Hourly Rainfall on September 1988 at Major Stations

| Serial | Station |
| ---: | :--- |
| 3111 | Paramo de Mucuchies |
| 3112 | Paramo Pico El Aguila |
| 3024 | Valle Grande |
| 3049 | La Punta |
| 3042 | Mesa de Ejido |
| 3080 | El Morro |
| 3169 | Jaji |
| 8057 | Tostos |
| 3108 | El Meson |
| 3035 | El Vigia |




| 018 |  | $f \mathrm{C}$ | $\|$Lluvia <br> 11 <br> 1 <br> -20 | ENGLOB. | $\mathrm{za}^{\text {PC }}$ | （3m ${ }^{5}$ |  | $0_{0}^{10^{m}}$ | ${ }^{30} 0^{\text {m }}$ | $\mathrm{in}^{\text {in }}$ | ${ }_{32} 2^{\text {n }} 35$ | $3^{36}$ | $80^{6 n} 63$ | $9_{49} 9^{n}$ | ${ }_{88}^{12^{n}}$ | ${ }_{72} 2^{7} 7$ | ${ }^{\text {PR }}{ }_{\text {sod }}$ | COMENTAR：OS \｛CODIGO：+2079$\}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 10955 |  | 50.0 |  |  |  |  | 18 | 30 | 4.6 | 6.5 | 7.9 | 74 | 10.61 |  | 108 | 105 |  |
| 2 | ． |  |  |  |  |  |  | $2 ?$ | 3.7 | 47 | 5.3 |  | 5.5 |  | 57 |  | 106 |  |
| 3 |  |  |  |  |  |  |  | 04 | 12 | 15 | 3.3 | $\leq 4^{\prime}$ |  |  |  |  | 5.71 |  |
| 4 |  |  |  |  |  |  |  | 0 O | 031 |  | 34 | 今． | $\because$ |  |  |  | 24 |  |
| 5 |  |  |  |  |  |  |  | 131 | 20 | 2.7 | 43 | 4.6 | 3.4 | 灾入 |  |  | 0.51 |  |
| 6 |  |  |  |  |  |  |  | 3.1 | 40 | 5.1 | 87 | 105 | 184 | 2.4 | －！－ | 55 | 13.8 |  |
| 7 |  |  |  |  |  |  |  | 20 | 34 | 46 | 7.0 | 97 | 11.8 | 129 |  | 14.4 | 44.5 |  |
| 8 |  |  |  |  |  |  |  | 14 | 25 | 4.6 | 6.7 | 72 |  |  |  |  | 1.5 |  |
| 9 | 10810 |  | 805 |  |  |  |  | 1.9 | 301 | 3.8 | 5.01 | 22．2 | 8.51 |  | 107 |  | 7.51 |  |
| 10 |  |  |  |  |  |  |  | 4.8 | 5.72 | 7：8 | $12 ?$ | 125 |  | 137 | 167 | 220 | 1541 |  |
| 11 |  |  |  |  |  |  |  | 0.51 | 09 | 1.01 |  |  |  |  |  |  | 16.81 |  |
| 12 |  |  |  |  |  |  |  | 0.6 |  |  |  |  |  |  | 1.1 |  | 1.0 |  |
| 13 |  |  |  |  |  |  |  | 19 | $2: 1$ | ご心 | 23 | 139 | 16.2 | 171 | 15－1 | 14.5 | $\because$ |  |
| 14 |  |  | ． |  |  |  |  | $\because \because$ | 03 | $0-1$ | 67 | 10 |  |  |  |  | 10 |  |
| 15 |  |  |  |  |  |  |  | $\because 2$ | $3-1$ | $\because$ |  |  |  |  |  |  |  |  |
| 16 |  |  |  |  |  |  |  | 0.1 | 0.21 |  |  |  |  |  |  |  | $2 \therefore$ |  |
| 17 |  |  |  |  |  |  |  | 0.3 |  |  |  |  |  |  |  |  | 0 |  |
| 18 |  |  |  |  |  |  |  | 0.7 | 0.1 | 36 | 27. |  |  |  | 2.1 |  | 3 | ， |
| 19 |  |  |  |  |  |  |  | 3.7 | 0.7 | ！ 9 | 12 | 1.1 | $1!5$ | 三． 1 | $\cdots$ | $\cdots$ | 29 |  |
