| Source | Data / Information | Period of Record | Format |
|---|---|---|---|
| Soquel Creek Water District | Water Levels - Production Wells | 6/90 - 9/03 | MS Access file |
| | | 1973 - 1990 | paper copies |
| | Water Levels - Monitoring Wells | 1/83 - 3/02 | MS Access file |
| | Groundwater Production - monthly by well | 11/83 - 9/03 | MS Access file |
| | - annual totals | 1966 - 1983 | paper copy |
| | Well Information (status, elevation, depth, construction, coordinates) | N/A | MS Access file |
| | Production well geophysical logs and pump-test data | 1965 - 2001 | paper copies |
| | Water Quality Indicators - All Wells (TDS, Chloride, $NO_3$) | 9/73 - 10/03 | MS Access file |
| | General Mineral Water Quality | | paper copies |
| | - Production Wells | 1942 - 2003 | |
| | - Monitoring Wells | 1995 - 2003 | |
| | Main Street Well aquifer test data | 5/91 | paper copies |
| | Opal Cliffs well water levels monitored during Garnet well pilot injection test | 5/00 | |
| | Santa Cruz County GIS layers | 8/03 version | ArcView |
| Linsley, Kraeger Associates | Mean daily stream discharge for 2 gages on upper branches of Soquel Creek | 9/83 - present | electronic data files |
| | Daily precipitation for 2 gages | 11/83 - present | |
| City of Santa Cruz Water Department | Water Levels - Production Wells | 1979 - 2003 | MS Excel files |
| | Water Levels - Monitoring Wells | 1989 - 2004 | |
| | Groundwater Production - by well | 1972 - 2002 | |
| | General Mineral Water Quality - Production Wells | 7/70 - 2/03 | MS Access files |
| | Water Quality Indicators - Monitoring Wells (Cl, EC, pH) | 9/91 - 1/02 | |
| Central Water District | Water Levels - Production Wells | 1993 - 2004 | MS Excel files |
| | Groundwater Production - by well | 1986 - 2002 | |
| USGS | Groundwater Levels - various wells | 1965 - 1985 | electronic data files from web site |
| | Mean daily streamflow for: | | |
| | Soquel Creek at Soquel | 5/51 - present | |
| | Soquel Creek near Soquel | 10/68 - 9/72 | |
| | West Branch Soquel Creek | 10/58 - 10/72 | |
| | Branciforte Creek | 4/52 - 9/68 | |
| | Aptos Creek at and near Aptos | 10/58 - 9/85 | |
| | Streamflow Water Quality | 1952 - 1977 | |
| Santa Cruz County Environmental Health Services Department | Water level monitoring data contained in reports for 5 remediation sites | 1988 - 2003 | paper copies |
| NOAA, DWR, and others | Precipitation records: various stations | 1867 - pres. | electronic data files and paper copies |

**Table 1-1**
**Summary of Available Data**
(other than data provided in referenced reports)

| Name | Alternate Names | State Well Number | Dist. Serv. Area | Production Capacity (gpm) | Gnd. Sfc. (ft msl) | Ref. Point (ft msl) | Stratigraphic Unit | Year Drilled | E-Log | Diam. (in) | Drilled (ft bgs) | Completed Depth (ft bgs) | Sanitary Seal (ft bgs) | Gravel Pack Top (ft bgs) | Gravel Pack Bot. (ft bgs) | Perforated/Screened Intervals: Range Top (ft bgs) | Range Bottom (ft bgs) | Range Top (ft msl) | Range Bottom (ft msl) | Top-Bot (ft) | Individual Intervals (ft bgs) | Sum (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Active Wells** | | | | | | | | | | | | | | | | | | | | | | |
| Main Street | | 11S/1W-10K | 1 | 1,450 | 54 | 54 | Tu/AA | 1986 | X | 16/12 | 675 | 656 | 60 | 60 | 675 | 232 | 652 | -179 | -599 | 420 | 232-246, 280-376, 424-448, 472-496, 544-652 | 266 |
| Garnet | Opal 5 | 11S/1W-15? | 1 | 700 | 81 | 81 | A | 1995 | X | 12 | 310 | 300 | 75 | 75 | 310 | 164 | 290 | -83 | -209 | 113 | 164-177, 190-290 | 113 |
| Rosedale | | 11S/1W-10J1 | 1 | 600 | 131 | 131 | AA/A | 1983 | X | 12 | 595 | 570 | 60 | 60 | 570 | 210 | 560 | -79 | -429 | 350 | 210-240, 266-310, 324-336, 350-400, 438-494, 530-560 | 222 |
| Monterey | Airport, Capitola Airport | 11S/1W-11N1 | 1 | 400 | 113 | 113 | A | 1950 | | 10 | 698 | 398 | | | | 240 | 391 | -127 | -278 | 151 | 240-391 | 151 |
| Tannery II | Tannery | 11S/1W-11L3? | 1 | 530 | 123 | 123 | A | 2001 | X | 16 | 643 | 620 | 310 | 310 | 643 | 385 | 605 | -262 | -482 | 220 | 385-605 | 220 |
| Estates | | 11S/1W-12P | 2 | 1,000 | 144 | 144 | A/BC | 1985 | X | 16/12 | 950 | 930 | 60 | 60 | 950 | 305 | 920 | -161 | -776 | 615 | 305-390, 440-510, 660-920 | 415 |
| Madeline 2 | | | 2 | 250 | 192 | | BC | 1984 | X | 16 | 700 | 680 | 60 | 60 | 680 | 480 | 670 | -288 | -478 | 190 | 480-570, 600-670 | 160 |
| Ledyard | | 11S/1E-18D | 2 | 300 | 190 | 190 | BC | 1985 | X | 12 | 880 | 880 | 60 | 60 | 880 | 640 | 850 | -450 | -660 | 210 | 640-850 | 210 |
| T. Hopkins | Hopkins | 11S/1E-18F | 2 | 350 | 120 | 120 | DEF | 1989 | | 16 | 610 | 600 | 50 | 50 | 610 | 240 | 585 | -120 | -465 | 345 | 240-300, 340-380, 400-525, 535-545, 565-585 | 255 |
| Aptos Creek | | 11S/1E-18F1 | 2 | 500 | 26 | 26 | BC/DEF | 1965 | X | 12 | 725 | 713 | 88 | 88 | 713 | 243 | 713 | -217 | -687 | 470 | 243-713 | 470 |
| Country Club | Berry Farm, Reiter | 11S/1E-20G1 | 3 | 350 | 197 | 197 | F/Qa | 1953 | | 12 | 495 | 495 | ? | ? | ? | 254 | 495 | -57 | -298 | 241 | 254-302, 326-350, 374-398, 422-495 | 169 |
| Bonita | | 11S/1E-21E1 | 3 | 900 | 231 | 231 | F/Qa | 1983 | X | 16/12 | 760 | 740 | 60 | 60 | 740 | 330 | 728 | -99 | -497 | 398 | 330-364, 380-410, 442-486, 518-542, 560-580, 600-634, 666-728 | 248 |
| Seascape | | 11S/1E-28D1 | 3 | 900 | 177 | 177 | F/Qa | 1970 | (x) | 16/10 | 810 | 550 | 54 | 54 | 550 | 310 | 550 | -133 | -373 | 240 | 310-340, 370-390, 410-440, 530-550 | 100 |
| San Andreas | | 11S/1E-21L | 3 | 1,100 | 165 | 165 | F/Qa | 1991 | | 16 | 880 | 630 | 65 | 65 | 640 | 268 | 610 | -104 | -446 | 342 | 268-348, 394-454, 510-610 | 240 |
| Sells | | 11S/1E-28R3 | 4 | 470 | 111 | 111 | F/Qa | 1983 | X | 16/12 | 445 | 440 | 120 | 120 | 440 | 200 | 430 | -89 | -319 | 230 | 200-260, 300-340, 410-430 | 120 |
| Altivo | | 11S/1E-28R4 | 4 | 620 | 166 | 166 | F/Qa | 1979 | (x) | 14/8 | 510 | 480 | 60 | 60 | 500 | 320 | 470 | -154 | -304 | 150 | 320-350, 385-425, 440-470 | 100 |
| **Offline Wells** | | | | | | | | | | | | | | | | | | | | | | |
| Opal 4 | Opal Cliff | 11S/1W-15? | 1 | | 81 | 81 | A | 1980 | | | 320 | 300 | 200 | 200 | 300 | 210 | 290 | -129 | -209 | 80 | 210-290 | 80 |
| Maplethorpe | | 11S/1W-11L1 | 1 | 350 | 135 | 135 | A | 1965 | (x) | 12 | | 628 | 68 | | | 368 | 628 | -233 | -493 | 260 | 368-628 | 260 |
| Tannery | | 11S/1W-11L2 | 1 | 670 | 124 | 124 | A | 1970 | | 14 | | 614 | 60 | | | 340 | 600 | -216 | -476 | 260 | 340-600 | 260 |
| Madeline 1 | | 11S/1W-12K1 | 2 | 460 | 192 | | A/BC | 1972 | | 16 | 1020 | 1020 | 60 | 60 | 1020 | 460 | 1000 | -268 | -808 | 540 | 460-690, 820-1000 | 410 |
| Aptos Jr. High School | Aptos, Aptos School, Aptos Reservoir, Old Aptos, at Monroe Ave, Rio Del Mar 1, Velentia, Luis Ranch? | 11S/1E-17F1 | 3 | 390 | 210 | 210 | F/Qa | 1927 | | 12 to 200' | | 460 | | | | 200 | 460 | 10 | -250 | 260 | 200-460 (uncased) | 260 |
| **Destroyed Wells** | | | | | | | | | | | | | | | | | | | | | | |
| Opal 1 | Opal | 11S/1W-15L1 | 1 | 320 | 81 | 81 | A | 1930 | | 10 | | 211 | | | | 109 | 211 | -28 | -130 | 102 | 109-211 | 102 |
| Opal 2 | | | 1 | | | | | | | | | | | | | | | | | | | |
| Opal 3 | Opal Cliff 3 | 11S/1W-15L2 | 1 | 270 | 81 | 81 | A | 1954 | | 12 | | *256* | | | | 184 | 256 | -103 | -175 | 72 | 184-256 | *72* |
| Rosedale 1 | Soquel, Grove Ranch | | 1 | | *135* | | A | *1952* | | *10* | | *250* | | | | *160* | *250* | *-25* | *-115* | 90 | 160-*250* ? | |
| Maplethorpe 1? | | | 1 | | | | A(&?) | 1956 | | | | | | | | | | | | | | |
| Seacliff 2 | at Soquel Dr | 11S/1W-12Q1 | 2 | | *170* | | EF | *1949* | | 12 | *400* | *350* | | | | *140* | *350* | *30* | *-180* | 210 | 140-*350* ? | |
| Seacliff 3 | at Mesa Dr | 11S/1E-12J1 | 2 | | *302* | | EF | *1926* | | 14 | *600* | *515* | | | | *360* | *515* | *-58* | *-213* | 155 | 360-*515* ? | |
| Hillcrest | Seacliff 1, at Mar Vista, Railroad | 11S/1W-13G1 | 2 | 190 | 145 | 145 | EF | 1923 | | 10 | | 330 | | | | 200 | 330 | -55 | -185 | 130 | 200-330 or 340-585?? | 130 |
| State Park Dr | Seacliff | 11S/1W-13A1 | 2 | | *150* | | EF | *1959* | | *12* | *215* | | | | | *126* | *215* | *24* | *-65* | 89 | 126-*215* ? | |
| Seacliff 4 | Seacliff, at Center, Foster, Subdivision 8 | 11S/1W-18E1 | 2 | | 111 | 111 | EF | 1935 | | 10 | | 300 | | | | 140 | 289 | -29 | -178 | 149 | 140-289 | 149 |
| Palmer | at Dorsey, Rio Del Mar 2 | 11S/1E-17M1 | 3 | 180 | *188* | | F/Qa | *1953* | | 10 | | *500* | | | | *216* | *500* | *-28* | *-312* | 284 | 216-*500* ? | *160* |
| Cliff | | 11S/1E-20E1 | 3 | | 63 | 63 | F | 1961 | | 12 | 508 | 400 | 135 | | | 194 | 394 | -131 | -331 | 200 | 194-394 | 200 |
| La Selva1 | LSB 1 | 11S/1E-28R1 | 4 | | *120* | | Qa | 1935 | | 12 | | *355* | | | | 345 | 355 | -225 | -235 | 10 | 345-355 | 10 |
| La Selva2 | LSB 2 | 11S/1E-28R2 | 4 | | *130* | | Qa | 1960 | | 12 | | *250* | | | | 345 | 355 | -215 | -225 | 10 | 345-355 | 10 |

