | Mean Vel | | Discharge | | | | | | | % | |
| # | Time | Duration | Temp. | Track | DMG | Width | Area | Boat | Water | Left | Right | Top | Middle | Bottom | Total | LCTotal | Measured | |
| 1 | R | 10:17:58 AM | 0:27:23 | 65.0 | 9,184.50 | 8,568.07 | 9,362.07 | 155,225.8 | 5.590 | 3.147 | 7,431.89 | 682.59 | 23,872.70 | 382,522.06 | 73,929.24 | 488,438.478 | -- | 78.3 |
| 2 | L | 10:47:42 AM | 0:24:17 | 66.1 | 9,215.91 | 8,746.96 | 9,585.96 | 158,039.6 | 6.325 | 3.019 | 4,778.38 | 681.72 | 23,263.24 | 377,387.74 | 71,007.53 | 477,118.609 | -- | 79.1 |
| | | | Mean | 65.5 | 9,200.21 | 8,657.51 | 9,474.01 | 156,632.7 | 5.958 | 3.083 | 6,105.13 | 682.16 | 23,567.97 | 379,954.88 | 72,468.38 | 482,778.544 | 0.000 | 78.7 |
| | | | Std Dev | 0.6 | 15.71 | 89.45 | 111.95 | 1,406.9 | 0.368 | 0.064 | 1,326.75 | 0.44 | 304.73 | 2,567.16 | 1,460.86 | 5,659.935 | 0.000 | 0.4 |
| | | | COV | 0.0 | 0.002 | 0.010 | 0.012 | 0.009 | 0.062 | 0.021 | 0.217 | 0.001 | 0.013 | 0.007 | 0.020 | 0.012 | 0.000 | 0.005 |

Exposure Time: 0:51:40

Tr1=20110520101757r.rivr; Tr2=20110520104742r.rivr;

| Comments |
|---|
| Tr1=20110520101757r.rivr - ; Tr2=20110520104742r.rivr - ; |

| Loop Method | | | | | |
|-------------|-----------|---------------------|----------------------|----------------|------------------------------|
| DMG | Loop Time | Moving Bed Velocity | Moving Bed Direction | Flow Direction | Estimated Percent Correction |
| 628.25 | 2,649 | 0.24 | 239.36 | 171.61 | 7.45 |

File Name: Loop_20110520111635r.rivr

Percent Bad Bottom Track: 2.9.

Difference in flow direction between out and back sections: 5.4 deg.

WARNING: Difference in flow direction between out and back sections of loop exceeds 5 degrees. This may indicate an inaccurate compass and the loop may not be accurate. Please review data.

Loop Closure Error not in Upstream Direction -- No Correction Recommended.

| Compass Calibration | |
|---|--|
| File Name: CompassCal20110520093253.txt | |
| Results: PASS | |
| Score is excellent. | |
| Magnetic interference is very low. | |
| Calibration score: M5.00Q9 | |

| System Test | |
|---|--|
| File Name: SystemTest20110520094001.txt | |
| System Test: PASS | |

Parameters and settings marked with a * are not constant for all files.

Report generated using SonTek RiverSurveyor Live v2.50

$$\text{Main } Q_{\text{Avg}} = \frac{459,090 + 490,056}{2} = 455,000 \text{ cfs.}$$

$$\text{Overflow } Q_{\text{Avg}} = \frac{29,348 + 27,063}{2} = 28,200 \text{ cfs}$$

(see attached)
-TK
2/16/12

20110520101757 20110520104742



Process
Step
Sample
Time
Duration
Voltage (V)
Settings
Track Reference
Depth Reference
Vertical Beam
Coordinate Syst.
Summary
Total Q (dfs)
Loop Corrected...
Boat Speed (ft/s)
Mean Speed (ft/s)
Track (ft)

Moving Boat
In Transect
1.267
10:39:04 AM
02:107
14.5

Bottom-Track
Vertical Beam
ENU

29,347,858
5,922
0.261
7,278.03

Processing Toolbox

Edge Estimates

Left Bank

Left Method

Left Distance (ft)

Estimated Flow (cfs)

Right Bank

Right Method

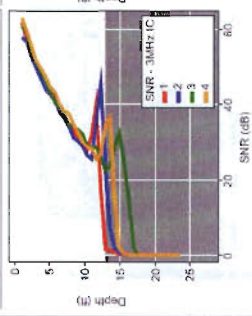
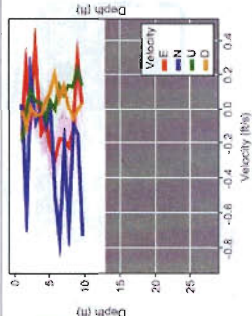
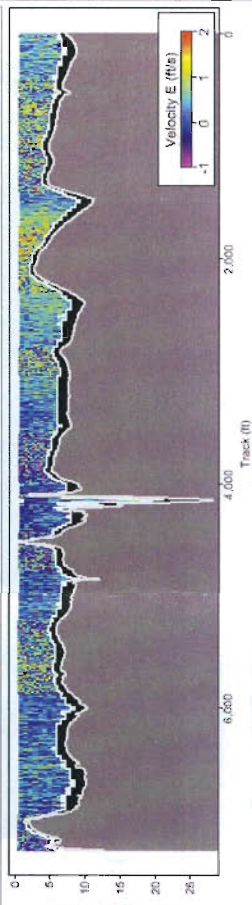
Right Distance (ft)