| 20 | 1c： |  | 5 |  |  |  |  | $\because{ }^{\prime}$ | 14 | 37 | $こ ゙$ | 5.51 | 4 | 1，2\％ |  |  | $\because 1$ |  |
| 21 |  |  |  |  |  |  |  | $\cdots$ | $\cdots$ | $0{ }^{7}$ |  | 9.1 | \％ |  |  |  | 48 |  |
| 22 |  |  |  |  |  |  |  | － | $\because$ | $\bigcirc$ | 06 |  |  |  |  |  | \％ |  |
| 23 |  |  |  |  |  |  |  | $0 ¢$ | 15 | $2 \geq$ | 26 | 31 | $\underline{-10}$ | 47 |  |  | $\cdots$ |  |
| 24 |  |  |  |  |  |  |  | 011 |  |  |  |  |  |  |  |  | 1.7 |  |
| 25 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | S1 | － |
| 26 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 27 |  |  |  |  |  |  |  | 0.2 |  |  | 03 |  |  | 34 | 0.5 |  |  |  |
| 28 |  |  |  |  |  |  |  | $0 \times 1$ | Dito |  |  |  | 1.10 |  |  |  | 6.5 |  |
| 29 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1.1 |  |
| 30 |  |  |  |  |  |  |  | 01i | 08 | 1.3 | 34 | 三¢ | 35 | 3 |  | 419 | － 2 |  |
| 31 |  | － |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SERI |  | ｜ 3 |  | MES MA | $\begin{aligned} & \text { MAXIMAS } \\ & \text { ENSIDADES } \end{aligned}$ |  |  | 40 | 5.5 | 73 | 1ここ | 12.5 | 1841 | こ－43 | $\pm 16$ | －20 5 | 175,2 |  |
| 31 | 11 | 41 | 6 \％ |  | ECMAS |  |  | 10 | 1．） | $\because$ | 10 | 10 | $x$ | 06 | 06 |  |  | FIRMA EVALUADOR：$\qquad$ FECKA： 29.$\qquad$ |
| ODservacionse： |  | 6 | $31011$ | 1213 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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| SERIAL | c. | II | ZONA | ANO | MES |
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| DTA | $\|$HORA <br> Her <br> 17 | fc | $\left\lvert\, \begin{gathered} \text { LLUVIA } \\ 18 \end{gathered}\right.$ | ENGLOB. | 20. ${ }^{2}$ | ${ }_{32} 5^{m}$ |  | $0^{3}$ | ${ }_{40}^{10^{m}}$ | ${ }_{40^{3 m}}^{47}$ | $8^{1 n}$ | $232^{2}$ |  | 6 ${ }^{6}$ | $9_{4} 9^{h}$ | ${ }_{60}^{12^{n}}$ | ${ }_{72} 24^{n}$ | PR 00 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 1818 |  | GG8 |  |  |  |  |  | 20 | 30 | 52 | 7.6 | 87 |  |  |  |  | $13 \cdot 7$ |
| 2 |  |  |  |  | . |  |  |  | 30 | 4.6 | 5.3 | 5.7 | 5.8 | 60 | 61 |  |  | .8.7 |
| 3 |  |  |  |  |  |  |  |  | 1.3 | 2.0 | 2.3 | 29 | 32 |  |  |  |  | 611 |
| 4 |  |  |  |  |  |  |  |  | 0.4 | 0.5 |  | 0.6 | . |  |  |  |  | 32 |
| 5 |  |  |  |  |  |  |  |  | 1.5 | 23. | 3.5 | 49 | 7.5 | 10.3 | 108 |  |  | 0.6 |