italics = from Hickey, 1968

Within groups, listed in order from west to east as projected onto line of section shown in Figure 1-2.

Approximate production capacities based on range reported by LSCE (1994, 1999) and SCWD "Existing Water System Schematic Profile" (2000).

(x) indicates e-log reportedly exists, but was not seen as part of this reviev

**Table 1-2**

**Soquel Creek Water District Production Wells**

| Well Cluster Name | Year Installed | State Well No. | Ref. Point (ft msl) | Total Depth (ft) | Total Depth (ft msl) | Well Label | Aquifer Unit* | Screened Interval Top (ft bgs) | Screened Interval Bot. (ft bgs) | Screened Interval Top (ft msl) | Screened Interval Bot. (ft msl) | Gravel Pack Top (ft bgs) | Gravel Pack Bot. (ft bgs) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SC-1 | 1983 | 11S/1W-15P | 72 | 320 | -248 | A | A | 113 | 320 | -40 | -248 | 109 | 320 |
| Prospect Ave | | | | | | B | B | 50 | 80 | 22 | -8 | 30 | 80 |
| SC-3 | 1983 | 11S/1W-14E | 97 | 510 | -413 | A | A | 278 | 510 | -180 | -413 | 270 | 510 |
| Escalona Dr | | | | | | B | B | 113 | 240 | -16 | -143 | 113 | 240 |
| | | | | | | C | C | 52 | 94 | 45 | 3 | 52 | 95 |
| SC-5 | 1983 | 11S/1W-14B | 120 | 765 | -645 | A | A | 520 | 765 | -400 | -645 | 500 | 765 |
| New Brighton | | | | | | B | B | 306 | 475 | -186 | -355 | 300 | 480 |
| State Beach | | | | | | C | C | 215 | 280 | -95 | -160 | 210 | 284 |
| | | | | | | D | D | 80 | 190 | 40 | -70 | 75 | 190 |
| | | | | | | E | E | 20 | 44 | 100 | 76 | 20 | 45 |
| SC-8 | 1983 | 11S/1E-18N | 11 | 1,100 | -1,089 | A | A | 825 | 1,100 | -814 | -1,089 | 810 | 1,100 |
| Aptos Creek | | | | | | B | B | 611 | 780 | -600 | -769 | 600 | 780 |
| State Beach | | | | | | C | C | 517 | 580 | -506 | -569 | 510 | 580 |
| | | | | | | D | D | 363 | 490 | -352 | -479 | 355 | 490 |
| | | | | | | E | E | 230 | 336 | -219 | -325 | 220 | 336 |
| | | | | | | F | F | 20 | 200 | -9 | -189 | 20 | 200 |
| SC-9 | 1983 | 11S/1W-13F | 13 | 900 | -887 | A | A | 625 | 900 | -612 | -887 | 600 | 900 |
| Seacliff Beach | | | | | | B | B | 406 | 575 | -393 | -562 | 400 | 590 |
| | | | | | | C | C | 316 | 380 | -303 | -367 | 300 | 380 |
| | | | | | | D | D | 184 | 290 | -171 | -277 | 170 | 290 |
| | | | | | | E | E | 25 | 140 | -12 | -127 | 25 | 140 |
| SC-10 | 1983 | 11S/1W-3B | 86 | 436 | -350 | A | A | 30 | 173 | 56 | -87 | 280 | 440 |
| Cherryvale | | | | | | AA | AA | 296 | 436 | -210 | -350 | 25 | 175 |
| SC-11 | 1983 | | *520* | 1,350 | *-830* | A | AA | 900 | 1,000 | *-380* | *-480* | 50 | 1,350 |
| Porter Gulch | | | | | | B | B | 500 | 600 | *20* | *-80* | | |
| | | | | | | C | C | 380 | 460 | *140* | *60* | | |
| | | | | | | D | D | 200 | 300 | *320* | *220* | | |
| SC-13, Opal | 1980 | 11S/1W-15 | 81 | 820 | -739 | A | AA/A | 760 | 770 | -679 | -689 | 451 | 820 |
| SC-14 | 1984 | 11S/1W-12K | 192 | 1,140 | -948 | A | A | 819 | 840 | -627 | -648 | 810 | 1,140 |
| Madeline | | | | | | | | 959 | 990 | -767 | -798 | | |
| | | | | | | | | 1,019 | 1,040 | -827 | -848 | | |
| | | | | | | | | 1,079 | 1,100 | -887 | -908 | | |
| | | | | | | B | B | 620 | 640 | -428 | -448 | 590 | 800 |
| | | | | | | | | 660 | 680 | -468 | -488 | | |
| | | | | | | C | C | 460 | 480 | -268 | -288 | 50 | 580 |
| | | | | | | | | 500 | 520 | -308 | -328 | | |
| SC-16 | 1985 | 11S/1W-12P | 143 | 980 | -837 | A | A/B | 660 | 970 | -517 | -827 | | |
| Estates Dr | | | | | | B | C/D | 305 | 465 | -162 | -322 | | |
| SC-17 | 1985 | 11S/1E-18D | 187 | 1,240 | -1,053 | A | A | 1,000 | 1,210 | -813 | -1,023 | | |
| Ledyard Way | | | | | | B | B | 640 | 840 | -453 | -653 | | |
| | | | | | | C | C | 430 | 550 | -243 | -363 | | |
| | | | | | | D | D | 210 | 350 | -23 | -163 | | |
| SC-18 | 1986 | | 50 | 620 | -570 | A | AA | 210 | 340 | -160 | -290 | 70 | 390 |
| Main St | | | | | | AA | Tu | 550 | 620 | -500 | -570 | 410 | 620 |
| SC-A1 | 1986 | 11S/1E-20E | 65 | 530 | -465 | A | F | 500 | 520 | -435 | -455 | 420 | 540 |
| Cliff Dr | | | | | | | | 460 | 470 | -395 | -405 | | |
| | | | | | | B | F | 375 | 395 | -310 | -330 | 220 | 400 |
| | | | | | | | | 260 | 280 | -195 | -215 | | |
| | | | | | | C | F | 170 | 190 | -105 | -125 | 165 | 200 |
| | | | | | | D | F | 100 | 120 | -35 | -55 | 60 | 150 |
| SC-A2 | 1986 | 11S/1E-29H | 127 | 490 | -363 | A | F | 460 | 480 | -333 | -353 | 455 | 650 |
| Sumner | | | | | | B | F | 420 | 440 | -293 | -313 | 330 | 445 |
| | | | | | | C | $Qa_U$ | 140 | 160 | -13 | -33 | 50 | 310 |
| SC-A3 | 1986 | 11S/1E-33E | 103 | 320 | -217 | A | $Qa_L$ | 290 | 310 | -187 | -207 | 285 | 330 |
| Playa & Vista | | | | | | B | $Qa_L$ | 260 | 270 | -157 | -167 | 205 | 275 |
| | | | | | | | | 230 | 250 | -127 | -147 | | |
| | | | | | | C | $Qa_U$ | 125 | 145 | -22 | -42 | 50 | 185 |
| SC-A4 | 1986 | 12S/1E-3C | 186 | 550 | -364 | A | F | 520 | 540 | -334 | -354 | 515 | 560 |
| Canon del Sol | | | | | | B | F | 480 | 500 | -294 | -314 | 440 | 505 |
| | | | | | | C | $Qa_L$ | 390 | 410 | -204 | -224 | 270 | 420 |
| | | | | | | | | 290 | 310 | -104 | -124 | | |
| | | | | | | D | $Qa_U$ | 220 | 240 | -34 | -54 | 50 | 250 |
| SC-A5 | 1986 | 11S/1E-28D | 175 | 680 | -505 | A | F | 650 | 670 | -475 | -495 | 630 | 700 |
| Seascape | | | | | | B | F | 580 | 600 | -405 | -425 | 510 | 610 |
| | | | | | | C | $Qa_L$ | 410 | 430 | -235 | -255 | 255 | 280 |
| | | | | | | | | 370 | 390 | -195 | -215 | | |
| | | | | | | | | 310 | 330 | -135 | -155 | | |
| | | | | | | D | $Qa_U$ | 210 | 230 | -35 | -55 | 50 | 235 |
| Pleasure Point | 1988 | 11S/1W-21H | 45 | 335 | -290 | A | AA | 325 | 345 | -280 | -300 | 317 | 362 |
| (City of Santa | | | | | | B | A | 210 | 230 | -165 | -185 | 170 | 300 |
| Cruz) | | | | | | C | A | 110 | 130 | -65 | -85 | 50 | 150 |

