Water-Data Report 2011

# 50055000 RIO GRANDE DE LOIZA AT CAGUAS, PR

RIO GRANDE DE LOIZA BASIN

LOCATION.--Lat 18°14′33″, long 66°00′34″ referenced to North American Datum of 1927, Caguas Municipio, PR, Hydrologic Unit 21010005, on right bank 250 ft (76 m) upstream from bridge on State Road 189, 1.2 mi (1.9 km) downstream from Río Turabo, and 1.8 mi (2.9 km) east of Caguas plaza.

DRAINAGE AREA.--89.8 $mi^2$, (233 $km^2$).

## SURFACE-WATER RECORDS

PERIOD OF RECORD.--1959 (low-flow measurement only), February to November 1959 (monthly measurements only), December 1959 to current year.

GAGE.--Water-stage recorder, satellite telemetry at station. Elevation of gage is 143.28 ft (43.672 m) above mean sea level.

REMARKS.--Records fair except those for estimated daily discharges, which are poor.

**50055000 RIO GRANDE DE LOIZA AT CAGUAS, PR—Continued**

**DISCHARGE, CUBIC FEET PER SECOND**
**WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011**
**DAILY MEAN VALUES**
[e, estimated]

| Day | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 486 | 179 | 128 | 92 | 65 | 48 | 36 | 233 | 1,260 | 877 | 548 | 452 |
| 2 | 425 | 183 | 121 | 101 | 63 | 47 | 36 | 269 | 510 | 987 | 680 | 426 |
| 3 | 938 | 170 | 120 | 106 | 63 | 47 | 41 | 107 | 333 | 1,500 | 8,250 | 442 |
| 4 | 513 | 304 | 115 | 91 | 62 | 50 | 36 | 76 | 855 | 962 | 3,880 | 462 |
| 5 | 236 | 925 | 114 | 90 | 64 | 58 | 39 | 64 | 1,240 | 450 | 1,020 | 433 |
| 6 | 296 | 2,010 | 111 | 86 | 77 | 61 | 46 | 55 | 1,000 | 355 | 686 | 416 |
| 7 | 4,220 | 401 | 139 | 85 | 73 | 77 | 37 | 49 | 1,940 | 518 | 688 | 359 |
| 8 | 2,510 | 326 | 346 | 84 | 66 | 61 | 43 | 46 | 904 | 712 | 540 | 582 |
| 9 | 588 | 755 | 487 | 82 | 69 | 50 | 47 | 46 | 533 | 360 | 461 | 492 |
| 10 | 349 | 618 | 147 | 78 | 64 | 47 | 38 | 1,010 | 477 | 301 | 455 | 338 |
| 11 | 309 | 479 | 117 | 76 | 68 | 47 | 35 | 293 | 347 | 276 | 422 | 385 |
| 12 | 307 | 346 | 117 | 78 | 65 | 47 | 30 | 98 | 321 | 1,040 | 392 | 410 |
| 13 | 237 | 261 | 104 | 130 | 63 | 43 | 34 | 81 | 286 | 615 | 466 | 4,950 |
| 14 | 211 | 237 | 108 | 145 | 70 | 43 | 66 | 88 | 265 | 1,870 | 389 | 1,350 |
| 15 | 196 | 209 | 105 | 86 | 65 | 44 | e76 | 75 | 254 | 598 | 327 | 665 |
| 16 | 187 | 188 | 199 | 81 | 59 | 45 | 45 | 138 | 1,960 | 473 | 409 | 467 |
| 17 | 178 | 176 | 119 | 77 | 60 | 44 | 38 | 2,460 | 529 | 389 | 527 | 444 |
| 18 | 169 | 167 | 101 | 75 | 62 | 45 | 32 | 412 | 338 | 345 | 375 | 871 |
| 19 | 160 | 159 | 97 | 74 | 90 | 45 | 30 | 1,820 | 292 | 851 | 765 | 1,730 |
| 20 | 157 | 153 | 93 | 72 | 77 | 47 | 48 | 8,360 | 319 | 435 | 465 | 1,350 |
| 21 | 153 | 149 | 98 | 71 | 145 | 50 | 50 | e1,910 | 266 | 358 | 747 | 523 |
| 22 | 147 | 160 | 112 | 72 | 80 | 48 | 44 | 651 | 237 | 349 | 10,100 | 1,470 |
| 23 | 146 | 401 | 97 | 104 | 61 | 68 | 52 | 442 | 216 | 1,820 | 10,800 | 655 |
| 24 | 145 | 178 | 89 | 114 | 56 | 48 | 46 | 648 | 207 | 1,070 | 6,840 | 463 |
| 25 | 136 | 150 | 88 | 75 | 55 | 41 | 36 | e533 | 242 | 487 | 2,350 | 457 |
| 26 | 138 | 145 | 91 | 77 | 55 | 39 | 58 | 486 | 259 | 386 | 1,090 | 421 |
| 27 | 150 | 141 | 110 | 71 | 52 | 37 | 555 | 2,610 | 761 | 1,250 | 788 | 363 |
| 28 | 193 | 136 | 115 | 70 | 49 | 35 | 181 | 1,440 | 268 | 1,990 | 706 | 336 |
| 29 | 508 | 132 | 191 | 68 | --- | 34 | 71 | 658 | 257 | 852 | 587 | 384 |
| 30 | 395 | 129 | 104 | 71 | --- | 36 | 56 | 393 | 222 | 601 | 535 | 381 |
| 31 | 191 | --- | 92 | 72 | --- | 38 | --- | 317 | --- | 757 | 501 | --- |
| Total | 14,974 | 9,967 | 4,175 | 2,654 | 1,898 | 1,470 | 1,982 | 25,868 | 16,898 | 23,834 | 56,789 | 22,477 |
| Mean | 483 | 332 | 135 | 85.6 | 67.8 | 47.4 | 66.1 | 834 | 563 | 769 | 1,832 | 749 |
| Max | 4,220 | 2,010 | 487 | 145 | 145 | 77 | 555 | 8,360 | 1,960 | 1,990 | 10,800 | 4,950 |
| Min | 136 | 129 | 88 | 68 | 49 | 34 | 30 | 46 | 207 | 276 | 327 | 336 |
| Ac-ft | 29,700 | 19,770 | 8,280 | 5,260 | 3,760 | 2,920 | 3,930 | 51,310 | 33,520 | 47,270 | 112,600 | 44,580 |
| Cfsm | 5.38 | 3.70 | 1.50 | 0.95 | 0.75 | 0.53 | 0.74 | 9.29 | 6.27 | 8.56 | 20.4 | 8.34 |
| In. | 6.20 | 4.13 | 1.73 | 1.10 | 0.79 | 0.61 | 0.82 | 10.72 | 7.00 | 9.87 | 23.53 | 9.31 |