| 6 |  |  |  |  |  |  |  |  | 2.7 | 3.7 | 4.6 | 60 | 8.8 | 15.5 | 21.3 | 29.6 | 32.1 | 13.3 |
| 7 |  |  |  |  |  |  |  |  | 36 | 5.0 | 7.2 | 94 | 117 | 1361 | 15.7 | 161 | 168 | 453 |
| 8 |  |  |  |  |  |  |  |  | 1.6 | 27 | 52 | 79 | 86 |  |  |  |  | 11 |
| 9 | 0830 |  | 822 |  |  |  |  |  | 3.5 | 44 | 8.0 | 11.2 | 15.7 | $16 ?$ |  | 18.5 | 19.1 | 8.6 |
| 10 |  |  |  |  |  |  |  |  | 3.0 | 44 | 6.01 | 8.5 | 10.4 | 10.8 | 13.8 | 16.7 | 24.2 | 26.6 |
| 11 |  |  |  |  |  |  |  |  | 02 | 0.3 | 041 |  |  |  |  |  |  | 16.7 |
| 12 |  |  |  |  |  |  |  |  | 04 | 0.5 |  |  | 0.8 |  |  |  | 11 | 0.7 |
| 13 |  |  |  |  |  |  |  |  | 19 | 3.0 | 53 | 86 | 104 | 13.7 | 16. | 176 | 188 | 2.0 |
| 14 |  |  |  |  |  |  |  |  | 0.3 | 0.1 | 0.5 | 0.6 | 07 |  |  |  |  | 183 |
| 15 |  |  |  |  |  |  |  |  | 0.6 | 0.7 |  |  |  | 0.8 |  |  |  |  |
| 16 |  |  |  |  |  |  |  |  | 0.1 | 02 | 0.3 | 0.5 |  |  |  |  |  | 0.8 |
| 17 |  |  |  |  |  |  |  |  | 01 | 0.2 |  |  |  |  |  |  |  | 0.5 |
| 18 |  |  |  |  |  |  |  |  | 0.1 | 02 | 0.3 | 04 | 0.5 | 0.8 |  |  |  | 02 |
| 19 |  |  |  |  |  |  |  |  | 0.5 | 03 | 09 | 1.1 | 14 | 1.5 |  | 20 | 21 | 2.3 |
| 20 | 1025 |  | 66.6 |  |  |  |  |  | 0.5 | 14 | 2.3 | 3.0 | 37 | 34 | 4.1 |  |  | 0.6 |
| 21 |  |  |  |  |  |  |  |  | 0 2? |  | 03 | 0.4 | 0.51 | 0.71 |  |  |  | 4.1 |
| 22 |  |  |  |  |  |  |  |  | 02 | 0.3 | 04 | $0.7{ }^{-}$ |  |  |  |  |  | 0.71 |
| 23 |  |  |  |  |  |  |  |  | 0.8 | 12 | 1. | 1.7 | 22 | 2.9 | 32 |  |  | 0.7 |
| 24 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 3.2 |
| 25 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | . |
| 26 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 27 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 |  |  |  |  |  |  |  |  | 0.6 | 0.8 | 1.0 |  |  | 18 |  |  |  | . |
| 29 |  |  |  |  |  |  |  |  | 0.2 | 0.3 |  | 0.5 |  |  |  |  |  | 18 |
| 30 |  |  |  |  |  |  |  |  | 0.6 | 04 | 14 | 19 | $\geq 2$ | 2.4 |  |  |  | 2.9 |
| 31 | - |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SER1 | 1AL'C | R ${ }^{1}$ | 20nalano <br> $16 / 82$ | MES INT | MAXIMAS |  |  |  | 36 | 50 | 8.0 | 11.2 | 1531 | $16 ?$ | 313 | 396 | 45.3 | 182 |
| 31 | 12 | 4 | 16.80 | [99] | FECHAS |  |  |  | 07 | 07 | 09 | 09 | 09 | 09 | 06 | 06 | 06/07 |  |
| Obsery | raciones: |  | $831011$ | $11213$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |






| 29 | 26 | 16809 |
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Firma evalurgor: stullecidelali/precma: 23-1fé
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MINISTERIO DEL AMBIENTE Y OE LOS RECURSOS NATURALES RENOVABLES - ZONA 5




$$
\begin{aligned}
& 68.6 \\
& \hline 08109 \\
& 305.0
\end{aligned}
$$

$$
\text { A.S.B. sifon FlSSTM以: } 刀 0
$$

Arithmetic Mean Daily Rainfall of the Chama River Basin from 1967 to 1987
$N$













































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| 1 | 15 | 1.8 | 14 | 8.6 | 14 | . 0 | 15 | . 0 | 14 | 1.3 | 14 | 2.1 | 14 | . 7 | 15 | 3.1 | 15 | 4.5 | 13 | 5.8 | 15 | 1.0 |  | . 5 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2 | 14 | . 1 | 15 | . 2 | 14 | 3.8 | 15 | . 0 | 15 | 8.5 | 14 | 4.9 | 13 | . 4 | 15 | . 5 | 15 | 1.5 | 14 | 3.6 | 15 | . 0 | 15 | 8 |
| 3 | 14 | . 1 | 15 | .1 | 14 | . 1 | 15 | . 0 | 15 | . 0 | 14 | 3.6 | 13 | 2.1 | 15 | 1.5 | 14 | 2.9 | 14 | 3.5 | 15 | 1.1 | 15 | 3.0 |
| 4 | 14 | . 0 | 15 | . 2 | 14 | 3.3 | 15 | . 0 | 15 | . 0 | 15 | 1.9 | 14 | . 6 | 15 | 1.6 | 14 | . 0 | 14 | 8.8 | 15 | . 0 | 15 | . 3 |
| 5 | 14 | . 0 | 14 | 10.8 | 14 | 1.1 | 15 | 2.7 | 14 | . 5 | 15 | 10.5 | 14 | . 5 | 15 | . 0 | 14 | . 2 | 15 | 9.8 | 15 | 2.8 | 15 | 2.0 |
| 6 | 14 | . 0 | 14 | 2.0 | 14 | . 0 | 15 | 1.1 | 14 | . 1 | 15 | . 7 | 14 | 1.6 | 15 | 1.7 | 13 | 1.4 | 14 | 24.4 | 14 | 16.2 | 15 | 1.1 |
|  | 14 | . 0 | 14 | . 4 | 13 | . 6 | 15 | 3.1 | 14 | 3.2 | 15 | 2.6 | 14 | . 1 | 15 | . 4 | 13 | 2.6 | 12 | 1.8 | 14 | 2.8 | 15 | . 2 |
| 8 | 14 | . 0 | 14 | . 9 | 13 | . 0 | 15 | 2.2 | 14 | 1.3 | . 15 | 1.9 | 14 | 9.4 | 15 | 5.9 | 13 | . 0 | 11 | 4.5 | 14 | 5.2 | 15 | . 2 |
|  | 14 | . 0 | 15 | . 0 | 13 | . 0 | 12 | 10.5 | 14 | 6.8 | 15 | . 9 | 13 | 1.2 | 15 | . 5 | 13 | 3.7 | 10 | 3.1 | 14 | 2.5 | 15 | 4.3 |
| 10 | 14 | . 0 | 15 | 4.0 | 13 | . 0 | 12 | 2.5 | 14 | 7.5 | 15 | 4.4 | 13 | 1 | 15 | 1.2 | 13 | . 2 | 10 | 2.3 | 12 | 2.3 | 15 | 2.1 |
| 11 | 14 | . 0 | 15 | 5.1 | 13 | . 0 | 12 | 2.5 | 14 | 2.0 | 14 | 1.6 | 13 | . | 15 | . 1 | 13 | . 9 | 10 | . 0 | 13 | . 6 | 15 | 3.6 |
| 12 | 14 | . 0 | 15 | . 1 | 14 | . 0 | 12 | 7.9 | 14 | . 1 | 14 | . 5 | 13 | 1.8 | 14 | 4.6 | 12 | . | 11 | 5.3 | 13 | 3.9 | 14 | 2.7 |
| 13 | 14 | . 3 | 15 | . 0 | 14 | 1.1 | 11 | 15.5 | 14 | . 0 | 14 | . 0 | 13 | 1.0 | 14 | . 8 | 12 | . 0 | 11 | 4.4 |  | . 1 | 14 | 0.5 |