*AA-F: Units of Purisima Formation
Qa-up and Qa-low: Upper and lower division of Aromas Sands
Tu: undifferentiated older sandstone

**Table 1-3**
**Soquel-Aptos Monitoring Wells**

| | | | | | | | | | | | | Perforated/Screened Intervals | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Range | | | | | Individual Intervals | |
| | | | | | | | | Com-pleted | Sani-tary | Gravel Pack | | | Bot- | | Bot- | Top- | | |
| | State Well | Ground Surface | Ref. Point | Aquifer | Year | Diam. | Depth Drilled | Depth | Seal | Top | Bot. | Top | tom | Top | tom | Bot | | Sum |
| Name | Number | (ft msl) | | Unit | Drilled | (in) | (ft bgs) | | | | | (ft bgs) | | (ft msl) | | (ft) | (ft bgs) | (ft) |
| **City of Santa Cruz** | | | | | | | | | | | | | | | | | | |
| Active Wells | | | | | | | | | | | | | | | | | | |
| Beltz 7 | 11S/1W-21B2 | 44 | 56 | AA/A | 1974 | 12/8 | 405 | 274 | 50 | 50 | 274 | 124 | 264 | -80 | -220 | 140 | 124-149,189-264 | 100 |
| Beltz 8 | 11S/1W-16R4? | 42 | 48 | A | 1998 | 14 | 240 | 210 | 80 | 80 | 220 | 100 | 180 | -58 | -138 | 80 | 100-180 | 80 |
| Beltz 9 | 11S/1W-21B/G? | 40 | 43 | A | 1998 | 14 | 240 | 230 | 90 | 90 | 240 | 110 | 200 | -70 | -160 | 90 | 110-200 | 90 |
| Inactive and Destroyed Wells | | | | | | | | | | | | | | | | | | |
| Betlz 1 | 11S/1W-21G1 | 20 | 20 | A/B | rehab 1951 | | | 116 | | | | 91 | 116 | -71 | -96 | 25 | ? | ? |
| Beltz 2 | 11S/1W-21G2 | 20 | 20 | A | 1963 | | | 125 | | | | 73 | 125 | -53 | -105 | 52 | ? | ? |
| Betlz 3 | 11S/1W-21B1 | *55* | | A | 1951 | *10* | | *137* | | | | *92* | | | | | | *45* |
| Beltz 4 | 11S/1W-16Q1 | | | A | 1955,<br>rehab 1977 | | | | | | | | | | | | | |
| Beltz 4A | 11S/1W-16Q? | 55 | 61 | A | 1985 | | | 136 | | | | 90 | 136 | -35 | -81 | 46 | | 46 |
| Beltz 5 | | | | A | 1956 | | | 125 | | | | | | | | | | |
| Beltz 6 | 11S/1W-16R3 | 42 | 48 | A | 1966 | 8 | 260 | 178 | 70 | 70 | 178 | 104 | 169 | -62 | -127 | 65 | 104-114,119-134,135-151,156-169 | 51 |
| **Central Water District** | | | | | | | | | | | | | | | | | | |
| CWD 1 | 11S/1E-4Q1 | 286 | 286 | | *1952* | *10* | | 248 | | | | 90 | | 196 | | | | |
| CWD 2 | | | | | | | | 261 | | | | | | | | | | 140 |
| CWD 3 | 11S/1E-4Q? | | 290 | | | | | 300 | | | | | | | | | | |
| CWD 4 | 11S/1E-17R | | 150 | | | | | | | | | | | | | | | |
| CWD 5 | 11S/1E-4Q? | | 318 | | | | | 272 | | | | | | | | | | |
| CWD 6 | | | | | | | | | | | | | | | | | | |
| CWD 7 | | | | | | | | | | | | | | | | | | |
| CWD 8 | | | | | | | | | | | | | | | | | | |
| CWD 9 | | | | | | | | | | | | | | | | | | |
| CWD 10 | 11S/1E-17R | | 156 | | | | | | | | | | | | | | | |
| CWD 11 | | | | | | | | | | | | | | | | | | |
| CWD 12 | | | 172 | | | | | | | | | | | | | | | |

italics = from Hickey, 1968

**Table 1-4**

**Other Soquel-Aptos Production Wells**

| Contact Top | Contact Bottom | Note | Depth (ft bgs) | Elev. (ft msl) | Thickness Unit[x] | Thickness (ft) | Screened Intervals (ft bgs) | Screened Intervals % of Unit | Screened Intervals % of Total | Unit Contact Source |
|---|---|---|---|---|---|---|---|---|---|---|
| **Garnet** | | | | | | | | | | |
| ground surface | | | 0 | 81 | | | | | | |
| B | C | | | | C | | | | | |
| A | B | | 82 | -1 | B | | | | | a,d |
| AA | A | | 290 | -209 | **A** | 208 | 164 - 177 | 54% | 100% | a,d |
| | | | | | | | 190 - 290 | | | |
| Tu | AA | > | 420 | -339 | AA | 130 | | | | a |
| basement | Tu | | | | Tu | | | | | |
| **Main Street** | | | | | | | | | | |
| ground surface | | | 0 | 54 | | | | | | |
| B | C | * | *-255* | *310* | C | | | | | c |
| A | B | * | *-65* | *120* | B | *190* | | | | c |
| AA | A | | 170 | -116 | A | *235* | | | | a,b,d |
| Tp? | AA | | 390 | -336 | **AA** | 220 | 232 - 246 | 50% | 41% | a |
| | | | | | | | 280 - 376 | | | |
| Tu | Tp? | | 535 | -481 | **Tp?** | 145 | 424 - 448 | 33% | 18% | a |
| | | | | | | | 472 - 496 | | | |
| basement | Tu | | 668 | -614 | **Tu** | 133 | 544 - 652 | 81% | 41% | a,d |
| **Rosedale** | | | | | | | | | | |
| ground surface | | | 0 | 131 | | | | | | |
| C | D | | | | D | | | | | |
| B | C | * | *-110* | *240* | C | | | | | c |
| A | B | | 140 | -9 | B | *250* | | | | a,b,d |
| AA | A | | 405 | -274 | **A** | 265 | 210 ^ 400 | 51% | 61% | a,b,d |
| Tu | AA | > | 660 | -529 | **AA** | 255 | 438 ^ 560 | 34% | 39% | a |
| basement | Tu | | | | Tu | | | | | |
| **Maplethorpe** | | | | | | | | | | |
| ground surface | | | 0 | 135 | | | | | | |
| C | D | | | | D | | | | | |
| B | C | | *143* | -8 | C | | | | | b,f |
| A | B | | *368* | -233 | B | *225* | | | | b,f |
| AA | A | | 620 | -485 | **A** | *252* | 368 - 628 | 100% | 100% | b |
| Tu | AA | > | 760 | -625 | AA | 140 | | | | c |
| basement | Tu | | | | Tu | | | | | |