Estimated Flow (cfs)

Apply

Apply to all

| Step | Sample | Time | Track (ft) | DMG (ft) | Depth (ft) | # Pings | # Cells | Sat... | GPS... (ft/s) | Boat Speed (ft/s) | Left Q (cfs) | Right Q (cfs) | Total Q (cfs) | Longitude (deg) | |
|------------|--------|-------------|---------------|-------------|---------------|---------|---------|--------|------------------|----------------------|-----------------|------------------|------------------|--------------------|-----------------|
| In Tran... | 1.252 | 10:38:49... | 7,173.53 | 6,636.91 | 6.50 | 31 | 14 | 9 | 2 | 0.745 | 7.502 | 0.00 | 681.96 | 29,118,277 | -89° 11' 58.18" |
| In Tran... | 1.253 | 10:38:50... | 7,180.98 | 6,643.07 | 6.66 | 31 | 15 | 9 | 2 | 0.476 | 7.452 | 0.00 | 681.66 | 29,141,451 | -89° 11' 58.10" |
| In Tran... | 1.254 | 10:38:51... | 7,188.54 | 6,649.37 | 6.73 | 31 | 15 | 9 | 2 | 0.697 | 7.556 | 0.00 | 681.36 | 29,173,173 | -89° 11' 58.01" |
| In Tran... | 1.255 | 10:38:52... | 7,196.28 | 6,655.61 | 6.40 | 31 | 15 | 9 | 2 | 0.703 | 7.744 | 0.00 | 681.03 | 29,206,204 | -89° 11' 57.93" |
| In Tran... | 1.256 | 10:38:53... | 7,203.66 | 6,661.88 | 5.74 | 31 | 14 | 9 | 2 | 0.450 | 7.373 | 0.00 | 680.75 | 29,223,591 | -89° 11' 57.84" |
| In Tran... | 1.257 | 10:38:54... | 7,211.45 | 6,667.92 | 6.58 | 31 | 15 | 9 | 2 | 0.801 | 7.791 | 0.00 | 680.39 | 29,262,537 | -89° 11' 57.76" |
| In Tran... | 1.258 | 10:38:55... | 7,218.49 | 6,673.71 | 5.52 | 31 | 13 | 9 | 2 | 0.580 | 7.044 | 0.00 | 680.11 | 29,280,695 | -89° 11' 57.68" |
| In Tran... | 1.259 | 10:38:56... | 7,225.90 | 6,680.13 | 5.11 | 31 | 12 | 9 | 2 | 0.451 | 7.410 | 0.00 | 679.84 | 29,285,899 | -89° 11' 57.59" |
| In Tran... | 1.260 | 10:38:57... | 7,233.25 | 6,685.98 | 5.27 | 31 | 12 | 9 | 2 | 0.395 | 7.347 | 0.00 | 679.52 | 29,300,854 | -89° 11' 57.51" |
| In Tran... | 1.261 | 10:38:58... | 7,240.12 | 6,691.67 | 5.53 | 31 | 13 | 9 | 2 | 0.072 | 6.870 | 0.00 | 679.24 | 29,302,349 | -89° 11' 57.44" |
| In Tran... | 1.262 | 10:38:59... | 7,246.71 | 6,697.17 | 6.37 | 31 | 14 | 9 | 2 | 0.140 | 6.596 | 0.00 | 678.98 | 29,306,956 | -89° 11' 57.36" |
| In Tran... | 1.263 | 10:39:00... | 7,253.25 | 6,702.75 | 7.23 | 31 | 15 | 9 | 2 | 0.104 | 6.531 | 0.00 | 678.74 | 29,306,102 | -89° 11' 57.29" |
| In Tran... | 1.264 | 10:39:01... | 7,259.44 | 6,708.31 | 8.42 | 31 | 16 | 9 | 2 | 0.082 | 6.199 | 0.00 | 678.54 | 29,302,220 | -89° 11' 57.22" |
| In Tran... | 1.265 | 10:39:02... | 7,266.03 | 6,714.04 | 9.59 | 31 | 22 | 9 | 2 | 0.507 | 6.586 | 0.00 | 678.31 | 29,328,307 | -89° 11' 57.14" |
| In Tran... | 1.266 | 10:39:03... | 7,272.11 | 6,719.58 | 7.05 | 31 | 19 | 9 | 2 | 0.135 | 6.082 | 0.00 | 678.13 | 29,328,338 | -89° 11' 57.07" |
| In Tran... | 1.267 | 10:39:04... | 7,278.03 | 6,724.96 | 12.78 | 31 | 14 | 9 | 2 | 0.261 | 5.922 | 0.00 | 677.95 | 29,347,858 | -89° 11' 57.00" |