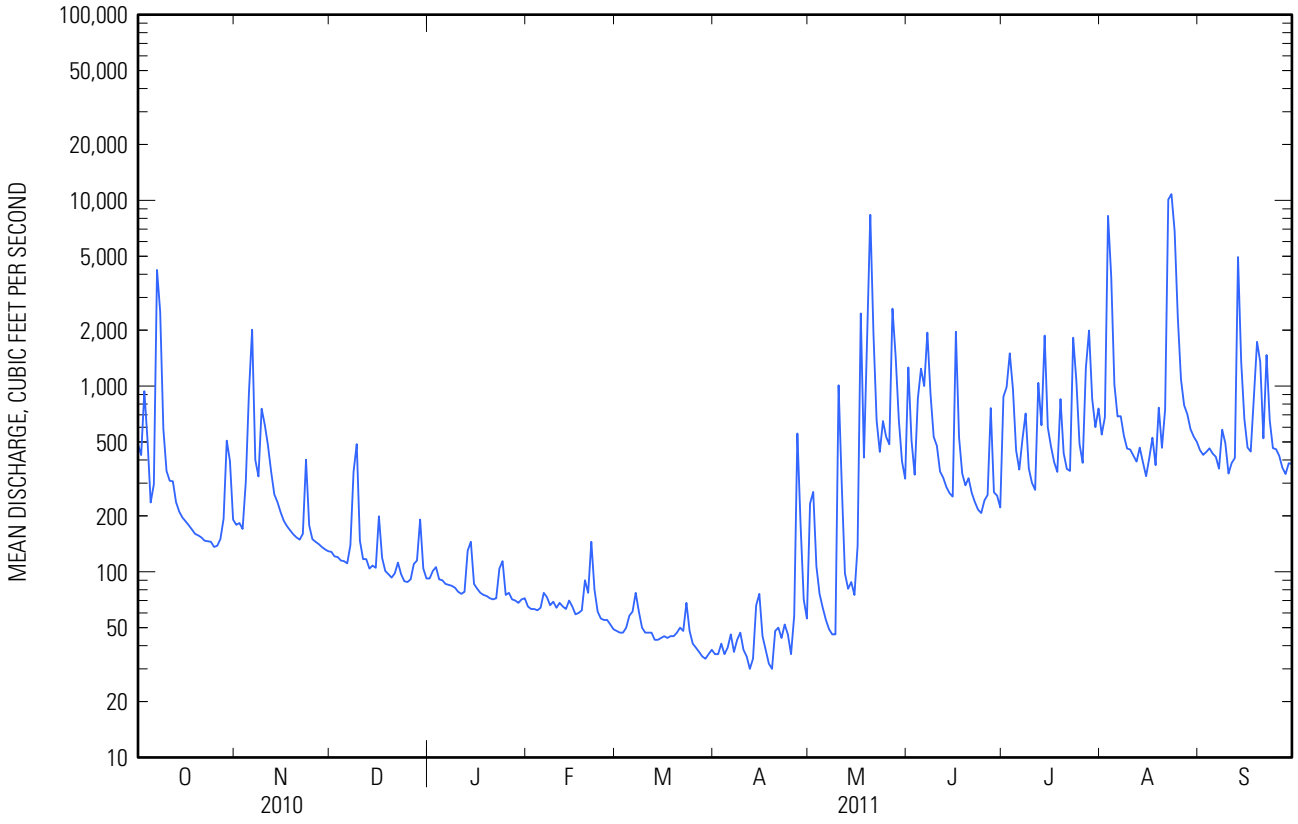
**STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1960 - 2011, BY WATER YEAR (WY)**