| Contact Top | Contact Bottom | Note | Depth (ft bgs) | Elev. (ft msl) | Thickness Unit[x] | Thickness (ft) | Screened Intervals (ft bgs) | Screened Intervals % of Unit | Screened Intervals % of Total | Unit Contact Source |
|---|---|---|---|---|---|---|---|---|---|---|
| **Monterey** | | | | | | | | | | |
| ground surface | | | 0 | 113 | | | | | | |
| B | C | | | | C | | | | | |
| A | B | | *225* | *-112* | B | | | | | f |
| AA | A | | *480* | *-367* | **A** | *255* | 240 - 391 | 59% | 100% | f |
| Tu | AA | | | | AA | | | | | |
| basement | Tu | | | | Tu | | | | | |
| **Tannery II** | | | | | | | | | | |
| ground surface | | | 0 | 123 | | | | | | |
| D | E | | | | E | | | | | |
| C | D | | *43* | *80* | D | | | | | |
| B | C | | 153 | -30 | C | *110* | | | | a |
| A | B | | 378 | -255 | B | 225 | | | | a |
| AA | A | | 609 | -486 | **A** | 231 | 385 - 605 | 95% | 100% | a |
| Tu | AA | | 790 | -667 | AA | 181 | | | | a |
| basement | Tu | > | 836 | -713 | Tu | 46 | | | | a |
| **Grove Ranch** | | | | | | | | | | |
| ground surface | | | 0 | *110* | | | | | | |
| A | B | | | | B | | | | | |
| AA | A | | 265 | *-155* | A | | | | | b |
| Tu | AA | | *490* | *-380* | AA | *225* | | | | c |
| basement | Tu | | *720* | *-610* | Tu | *230* | | | | c |

[x]Bold highlights which aquifer units are screened.

**Service Area I wells (screened in Purisima units A and AA)**

**Table 2-1a**
**Interpreted Stratigraphic Contacts -- Production Wells**
See notes last page Table 2-1a

| Contact Top | Bottom | Note | Depth (ft bgs) | Elev. (ft msl) | Thickness Unit[x] | (ft) | Screened Intervals (ft bgs) | % of Unit | % of Total | Unit Contact Source |
|---|---|---|---|---|---|---|---|---|---|---|
| **Estates (SC-16)** | | | | | | | | | | |
| ground surface | | | 0 | 144 | | | | | | |
| E | F | * | *-10* | *154* | F | | | | | f |
| D | E | | 140 | 4 | E | *150* | | | | a,d |
| C | D | | 300 | -156 | D | 160 | | | | a,d |
| B | C | | 410 | -266 | **C** | 110 | 305 - 390 | 77% | 20% | a,d |
| A | B | | 650 | -506 | **B** | 240 | 440 - 510 | 29% | 17% | a,d |
| AA | A | | 925 | -781 | **A** | 275 | 660 - 920 | 95% | 63% | a,d |
| Tu | AA | > | 1,100 | -956 | AA | 175 | | | | a |
| basement | Tu | | | | Tu | | | | | |
| **Madeline (SC-14)** | | | | | | | | | | |
| ground surface | | | 0 | 192 | | | | | | |
| E | F | | 178 | 14 | F | | | | | a,b,d |
| D | E | | 320 | -128 | E | 142 | | | | a,b,d |
| C | D | | 445 | -253 | D | 125 | | | | a,b,d |
| B | C | | 565 | -373 | **C** | 120 | 480 - 545 | 54% | 41% | a,b,d |
| A | B | | 800 | -608 | **B** | 235 | 545 - 570 | 40% | 59% | a,b,d |
| | | | | | | | 600 - 670 | | | |
| AA | A | | 1,040 | -848 | A | 240 | | | | a,b,d |
| Tu | AA | > | 1,220 | -1,030 | AA | 180 | | | | a |
| basement | Tu | | *1,435* | *-1,240* | Tu | | | | | c |
| **T. Hopkins** | | | | | | | | | | |
| ground surface | | | 0 | 120 | | | | | | |
| E | F | | *380* | *-260* | **F** | *380* | 240 ^ 380 | 26% | 39% | f |
| D | E | | *525* | *-405* | **E** | *145* | 400 - 525 | 86% | 49% | f |
| C | D | | *624* | *-504* | **D** | *99* | 535 ^ 585 | 30% | 12% | f |
| B | C | | | | C | | | | | |
| basement | Tu | | | | Tu | | | | | |

| Contact Top | Bottom | Note | Depth (ft bgs) | Elev. (ft msl) | Thickness Unit[x] | (ft) | Screened Intervals (ft bgs) | % of Unit | % of Total | Unit Contact Source |
|---|---|---|---|---|---|---|---|---|---|---|
| **Aptos Creek** | | | | | | | | | | |
| ground surface | | | 0 | 26 | | | | | | |
| E | F | | 305 | -279 | **F** | 305 | 243 - 305 | 20% | 13% | a |
| D | E | | 470 | -444 | **E** | 165 | 305 - 470 | 100% | 35% | a |
| C | D | | 590 | -564 | **D** | 120 | 470 - 590 | 100% | 26% | a |
| B | C | > | 600 | -574 | **C** | 10 | 590 - 713 | 37% | 26% | a |
| A | B | | *926* | *-900* | **B** | | | | | |
| AA | A | | | | A | | | | | |
| Tu | AA | | | | AA | | | | | |
| basement | Tu | | | | Tu | | | | | |
| **Ledyard (SC-17)** | | | | | | | | | | |
| ground surface | | | 0 | 190 | | | | | | |
| E | F | | 335 | -145 | F | 335 | | | | |
| D | E | | 515 | -325 | E | 180 | | | | a |
| C | D | | 635 | -445 | D | 120 | | | | a |
| B | C | | 750 | -560 | **C** | 115 | 640 - 750 | 96% | 52% | a |
| A | B | | 990 | -800 | **B** | 240 | 750 - 850 | 42% | 48% | a |
| AA | A | > | 1,240 | -1,050 | A | 250 | | | | a |
| Tu | AA | | | | AA | | | | | |
| basement | Tu | | | | Tu | | | | | |

[x]Bold highlights which aquifer units are screened.

**Service Area II wells (screened in Purisima units B, C, D, E)**

**Table 2-1a** (continued)

**Interpreted Stratigraphic Contacts -- Production Wells**

See notes last page Table 2-1a

| Contact Top | Contact Bottom | Note | Depth (ft bgs) | Elev. (ft msl) | Thickness Unit[x] | Thickness (ft) | Screened Intervals (ft bgs) | Screened Intervals % of Unit | Screened Intervals % of Total | Unit Contact Source |
|---|---|---|---|---|---|---|---|---|---|---|
| **Country Club** | | | | | | | | | | |
| ground surface | | | 0 | 197 | | | | | | |
| Qa-lower | Qa-upper | | *187* | *10* | $Qa_U$ | *187* | | | | f |
| F | Qa-lower | | *360* | *-163* | **$Qa_L$** | *173* | 254 ^ 350 | 42% | 43% | f |
| E | F | > | 495 | -298 | **F** | *135* | 374 ^ 495 | *** | 57% | a |
| D | E | | | | E | | | | | |
| basement | Tu | | | | Tu | | | | | |
| **Bonita** | | | | | | | | | | |
| ground surface | | | 0 | 231 | | | | | | |
| Qa-lower | Qa-upper | | 250 | -19 | $Qa_U$ | 250 | | | | |
| F | Qa-lower | | 415 | -184 | **$Qa_L$** | 165 | 330 ^ 410 | 39% | 26% | a |
| E | F | > | 800 | -569 | **F** | 385 | 442 ^ 728 | *** | 74% | a |
| D | E | | | | E | | | | | |
| basement | Tu | | | | Tu | | | | | |
| **San Andreas** | | | | | | | | | | |
| ground surface | | | 0 | 165 | | | | | | |
| Qa-lower | Qa-upper | | *244* | *-79* | $Qa_U$ | *244* | | | | f |
| F | Qa-lower | | *349* | *-184* | **$Qa_L$** | *105* | 268 - 348 | 76% | 33% | f |
| E | F | > | 880 | -715 | **F** | *531* | 394 ^ 610 | *** | 67% | a |
| D | E | | | | E | | | | | |
| basement | Tu | | | | Tu | | | | | |

*** Bottom and thickness of unit are undefined.

| Contact Top | Contact Bottom | Note | Depth (ft bgs) | Elev. (ft msl) | Thickness Unit[x] | Thickness (ft) | Screened Intervals (ft bgs) | Screened Intervals % of Unit | Screened Intervals % of Total | Unit Contact Source |
|---|---|---|---|---|---|---|---|---|---|---|
| **Seascape** | | | | | | | | | | |
| ground surface | | | 0 | 177 | | | | | | |
| Qa-lower | Qa-upper | | *250* | *-73* | $Qa_U$ | *250* | | | | f |
| F | Qa-lower | | *362* | *-185* | **$Qa_L$** | *112* | 310 ^ 340 | 27% | 30% | f |
| E | F | > | 810 | -633 | **F** | *448* | 370 ^ 550 | *** | 70% | a |
| D | E | | | | E | | | | | |
| basement | Tu | | | | Tu | | | | | |
| **Sells** | | | | | | | | | | |
| ground surface | | | 0 | 111 | | | | | | |
| Qa-lower | Qa-upper | | ? | | | | | | | |
| F | Qa-lower | | 345 | -234 | **Qa** | 345 | 200 ^ 340 | 29% | 83% | a |
| E | F | > | 747 | -636 | **F** | 402 | 410 - 430 | *** | 17% | a |
| D | E | | | | E | | | | | |
| basement | Tu | | | | Tu | | | | | |
| **Altivo** | | | | | | | | | | |
| ground surface | | | 0 | 166 | | | | | | |
| Qa-lower | Qa-upper | | *244* | *-78* | $Qa_U$ | *244* | | | | f |
| F | Qa-lower | | *380* | *-214* | **$Qa_L$** | *136* | 320 - 350 | 22% | 30% | f |
| E | F | > | 510 | -344 | **F** | *130* | 385 ^ 470 | *** | 70% | a |
| D | E | | | | E | | | | | |
| basement | Tu | | | | Tu | | | | | |

[x]Bold highlights which aquifer units are screened.