Track (ft)

Velocity (ft/s)

SNR (dB)

Track (ft)

System Samples Navigation Edges Time Series Transact

Discharge Summary

File

20110520... 5/20/2011 10:17:58 ... 0:27:23 9,184.50 8,568.07 9,362.07 155,225.8 3,147 5,590 7,431.89 682.59 488,438.4... 78.3

20110520... 5/20/2011 10:47:42 ... 0:24:17 9,215.91 8,746.96 9,585.96 158,039.6 3,019 6,325 4,778.38 681.72 477,118.6... 79.1

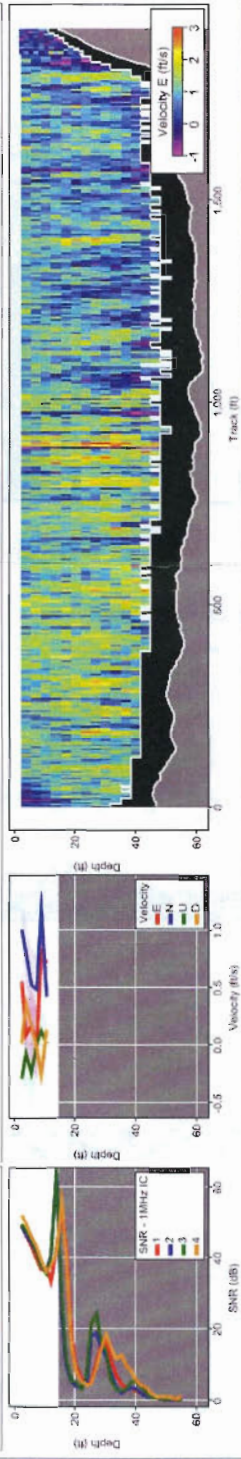
Mean 0:25:50 9,200.21 8,657.51 9,474.01 156,632.7 3,083 5,958 6,105.13 682.16 482,778.5... 78.7

Std Dev 0:01:33 15.71 89.45 111.95 1,406.9 0.064 0.368 1,326.75 0.44 5,659.935 ... 0.4

COV 0.000 0.002 0.010 0.009 0.021 0.062 0.217 0.001 0.012 0.000 0.005

Overflow W = 6725 + 592 = 7317
Main W = 9362 - 7317 = 2045

Overflow Q = 29,348
Main Q = 488,438 - 29,348 = 459,090

[illegible]

| Discharge Summary | | Post-Processing | | File | Start Date | Start Time | Duration | Track (ft) | DMG (ft) | Width (ft) | Area (ft ²) | mean Speed (ft/s) | Boat Speed (ft/s) | Left Q (cfs) | Right Q (cfs) | Total Q (cfs) | Corrected T (cfs) | % Measure |
|-------------------------------------|-------------|-----------------|--|------|------------|--------------|----------|------------|----------|-----------------|-------------------------|-------------------|-------------------|--------------|---------------|---------------------|-------------------|-----------|
| <input checked="" type="checkbox"/> | 20110520... | | | | 5/20/2011 | 10:17:58 ... | 0:27:23 | 9,184.50 | 8,568.07 | 9,362.07 | 155,225.8 | 3,147 | 5,590 | 7,431.89 | 682.59 | 483,438.4... | .. | 78.3 |
| <input checked="" type="checkbox"/> | 20110520... | | | | 5/20/2011 | 10:47:42 ... | 0:24:17 | 9,215.91 | 8,746.96 | <u>9,585.96</u> | 158,039.6 | 3,019 | 6,325 | 4,778.38 | 681.72 | <u>477,118.5...</u> | .. | 79.1 |
| | | | | | | Mean | 0:25:50 | 9,200.21 | 8,657.51 | 9,474.01 | 156,632.7 | 3,083 | 5,958 | 6,105.13 | 682.16 | 482,778.5... | .. | 78.7 |
| | | | | | | Std Dev | 0:01:33 | 15.71 | 89.45 | 111.95 | 1,406.9 | 0.064 | 0.368 | 1,326.75 | 0.44 | 5,659.935 | .. | 0.4 |
| | | | | | | COV | 0:00:00 | 0.002 | 0.010 | 0.012 | 0.009 | 0.021 | 0.062 | 0.217 | 0.001 | 0.012 | 0.000 | 0.005 |

Main W = 1860 + 209 = 2069

Overflow W = 9586 - 2069 = 7517

Main Q = 450.056

Overflow Q = 477.119 - 450.056 = 27.063