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 355 | 323 | 227 | 150 | 108 | 91.7 | 102 | 240 | 241 | 245 | 285 | 335 |
| Max | 1,910 | 1,223 | 714 | 559 | 291 | 306 | 521 | 863 | 1,283 | 834 | 1,832 | 1,438 |
| (WY) | (1971) | (2004) | (1988) | (1992) | (1984) | (1989) | (2003) | (1985) | (1979) | (2010) | (2011) | (1960) |
| Min | 44.2 | 64.9 | 33.6 | 45.3 | 35.6 | 23.2 | 30.6 | 33.7 | 34.1 | 21.8 | 51.4 | 37.4 |
| (WY) | (1968) | (1968) | (1968) | (1968) | (1968) | (1968) | (1995) | (1974) | (1975) | (1974) | (1994) | (1967) |

**50055000 RIO GRANDE DE LOIZA AT CAGUAS, PR—Continued**

**SUMMARY STATISTICS**

| | Calendar Year 2010 | | Water Year 2011 | | Water Years 1960 - 2011 | |
|---|---|---|---|---|---|---|
| **Annual total** | 119,696 | | 182,986 | | | |
| **Annual mean** | 328 | | 501 | | 224 | |
| **Highest annual mean** | | | | | 526 | 1979 |
| **Lowest annual mean** | | | | | 82.3 | 1967 |
| **Highest daily mean** | 4,220 | Oct 7 | 10,800 | Aug 23 | 25,300 | Sep 6, 1960 |
| **Lowest daily mean** | 43 | Apr 5 | 30 | Apr 12 | 11 | Apr 8, 1968 |
| **Annual seven-day minimum** | 47 | Mar 25 | 36 | Mar 27 | 11 | Apr 8, 1968 |
| **Maximum peak flow** | | | 34,900 | May 20 | 83,000 | Sep 10, 1996 |
| **Maximum peak stage** | | | 22.25 | May 20 | 32.32 | Sep 10, 1996 |
| **Instantaneous low flow** | | | 26 | Apr 20 | 17 | Aug 18, 1994 |
| **Annual runoff (ac-ft)** | 237,400 | | 363,000 | | 162,200 | |
| **Annual runoff (cfsm)** | 3.65 | | 5.58 | | 2.49 | |
| **Annual runoff (inches)** | 49.58 | | 75.80 | | 33.88 | |
| **10 percent exceeds** | 700 | | 972 | | 382 | |
| **50 percent exceeds** | 167 | | 179 | | 108 | |
| **90 percent exceeds** | 73 | | 47 | | 41 | |



**50055000 RIO GRANDE DE LOIZA AT CAGUAS, PR—Continued**

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water year 1959 to current year.

**WATER-QUALITY DATA**
**WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011**
Part 1 of 4
[MF, membrane filter; N, nitrogen; NTRU, nephelometric turbidity ratio unit; P, phosphorus; col/100 mL, colonies per 100 milliliters; ft³/s, cubic feet per second; mg/L, milligrams per liter; ng/L, nanograms per liter; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; --, no data; <, less than; E, estimated]