**Table 2-1a** (continued)

**Service Area III and IV wells (screened in Purisima Unit F and Aromas Sands)**

**Interpreted Stratigraphic Contacts -- Production Wells**

See notes last page Table 2-1a

| Contact | | Note | Depth | Elev. | Thickness | | Screened Intervals | | | Unit Contact |
|---|---|---|---|---|---|---|---|---|---|---|
| Top | Bottom | | (ft bgs) | (ft msl) | Unit[x] | (ft) | (ft bgs) | % of Unit | % of Total | Source |
| **Beltz 7 (test hole 2 E-log)** | | | | | | | | | | |
| ground surface | | | 0 | 44 | | | | | | |
| B | C | | | | C | | | | | |
| A | B | * | *-65* | *110* | B | | | | | f |
| AA | A | | 155 | -111 | **A** | *220* | 124 - 149 | 11% | 25% | a,d |
| Tp? | AA | | 360 | -316 | **AA** | 205 | 189 - 264 | 37% | 75% | a,d |
| Tu | Tp? | > | 435 | -391 | Tp? | 75 | | | | a,d |
| basement | Tu | | | | Tu | | | | | |
| **Beltz 6 and 8 (test hole 3 E-log)** | | | | | | | | | | |
| ground surface | | | 0 | 42 | | | | | | |
| B | C | | | | C | | | | | |
| A | B | * | *-30* | *72* | B | | Beltz 6 | | | f |
| AA | A | | 180 | -138 | **A** | *210* | 104 ^ 169 | 31% | 100% | a,d |
| | | | | | | | 100 - 180 | 38% | 100% | |
| Tp? | AA | | *375* | *-333* | AA | *195* | Beltz 8 | | | a,d |
| Tu | Tp? | | 500 | -458 | Tp? | 125 | | | | a,d |
| basement | Tu | > | 606 | -564 | Tu | 106 | | | | a |
| **Beltz 9 (test hole 1 E-log)** | | | | | | | | | | |
| ground surface | | | 0 | 40 | | | | | | |
| B | C | | | | C | | | | | |
| A | B | * | *-10* | *50* | B | | | | | f |
| AA | A | | 200 | -160 | **A** | *210* | 110 - 200 | 43% | 100% | a |
| Tp? | AA | | *360* | *-320* | AA | *160* | | | | a |
| Tu | Tp? | > | 426 | -386 | Tp? | *66* | | | | a |
| basement | Tu | | | | Tu | | | | | |

[x]Bold highlights which aquifer units are screened.

**Beltz Wells (screened in Purisima Units A and AA)**

Key to Units

| | |
|---|---|
| Qa-upper | Aromas Sands upper zone |
| Qa-lower | Aromas Sands lower zone |
| AA - F | Purisima units AA, A, B, C, D, E, and F |
| Tp? | Fine-grained zone below Purisima unit AA |
| Tu | Older Tertiary sandstone, possibly Santa Margarita or Lompico sandstone |
| basement | Granitic basement rock |

Key to "Note"Symbols and Unit Abbreviations

| | |
|---|---|
| ** | Ground surface elevation estimated. |
| * | Contact extrapolated above ground surface from available cross section. |
| > | Contact is below bottom of well log, thus contact depth is greater than value. |
| ^ | Spans multiple screened intervals. |
| bgs | below ground surface |
| msl | elevation relative to mean sea level |
| | *Italics* indicate rough estimates (either because estimated ground surface or contact estimated from cross section). |

Key to Sources

| | |
|---|---|
| a | Reviewed e-log. |
| b | Contact depth posted on LSCE cross section (1984). |
| c | Contact suggested by LSCE cross section (1984, 1987). |
| d | Contact indicated on draft cross sections by M. Cloud, Santa Cruz Co. FCWCD. |
| e | Thorup, 1981. |
| f | Estimated consistent with overall interpretation. |

See Tables 1-1 through 1-3 for detailed well information.

**Table 2-1a** (continued)

**Interpreted Stratigraphic Contacts -- Production Wells**

| Contact Top | Contact Bottom | Note | Depth (ft bgs) | Elev. (ft msl) | Thickness Unit | Thickness (ft) | Monitoring Well Label | Screened Interval (ft bgs) | Screened Interval % of Unit | Unit Contact Source |
|---|---|---|---|---|---|---|---|---|---|---|
| **SC-1** | | | | | | | | | | |
| ground surface | | | 0 | 72 | | | | | | |
| E | F | * | *-520* | *590* | F | | | | | c |
| D | E | * | *-370* | *440* | E | *150* | | | | c |
| C | D | * | *-220* | *290* | D | *150* | | | | c |
| B | C | * | *-110* | *180* | C | *110* | | | | c |
| A | B | | 114 | -42 | B | *224* | B | 50 - 80 | 13% | a,b |
| AA | A | | 323 | -251 | A | 209 | A | 113 - 320 | 99% | a,b |
| Tu | AA | > | 520 | -448 | AA | | | | | a |
| basement | Tu | | *880* | *-810* | Tu | *557* | | | | c |
| **SC-3** | | | | | | | | | | |
| ground surface | | | 0 | 97 | | | | | | |
| E | F | * | *-315* | *410* | F | | | | | c |
| D | E | * | *-155* | *250* | E | *160* | | | | c |
| C | D | * | *-15* | *110* | D | *140* | | | | c |
| B | C | | 95 | 2 | C | *110* | C | 52 - 94 | 38% | a,b |
| A | B | | 280 | -183 | B | 185 | B | 113 - 240 | 69% | a,b,d |
| AA | A | | 510 | -413 | A | 230 | A | 278 - 510 | 101% | a,b,d |
| Tu | AA | | *700* | *-603* | AA | *190* | | | | a,d |
| basement | Tu | | *1,080* | *-980* | Tu | *380* | | | | c |
| **SC-5** | | | | | | | | | | |
| ground surface | | | 0 | 120 | | | | | | |
| E | F | * | *-115* | *235* | F | | | | | |
| D | E | | *40* | *80* | E | *155* | E | 20 - 44 | 55% | c |
| C | D | | 172 | -52 | D | 132 | D | 80 - 190 | 83% | a,b,d |
| B | C | | 282 | -162 | C | 110 | C | 215 - 280 | 59% | a,b,d |
| A | B | | 516 | -396 | B | 234 | B | 306 - 475 | 72% | a,b,d |
| AA | A | | 768 | -648 | A | 252 | A | 520 - 765 | 97% | a,b,d |
| Tu | AA | > | 790 | -670 | AA | | | | | a |
| basement | Tu | | *1,290* | *-1,170* | Tu | *522* | | | | c |
| **SC-8** | | | | | | | | | | |
| ground surface | | | 0 | 11 | | | | | | |
| E | F | | 207 | -196 | F | >207 | F | 20 - 200 | 87% | a,b,d |
| D | E | | 363 | -352 | E | 156 | E | 230 - 336 | 68% | a,b,d |
| C | D | | 480 | -469 | D | 117 | D | 363 - 490 | 100% | a,b,d |
| B | C | | 590 | -579 | C | 110 | C | 517 - 580 | 57% | a,b,d |
| A | B | | 830 | -819 | B | 240 | B | 611 - 780 | 70% | a,b,d |
| AA | A | > | 1,012 | -1,001 | A | 182 | A | 825 - 1,100 | 100% | a |
| Tu | AA | | | | AA | | | | | |
| basement | Tu | | *1,530* | *-1,520* | Tu | *518* | | | | c |