| 14 | 14 | 4.0 | 15 | . 1 | 15 | . 8 | 11 | 3.9 | 14 | 1.2 | 14 | 1.8 | 13 | . 4 | 14 | 2.0 | 12 | 1.8 | 11 | 1.0 | 13 | 2.9 |  | 7.6 |
| 15 | 13 | 3.8 | 15 | . 6 | 15 | 1.2 | 10 | 7.2 | 14 | 2.6 | 14 | . 6 | 13 | . 0 | 14 | 2.3 | 12 | 1.4 | 11 | 5.1 | 13 | . 0 | 13 | . 7 |
| 16 | 13 | 1.5 | 15 | . 0 | 15 | . 4 | 12 | 14.0 | 14 | 2.1 | 14 | . 9 | 14 | . 5 | 14 | 4.8 | 12 | 2.9 | 10 | 6.8 | 13 | 10.8 | 13 | . 2 |
| 17 | 13 | 7.6 | 15 | . 0 | 15 | . 0 | 13 | 9.3 | 14 | 2.3 | 14 | 1.6 | 14 | . 8 | 15 | 1.7 | 12 | . 9 | 10 | . 8 | 12 | 11.4 | 13 | . 0 |
| 18 | 14 | 3.6 | 14 | . 0 | 15 | . 0 | 13 | 9.6 | 14 | . 3 | 14 | 4.0 | 14 | 1.9 | 15 | 1.5 | 14 | . 0 | 11 | . 1 | 12 | 9.1 | 14 | . 0 |
| 19 | 15 | 1.0 | 14 | . 3 | 15 | . 0 | 12 | 5.5 | 14 | 1.4 | 13 | . 6 | 14 | . 0 | 15 | 11.8 | 14 | 8.8 | 12 | . 6 | 11 | 31.6 | 14 | 4.4 |
| 20 | 14 | 3.5 | 14 | . 0 | 15 | . 0 | 12 | . 4 | 14 | 1.7 | 13 | . 4 | 13 | . 0 | 15 | 6.2 | 14 | 2.2 | 12 | . 0 | 11 | 9.2 | 13 | . 0 |
| 21 | 14 | 4.9 | 14 | . 2 | 14 | .1 | 12 | 3.0 | 14 | 2.7 | 14 | . 6 | 13 | . 7 | 14 | 1.3 | 15 | 5.4 | 12 | 1.3 | 10 | 6.6 | 14 | . 7 |
| 22 | 14 | 2.9 | 13 | . 4 | 15 | . 0 | 12 | 3.7 | 14 | . 3 | 14 | . 5 | 13 | . | 14 | 4.2 | 14 | . 4 | 12 | 3.8 | 10 | 13.2 | 15 | . 4 |
| 23 | 13 | 3.4 | 13 | 1.4 | 15 | . | 13 | . 7 | 14 | 1.5 | 14 | . 9 | 13 | . | 14 | . 6 | 14 | 2.1 | 15 | 8.6 | 10 | 1.5 | 15 | 1.0 |
| 24 | 13 | . 6 | 13 | 5.6 | 15 | . 0 | 13 | 15.0 | 14 | 2.8 | 13 | 2.8 | 14 | 1.2 | 14 | . 1 | 14 | 4.4 | 14 | 6.2 | 10 | . | 15 | . 0 |
| 25 | 13 | . 0 | 13 | 3.5 | 15 | . 0 | 13 | 9.5 | 14 | . 4 | 14 | . 3 | 13 | . 8 | 14 | 1.4 | 14 | 3.5 | 14 | 3.6 | 10 | . 0 | 15 | 1.4 |
| 26 | 13 | 1.9 | 14 | 2.4 | 15 | . 4 | 13 | 2.0 | 14 | . 0 | 14 | . 6 | 13 | . 3 | 14 | . 1 | 14 | 6.9 | 14 | 3.7 | 12 | . 0 | 15 | . 0 |
| 27 | 13 | .1 | 14 | . 5 | 15 | . 5 | 14 | 1.9 | 14 | . 0 | 14 | 2.8 | 13 | . 2 | 14 | . 6 | 14 | 1.9 | 14 | 3.6 | 12 | . 0 | 15 | . 4 |
| 28 | 13 | . 0 | 14 | . 9 | 15 | . 4 | 14 | . 0 | 14 | . 1 | 14 | . 1 | 13: | . 4 | 15 | 7.3 | 14 | 1.1 | 14 | 1.9 | 13 | 2.2 | 15 | . 8 |
| 29 | 15 | . 0 | 0 | . 0 | 15 | . 0 | 13 | . 0 | 14 | . 0 | 14 | . 2 | 13 | . 0 | 15 | . 2 | 14 | . 3 | 14 | . 1 | 13 | . 0 | 15 | . 6 |
| 30 | 15 | 3.9 | 0 | . 0 | 15 | . 3 | 14 | 2.4 | 14 | . 0 | 14 | 1.2 | 15 | 2.0 | 15 | 3.1 | 14 | 2.4 | 15 | 4.5 | 15 | . 4 | 15 | . 6 |
| 31 | 15 | 15.2 | 0 | . 0 | 15 | . 0 | 0 | . 0 | 14 | 2.1 | 0 | . 0 | 15 | 5.8 | 15 | 1.6 | 0 | . 0 | 15 | . 5 | 0 | . 0 | 15 | . 0 |