| Date | Sample start time | Discharge, instantaneous, ft³/s (00061) | Dissolved oxygen, water, unfiltered, mg/L (00300) | pH, water, unfiltered, field, standard units (00400) | Specific conductance, water, unfiltered, µS/cm at 25 °C (00095) | Temperature, water, °C (00010) | Turbidity, water, unfiltered, broad band light source (400-680 nm), detectors at multiple angles including 90 +/- 30 degrees, ratiometric correction, NTRU (63676) | Calcium, water, unfiltered, recoverable, mg/L (00916) | Magnesium, water, unfiltered, recoverable, mg/L (00927) |
|---|---|---|---|---|---|---|---|---|---|
| **11-30-2010** | **1100** | 132 | 8.9 | 7.7 | 281 | 23.8 | E 12 | -- | -- |
| **02-24-2011** | **1200** | 55 | 7.9 | 7.7 | 315 | 25.6 | E 12 | 23.7 | 7.95 |
| **05-26-2011** | **1220** | 344 | 7.8 | 7.7 | 179 | 26.8 | 120 | -- | -- |
| **08-25-2011** | **1035** | 2,540 | 8.1 | 6.9 | 145 | 25.5 | 110 | 11.8 | 5.00 |

**WATER-QUALITY DATA**
**WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011**
Part 2 of 4
[MF, membrane filter; N, nitrogen; NTRU, nephelometric turbidity ratio unit; P, phosphorus; col/100 mL, colonies per 100 milliliters; ft³/s, cubic feet per second; mg/L, milligrams per liter; ng/L, nanograms per liter; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; --, no data; <, less than; E, estimated]

| Date | Sample start time | Hydrogen ion, water, unfiltered, calculated, mg/L (00191) | Ammonia, water, unfiltered, mg/L as N (00610) | Nitrate plus nitrite, water, filtered, mg/L as N (00631) | Nitrite, water, filtered, mg/L as N (00613) | Phosphorus, water, unfiltered, mg/L as P (00665) | Total nitrogen, water, unfiltered, analytically determined, mg/L (62855) | Fecal coliform, M-FC MF (0.7 micron) method, water, col/100 mL (31625) | Total coliform, M-Endo MF method, immediate, water, col/100 mL (31501) |
|---|---|---|---|---|---|---|---|---|---|
| **11-30-2010** | **1100** | .00002 | .12 | .60 | .024 | .076 | .93 | E 7,200 | 36,000 |
| **02-24-2011** | **1200** | .00002 | .08 | .63 | .021 | .116 | .91 | 2,300 | E 9,000 |
| **05-26-2011** | **1220** | .00002 | .09 | .48 | .011 | .189 | 1.71 | E 9,000 | 67,000 |
| **08-25-2011** | **1035** | .00013 | .06 | .50 | .004 | .169 | 1.08 | 24,000 | 58,000 |

**50055000 RIO GRANDE DE LOIZA AT CAGUAS, PR—Continued**

**WATER-QUALITY DATA**
**WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011**
Part 3 of 4
[MF, membrane filter; N, nitrogen; NTRU, nephelometric turbidity ratio unit; P, phosphorus; col/100 mL, colonies per 100 milliliters; ft³/s, cubic feet per second; mg/L, milligrams per liter; ng/L, nanograms per liter; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; --, no data; <, less than; E, estimated]

| Date | Sample start time | Cadmium, water, unfiltered, µg/L (01027) | Chromium, water, unfiltered, recover-able, µg/L (01034) | Copper, water, unfiltered, recover-able, µg/L (01042) | Lead, water, unfiltered, recover-able, µg/L (01051) | Mercury, water, unfiltered, ng/L (50286) | Zinc, water, filtered, µg/L (01090) | Arsenic, water, unfiltered, µg/L (01002) | Cyanide, water, unfiltered, milligrams per liter (00720) | Selenium, water, unfiltered, µg/L (01147) |
|---|---|---|---|---|---|---|---|---|---|---|
| **11-30-2010** | **1100** | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **02-24-2011** | **1200** | < .05 | < 0.5 | 2.5 | .25 | 2.27 | < 1.4 | 1.1 | E .0041 | .13 |
| **05-26-2011** | **1220** | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **08-25-2011** | **1035** | < .05 | 1 | 10.2 | 1.77 | 15.5 | < 1.4 | .52 | E .0017 | .19 |

**WATER-QUALITY DATA**
**WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011**
Part 4 of 4
[MF, membrane filter; N, nitrogen; NTRU, nephelometric turbidity ratio unit; P, phosphorus; col/100 mL, colonies per 100 milliliters; ft³/s, cubic feet per second; mg/L, milligrams per liter; ng/L, nanograms per liter; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; --, no data; <, less than; E, estimated]

| Date | Sample start time | Methylene blue active sub-stances, water, unfiltered, recover-able, mg/L (38260) |
|---|---|---|
| **11-30-2010** | **1100** | -- |
| **02-24-2011** | **1200** | < .05 |
| **05-26-2011** | **1220** | -- |
| **08-25-2011** | **1035** | < .05 |