| Contact Top | Contact Bottom | Note | Depth (ft bgs) | Elev. (ft msl) | Thickness Unit[x] | Thickness (ft) | Monitoring Well Label[a] | Screened Interval (ft bgs) | Screened Interval % of Unit | Unit Contact Source |
|---|---|---|---|---|---|---|---|---|---|---|
| **SC-9** | | | | | | | | | | |
| ground surface | | | 0 | 13 | | | | | | |
| E | F | | *15* | *-2* | F | | | | | a,d |
| D | E | | 143 | -130 | E | 128 | E | 25 - 140 | 90% | a,b,d |
| C | D | | 286 | -273 | D | 143 | D | 184 - 290 | 71% | a,b,d |
| B | C | | 385 | -372 | C | 99 | C | 316 - 380 | 65% | a,b,d |
| A | B | | 625 | -612 | B | 240 | B | 406 - 575 | 70% | a,b,d |
| AA | A | | 905 | -892 | A | 280 | A | 625 - 900 | 98% | a,b,d |
| Tu | AA | > | 965 | -952 | AA | | | | | a |
| basement | Tu | | *1,355* | *-1,340* | Tu | *450* | | | | c |
| **SC-10** | | | | | | | | | | |
| ground surface | | | 0 | 86 | | | | | | |
| D | E | | | | E | | | | | |
| C | D | * | *-490* | *580* | D | | | | | a,c |
| B | C | | | | C | | | | | |
| A | B | * | *-100* | *190* | B | *390* | | | | a,c |
| AA | A | | 173 | -87 | A | *273* | A | 30 - 173 | 52% | a,b |
| Tu/Tp? | AA | | *425* | *-340* | AA | *252* | AA | 296 - 436 | 51% | a,c |
| basement | Tu/Tp? | | 648 | -562 | Tu/Tp? | 223 | | | | a,b |
| **SC-11** | | | | | | | | | | |
| ground surface | | ** | 0 | *520* | | | | | | |
| E | F | | 68 | *452* | F | | | | | a,b |
| D | E | | 218 | *302* | E | 150 | | | | a,b |
| C | D | | 372 | *148* | D | 154 | D | 200 - 300 | 65% | a,b |
| B | C | | *475* | *45* | C | *103* | C | 380 - 460 | 78% | a,c |
| A | B | | 749 | *-229* | B | *274* | B | 500 - 600 | 36% | a,b |
| AA | A | | 960 | *-440* | A | 211 | | | | a,b |
| Tu | AA | | *1,310* | *-790* | **AA** | *350* | **A** | 900 - 1,000 | 29% | a,c |
| basement | Tu | | 1,341 | *-821* | Tu | *31* | | | | a,b |
| **SC-18** | | | | | | | | | | |
| ground surface | | | 0 | 50 | | | | | | |
| B | C | | | | C | | | | | |
| A | B | * | *-69* | *120* | B | | | | | based |
| AA | A | | 176 | -126 | A | 245 | | | | on |
| Tp? | AA | | 386 | -336 | **AA** | 210 | **A** | 210 - 340 | 62% | Main |
| Tu | Tp? | | 541 | -491 | Tp? | 155 | | | | Street |
| basement | Tu | | 664 | -610 | **Tu** | 123 | **AA** | 550 - 620 | 57% | well |

[x]Bold highlights where aquifer unit and well label designations do not match.

**Table 2-1b**

**Interpreted Stratigraphic Contacts -- Monitoring Wells**

See notes last page Table 2-1a

| Contact Top | Contact Bottom | Note | Depth (ft bgs) | Elev. (ft msl) | Thickness Unit[x] | Thickness (ft) | Monitoring Well Label[a] | Screened Interval (ft bgs) | Screened Interval % of Unit | Unit Contact Source |
|---|---|---|---|---|---|---|---|---|---|---|
| **SC-A1** | | | | | | | | | | |
| ground surface | | | 0 | 65 | | | | | | |
| F | Qa | | *65* | 0 | **Qa** | *65* | | | | d |
| E | F | | 605 | -540 | **F** | *540* | **D** | 100 - 120 | 100% | a,c |
| | | | | | | | **C** | 170 - 190 | | |
| | | | | | | | **B** | 260 - 280 | | |
| | | | | | | | | 375 - 395 | | |
| | | | | | | | **A** | 460 - 470 | | |
| | | | | | | | | 500 520 | | |
| D | E | | *760* | *-695* | E | *155* | | | | c |
| A | B | | *1,250* | *-1,185* | B | *490* | | | | c |
| AA | A | | | | A | | | | | |
| basement | Tu | | *1,850* | *-1,785* | Tu | *600* | | | | c |
| **SC-A2** | | | | | | | | | | |
| ground surface | | | 0 | 127 | | | | | | |
| Qa-lower | Qa-upper | | 170 | -43 | **Qa$_U$** | 170 | **C** | 140 - 160 | 12% | a,c |
| F | Qa-lower | | 300 | -173 | **Qa$_L$** | 130 | | | | a,c |
| E | F | | *935* | *-810* | **F** | *635* | **B** | 420 - 440 | 6% | c |
| | | | | | | | **A** | 460 - 480 | | |
| D | E | | *1,100* | *-970* | E | *165* | | | | c |
| A | B | | *1,630* | *-1,500* | B | *530* | | | | c |
| AA | A | | | | A | | | | | |
| basement | Tu | | *2,160* | *-2,030* | Tu | *530* | | | | c |
| **SC-A3** | | | | | | | | | | |
| ground surface | | | 0 | 103 | | | | | | |
| Qa-lower | Qa-upper | | 190 | -87 | **Qa$_U$** | 190 | **C** | 125 - 145 | 11% | a,c |
| F | Qa-lower | | 320 | -217 | **Qa$_L$** | 130 | **B** | 230 - 250 | 38% | a,c |
| | | | | | | | | 260 - 270 | | |
| | | | | | | | **A** | 290 - 310 | | |
| E | F | | *1,180* | *-1,080* | F | *860* | | | | c |
| D | E | | *1,360* | *-1,260* | E | *180* | | | | c |
| A | B | | *1,920* | *-1,820* | B | *560* | | | | c |
| AA | A | | | | A | | | | | |
| basement | Tu | | *2,420* | *-2,320* | Tu | *500* | | | | c |
| **SC-A4** | | | | | | | | | | |
| ground surface | | | 0 | 186 | | | | | | |
| Qa-lower | Qa-upper | | 260 | -74 | **Qa$_U$** | 260 | **D** | 220 - 240 | 8% | a,c |
| F | Qa-lower | | 420 | -234 | **Qa$_L$** | 160 | **C** | 290 - 310 | 25% | a,c |
| | | | | | | | | 390 - 410 | | |
| E | F | | *1,265* | *-1,080* | **F** | *845* | **B** | 480 - 500 | 5% | c |
| | | | | | | | **A** | 520 - 540 | | |
| D | E | | *1,430* | *-1,240* | E | *165* | | | | c |
| A | B | | *2,025* | *-1,840* | B | *595* | | | | c |
| AA | A | | | | A | | | | | |
| basement | Tu | | *2,740* | *-2,550* | Tu | *715* | | | | c |
| **SC-A5** | | | | | | | | | | |
| ground surface | | | 0 | 175 | | | | | | |
| Qa-lower | Qa-upper | | 245 | -70 | **Qa$_U$** | 245 | **D** | 210 - 230 | 8% | a,c |
| F | Qa-lower | | 360 | -185 | **Qa$_L$** | 115 | **C** | 310 - 330 | 52% | a,c |
| E | F | | *1,120* | *-945* | **F** | *760* | | 370 - 390 | | |
| | | | | | | | | 410 - 430 | | |
| | | | | | | | **B** | 580 - 600 | 16% | c |
| | | | | | | | **A** | 650 - 750 | | |
| D | E | | *1,285* | *-1,110* | E | *165* | | | | c |
| A | B | | *1,835* | *-1,660* | B | *550* | | | | c |
| AA | A | | | | A | | | | | |
| basement | Tu | | *2,320* | *-2,145* | Tu | *485* | | | | c |
| **Pleasure Point monitoring well** | | | | | | | | | | |
| ground surface | | | 0 | 45 | | | | | | |
| B | C | | | | C | | | | | |
| A | B | | 105 | -60 | B | | | | | a |
| AA | A | | 312 | -267 | **A** | 207 | **C** | 110 - 130 | 19% | a |
| | | | | | | | **B** | 210 - 230 | | |
| Tu | AA | > | 420 | -375 | **AA** | 108 | **A** | 325 - 345 | 19% | a |
| basement | Tu | | | | Tu | | | | | |

[x]Bold highlights where aquifer unit and well label designations do not match.

**Table 2-1b** (continued)

**Interpreted Stratigraphic Contacts -- Monitoring Wells**

See notes last page Table 2-1a

| Contact | | Note | Depth | Elev. | Thickness | | Unit Contact |
|---|---|---|---|---|---|---|---|
| Top | Bottom | | (ft bgs) | (ft msl) | Unit | (ft) | Source |
| **Opal test hole 1** | | | | | | | |
| ground surface | | | 0 | 81 | | | |
| E | F | * | *-550* | *630* | F | | c |
| D | E | * | *-400* | *480* | E | *150* | c |
| C | D | * | *-260* | *340* | D | *140* | c |
| B | C | * | *-140* | *220* | C | *120* | c |
| A | B | | 80 | 1 | B | 220 | b |
| AA | A | | *280* | *-200* | A | *200* | c |
| Tu | AA | | *540* | *-460* | AA | *260* | c |
| basement | Tu | | *800* | *-720* | Tu | *260* | c |
| **O'Neill Ranch test hole** | | | | | | | |
| ground surface | | ** | 0 | *110* | | | |
| A | B | | | | B | | |
| AA | A | | 110 | *0* | A | | a |
| Tp? | AA | | 420 | *-310* | AA | 310 | a |
| Tu | Tp? | | 540 | *-430* | Tp? | 120 | a |
| basement | Tu | > | 570 | *-460* | Tu | 150 | a |
| **Monte Toyon** | | | | | | | |
| ground surface | | ** | 0 | *250* | | | |
| E | F | | *495* | *-245* | F | | c |
| D | E | | *655* | *-405* | E | *160* | c |
| C | D | | 828 | *-578* | D | *173* | b |
| B | C | | *935* | *-685* | C | *107* | c |
| A | B | | 1,222 | *-972* | B | *287* | b |
| AA | A | | *1,475* | *-1,225* | A | *253* | c |
| Tu | AA | | | | AA | | |
| basement | Tu | | *1,750* | *-1,500* | Tu | 275 | e |
| **SC-12** | | | | | | | |
| ground surface | | ** | 0 | *320* | | | |
| E | F | | *1,110* | *-790* | F | | c |
| D | E | | *1,270* | *-950* | E | 160 | c |
| C | D | | 1,392 | *-1,072* | D | 122 | b |
| B | C | | *1,490* | *-1,170* | C | *98* | c |
| A | B | | 1,752 | *-1,432* | B | 262 | b |
| AA | A | | *2,020* | *-1,700* | A | *268* | c |
| Tu | AA | | | | AA | | |
| basement | Tu | > | 1,986 | -1,670 | | | b |
| | | | *2,420* | *-2,100* | Tu | *400* | c |