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NON-UNIFORM CALCULATION RESULTS (I)
(No. 0.0 K to No. 74.0 K )

## Study Cases

Case 1: $50 \mathrm{~m}^{3} / \mathrm{s}$ of discharge
Case 2: $100 \mathrm{~m}^{3} / \mathrm{s}$ of discharge
Case 3: $150 \mathrm{~m}^{3} / \mathrm{s}$ of discharge

## Abbreviations

No. : Number of Section
H : Water Level
A : Current Area
R : Hydraulic Radius
$v$ : Current Velocity
N : Manning's Roughness Coefficient
Q : Discharge
DX : Distance between two sections
FROUD : Froude's Number
IE : Energy gradient


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#### Abstract

 



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NON-UNIFORM CALCULATION RESUL.TS (II)
(No. 60.0 K to No. 73.5 K )

## Study Cases

Case 1: $1,000 \mathrm{~m}^{3} / \mathrm{s}$ of discharge
Case 2: $2,000 \mathrm{~m}^{3} / \mathrm{s}$ of discharge
Case 3: $3,000 \mathrm{~m}^{3} / \mathrm{s}$ of discharge

## Abbreviations

No. : Number of Section
H : Water Level
A : Current Area
R : Hydraulic Radius
$V$ : Current Velocity
N : Manning's Roughness Coefficient
Q : Discharge
DX : Distance between two sections
FROUD : Froude's Number
IE : Energy gradient

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