| Contact | | Note | Depth | Elev. | Thickness | | Unit Contact |
|---|---|---|---|---|---|---|---|
| Top | Bottom | | (ft bgs) | (ft msl) | Unit | (ft) | Source |
| **Thurber Lane North** | | | | | | | |
| ground surface | | ** | 0 | *360* | | | |
| A | B | | | | B | | |
| AA | A | | 145 | *215* | A | | a,d |
| Tp? | AA | | 385 | *-25* | AA | 240 | a,d |
| Tu | Tp? | | 517 | *-157* | Tp? | 132 | a |
| basement | Tu | | 575 | *-215* | Tu | 58 | a,d |
| **Santa Cruz test hole 1** | | | | | | | |
| ground surface | | | 0 | 110 | | | |
| C | D | | | | D | | |
| B | C | * | *-300* | *410* | C | | c |
| A | B | * | *-110* | *220* | B | *190* | c |
| AA | A | | 150 | -40 | A | *260* | b |
| Tu | AA | | | | AA | | |
| basement | Tu | | 615 | -505 | Tu | 465 | b |
| **Santa Cruz test hole 2** | | | | | | | |
| ground surface | | | 0 | 65 | | | |
| E | F | * | *-660* | *725* | F | | c |
| D | E | * | *-500* | *565* | E | *160* | c |
| C | D | * | *-355* | *420* | D | *145* | c |
| B | C | * | *-230* | *295* | C | *125* | c |
| A | B | * | *-10* | *75* | B | *220* | c |
| AA | A | | *185* | -120 | A | *195* | c |
| Tu | AA | | | | AA | | |
| basement | Tu | | 730 | -665 | Tu | *545* | b |
| **Texaco-Pierce 1** | | | | | | | |
| ground surface | | ** | *0* | 235 | | | |
| E | F | | *1,675* | *-1,440* | F | | c |
| D | E | | *1,810* | *-1,575* | E | *135* | c |
| C | D | | *1,950* | *-1,715* | D | *140* | c |
| B | C | | *2,070* | *-1,835* | C | *120* | c |
| A | B | | *2,315* | *-2,080* | B | *245* | c |
| AA | A | | | | A | | |
| Tu | AA | | | | AA | | |
| basement | Tu | | *2,600* | *-2,365* | Tu | *285* | c |

**Table 2-1c**

**Intrpreted Stratigraphic Contacts -- Test Holes**

See notes last page Table 2-1a

| Layer | Bot Top | Thurber Ln N | | | O'Neill Ranch | | | SC-10 | | | Beltz 7 | | | Beltz 9 | | | Beltz 8 | | | Main Street | | | Pleasure Point | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | bgs | msl | thick | bgs | msl | thick | bgs | msl | thick | bgs | msl | thick | bgs | msl | thick | bgs | msl | thick | bgs | msl | thick | bgs | msl | thick |
| | gs | 0 | 360 | - | 0 | 110 | - | 0 | 86 | - | 0 | 44 | - | 0 | 40 | - | 0 | 42 | - | 0 | 54 | - | 0 | 45 | - |
| 1 | **$Qa_U$** - $Qa_L$ | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 2 | **$Qa_L$** - F | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 3 | **F** - DEF | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 4 | **DEF** - D | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 5 | **D** - BC | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 6 | **BC** - B | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 7 | **B** - A | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 8 | **A** - AA | *145* | 215 | 145 | 110 | 0 | 110 | 175 | -89 | 175 | **155** | **-111** | **155** | **200** | **-160** | **200** | **180** | **-138** | **180** | 170 | -116 | 170 | 312 | -267 | - |
| 9 | **AA** - Tp | 385 | -25 | 240 | 420 | -310 | 310 | 425 | -339 | 250 | **362** | **-318** | **207** | 360 | -320 | 160 | 374 | -332 | 194 | **390** | **-336** | **220** | - | - | - |
| 10 | **Tp** - Tu | 517 | -157 | 132 | 540 | -430 | 120 | - | - | | - | - | - | - | - | - | - | - | - | **535** | **-481** | **145** | - | - | - |
| 11 | **Tu** - gr | 575 | -215 | 58 | - | - | - | 648 | -562 | 223 | - | - | - | - | - | - | - | - | - | **668** | **-614** | **133** | - | - | - |

| Layer | Bot Top | Garnet | | | Rosedale | | | SC-1 | | | Monterey | | | SC-3 | | | Maplethorpe | | | Tannery | | | SC-5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | bgs | msl | thick | bgs | msl | thick | bgs | msl | thick | bgs | msl | thick | bgs | msl | thick | bgs | msl | thick | bgs | msl | thick | bgs | msl | thick |
| | gs | 0 | 81 | - | 0 | 131 | - | 0 | 72 | - | 0 | 113 | - | 0 | 97 | - | 0 | 135 | - | 0 | 123 | - | 0 | 120 | - |
| 1 | **$Qa_U$** - $Qa_L$ | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 2 | **$Qa_L$** - F | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 3 | **F** - DEF | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 4 | **DEF** - D | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 93 | 27 | - |
| 5 | **D** - BC | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 177 | -57 | 84 |
| 6 | **BC** - B | - | - | - | - | - | - | - | - | - | - | - | - | 95 | 2 | - | - | - | - | 153 | -30 | 153 | 378 | -258 | 201 |
| 7 | **B** - A | 82 | -1 | - | 140 | -9 | 140 | 114 | -42 | - | *240* | *-127* | - | 280 | -183 | 185 | 368 | -233 | - | 325 | -202 | 172 | 516 | -396 | 138 |
| 8 | **A** - AA | **290** | **-209** | **208** | **405** | **-274** | **265** | 323 | -251 | 209 | **488** | **-375** | **248** | 510 | -413 | 230 | **620** | **-485** | **252** | **609** | **-486** | **284** | 768 | -648 | 252 |
| 9 | **AA** - Tp | - | - | - | **-** | **-** | **-** | - | - | | - | - | - | *700* | *-603* | *190* | - | - | - | - | - | | - | - | - |
| 10 | **Tp** - Tu | - | - | - | - | - | - | - | - | | - | - | - | - | - | | - | - | - | 790 | -667 | 181 | - | - | - |
| 11 | **Tu** - gr | - | - | - | - | - | - | *880* | *-808* | *557* | - | - | - | *907* | *-810* | *207* | - | - | - | - | - | - | - | - | - |

| Layer | Bot Top | Estates | | | Madeline | | | SC-9 | | | Seacliff 2 | | | Ledyard | | | SC-8 | | | T. Hopkins | | | Aptos Creek | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | bgs | msl | thick | bgs | msl | thick | bgs | msl | thick | bgs | msl | thick | bgs | msl | thick | bgs | msl | thick | bgs | msl | thick | bgs | msl | thick |
| | gs | 0 | 144 | - | 0 | 192 | - | 0 | 13 | - | 0 | 170 | - | 0 | 190 | - | 0 | 11 | - | 0 | 120 | - | 0 | 26 | - |
| 1 | **$Qa_U$** - $Qa_L$ | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 2 | **$Qa_L$** - F | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 3 | **F** - DEF | - | - | - | 20 | 172 | - | - | - | - | 140 | 30 | - | 210 | -20 | 210 | 50 | -39 | - | 240 | -120 | 240 | 160 | -134 | 160 |
| 4 | **DEF** - D | 210 | -66 | - | 345 | -153 | 325 | 212 | -199 | - | **-** | **-** | **-** | 551 | -361 | 341 | 415 | -404 | 365 | **535** | **-415** | **295** | **510** | **-484** | **350** |
| 5 | **D** - BC | 300 | -156 | 90 | 443 | -251 | 98 | 273 | -260 | 61 | - | - | - | 635 | -445 | 84 | 475 | -464 | 60 | **-** | **-** | **-** | **590** | **-564** | **80** |
| 6 | **BC** - B | **515** | **-371** | **215** | **670** | **-478** | **227** | 480 | -467 | 207 | - | - | - | **848** | **-658** | **213** | 665 | -654 | 190 | - | - | - | **-** | **-** | **-** |
| 7 | **B** - A | 650 | -506 | 135 | 803 | -611 | 133 | 626 | -613 | 146 | - | - | - | 990 | -800 | 142 | 830 | -819 | 165 | - | - | - | - | - | - |
| 8 | **A** - AA | **925** | **-781** | **275** | 1080 | -888 | 277 | 905 | -892 | 279 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 9 | **AA** - Tp | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 10 | **Tp** - Tu | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 11 | **Tu** - gr | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

| Layer | Bot Top | SC-A1 | | | Country Club | | | Bonita | | | SC-A2 | | | SC-A5 | | | Seascape | | | San Andreas | | | SC-A3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | bgs | msl | thick | bgs | msl | thick | bgs | msl | thick | bgs | msl | thick | bgs | msl | thick | bgs | msl | thick | bgs | msl | thick | bgs | msl | thick |
| | gs | 0 | 65 | - | 0 | 197 | - | 0 | 231 | - | 0 | 127 | - | 0 | 175 | - | 0 | 177 | - | 0 | 165 | - | 0 | 103 | - |
| 1 | **$Qa_U$** - $Qa_L$ | - | - | - | 187 | 10 | 187 | 250 | -19 | 250 | 170 | -43 | 170 | 245 | -70 | 245 | 250 | -73 | 250 | 244 | -79 | 244 | 190 | -87 | 190 |
| 2 | **$Qa_L$** - F | 65 | 0 | 65 | **360** | **-163** | **173** | **415** | **-184** | **165** | 300 | -173 | 130 | 360 | -185 | 115 | **362** | **-185** | **112** | **349** | **-184** | **105** | 320 | -217 | 130 |
| 3 | **F** - DEF | 460 | -395 | 395 | **-** | **-** | **-** | **908** | **-677** | **493** | - | - | - | - | - | - | **-** | **-** | **-** | **-** | **-** | **-** | - | - | - |
| 4 | **DEF** - D | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 5 | **D** - BC | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 6 | **BC** - B | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 7 | **B** - A | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 8 | **A** - AA | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 9 | **AA** - Tp | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 10 | **Tp** - Tu | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 11 | **Tu** - gr | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

| Layer | Bot Top | Sells | | | Altivo | | | SC-A4 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | bgs | msl | thick | bgs | msl | thick | bgs | msl | thick |
| | gs | 0 | 111 | - | 0 | 166 | - | 0 | 186 | - |
| 1 | **$Qa_U$** - $Qa_L$ | - | - | - | 244 | -78 | 244 | 260 | -74 | 260 |
| 2 | **$Qa_L$** - F | **345** | **-234** | **-** | **380** | **-214** | **136** | 420 | -234 | 160 |
| 3 | **F** - DEF | **-** | **-** | **-** | **-** | **-** | **-** | - | - | - |
| 4 | **DEF** - D | - | - | - | - | - | - | - | - | - |
| 5 | **D** - BC | - | - | - | - | - | - | - | - | - |
| 6 | **BC** - B | - | - | - | - | - | - | - | - | - |
| 7 | **B** - A | - | - | - | - | - | - | - | - | - |
| 8 | **A** - AA | - | - | - | - | - | - | - | - | - |
| 9 | **AA** - Tp | - | - | - | - | - | - | - | - | - |
| 10 | **Tp** - Tu | - | - | - | - | - | - | - | - | - |
| 11 | **Tu** - gr | - | - | - | - | - | - | - | - | - |

## Table 2-2
## Interpreted Hydrostratigraphic Contacts

Listed from west to east as projected onto line of section shown in Figure 1-2
Bold in 2nd column indicates layers for which thicknesses and well screens correspond.
Shading indicates zone screened/perforated by production well.

| Author | Test Date | Assumed Aquifer Thick-ness ($b$) (ft) | Assumed Aqui-tard Thick-ness ($b'$) (ft) | Obs. Well | Actual Aquifer Zone* | Method | Type | Transmisivity ($T$) (ft$^2$/day) | Hydraulic Conduc-tivity ($K$) (ft/day) | Solution Coefficients $r/B$ or β | Solution Coefficients $B$ or $S/S'$ | $K_V$ or $K'$ (ft/day) | $K_V$:$K_H$ or $K'/K$ Ratio | Stora-tivity ($S$) | Specific Yield ($S_y$) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LSCE, 1991 | Jul-86 | 400 | - | Main St | Tu/AA | Cooper-Jacob | C | 4,260 | 10.7 | - | - | - | - | - | - | |
| | | | | SC-18AA | Tu | | | 4,390 | 11.0 | - | - | - | - | 0.00082 | - | |
| | | | | SC-18A | AA | | | 4,590 | 11.5 | - | - | - | - | 0.00433 | - | |
| | May-91 | | | unspecified | | unspecified | ? | 3,880 - 4,540 | 9.7-11.4 | - | - | - | - | 0.0033 | - | |
| LSCE, 1995 | May-91 | 400 | *100* | Main St | Tu/AA | Theis | C | 4,270 | 10.7 | - | - | - | - | 3.9E-05 | - | |
| | | | | SC-18AA | Tu | Theis | C | 3,750 | 9.4 | - | - | - | - | 0.00125 | - | |
| | | | | SC-18A | AA | Hantush-Jacob | L | 3,790 | 9.5 | 0.04 | *980* | *0.4* | *0.042* | 0.0066 | - | |
| Todd, 2001 | May-91 | *400* | - | unspecified | | unspecified | ? | 4,010 | 10 | - | - | - | - | 0.0008 | - | |
| Johnson, 2001 | May-91 | 400 | 100 | Main St | Tu/AA | Theis | C | 4,050 | 10.1 | - | - | - | - | - | - | |
| | | | | | | Hantush-Jacob | L | 3,975 | 9.9 | - | - | - | - | - | - | |
| | | | | SC-18AA | Tu | Cooper-Jacob | C | 3,735 | 9.3 | - | - | - | - | 0.0013 | - | |
| | | | | | | Theis | C | 3,560 | 8.9 | - | - | - | - | 0.002 | - | |
| | | | | | | Hantush-Jacob | L | 3,415 | 8.5 | 0.0066 | 5,870 | 0.01 | 0.001 | 0.0025 | - | |
| | | | | | | Hantush | L | 3,400 | 8.5 | 0.00073 | 1 | 0.002 | 0.0002 | 0.0025 | - | |
| | | | | | | Neuman | UC | 3,400 | 8.5 | 0.0001 | - | 0.094 | 0.01 | 0.0025 | 0.0025 | |
| | | | | SC-18A | AA | Cooper-Jacob | C | 4,475 | 11 | - | - | - | - | 0.0045 | - | |
| | | | | | | Theis | C | 4,600 | 12 | - | - | - | - | 0.0057 | - | |
| | | | | | | Hantush-Jacob | L | 4,200 | 10.5 | 0.035 | 1,110 | 0.34 | 0.03 | 0.0068 | - | |
| | | | | | | Hantush | L | 3,700 | 9.3 | 0.024 | 1 | 2.2 | 0.24 | 0.0063 | - | |
| | | | | | | Neuman | UC | 3,100 | 7.8 | 0.0001 | - | 0.086 | 0.01 | 0.01 | 0.056 | |
| **this report** | May-91 | 400 | - | Main St | Tu/AA | $S_c$ x 2000 | C | 3,700 | 9.3 | - | - | - | - | - | - | $s$=53 ft, $S_c$=14 gpm/ft |
| | | 600 | 30 | SC-18AA | Tu | Hantush-Jacob | L | 3,590 | 6.0 | 0.01 | 3,900 | 0.007 | 0.00059 | 0.0015 | - | See Figure 3-2 |
| | | 400 | 100 | | | Theis (same | C | | 9.0 | | | 0.02 | | | | |
| | | 300 | 200 | | | $S$ & $T$) | | | 12.0 | | | 0.05 | 0.008 | | | |
| | | 600 | 30 | SC-18A | AA | Hantush-Jacob | L | 3,730 | 6.2 | 0.04 | 975 | 0.12 | 0.01 | 0.007 | - | See Figure 3-3 |
| | | 400 | 100 | | | | | | 9.3 | | | 0.4 | | | | |
| | | 300 | 200 | | | | | | 12.4 | | | 0.8 | 0.13 | | | |
| | | 600 | 30 | SC-10AA | AA | Hantush-Jacob | L | 3,765 | 6.3 | 0.95 | 7,163 | 0.002 | 0.0002 | 0.00012 | - | SC-10AA $s$~2.5 ft |
| | | 400 | 100 | | | | | | 9.4 | | | 0.007 | | | | SC-10A $s$<0.5 ft |
| | | 300 | 200 | | | | | | 12.6 | | | 0.01 | 0.002 | | | See Figure 3-4 |
| | | 600 | 30 | | | Hantush | L | 4,455 | 7.4 | 0.3879 | 1 | 0.01 | 0.0005 | 6.5E-05 | - | |
| | | 400 | 100 | | | | | | 11.1 | | | 0.02 | | | | |
| | | 300 | 200 | | | | | | 14.9 | | | 0.05 | 0.01 | | | |
| | | | | | | Average | | 3,900 | 9.8 | n/a | n/a | 0.24 | 0.033 | 0.0033 | 0.029 | Represents a mixed |
| | | | | | | Minimum | | 3,100 | 6.0 | - | - | 0.002 | 0.00018 | 4E-5 | 0.0025 | range of aquifer zones |
| | | | | | | Maximum | | 4,600 | 15 | - | - | 2.2 | 0.24 | 0.01 | 0.056 | and conditions. |

*A zone may also contribute through gravel pack.
July 1986 test pumping duration 8 hrs at 1,500 gpm.
May 1991 test pumping duration 72 hrs at 725 gpm.
Monitoring well cluster SC-18 is 39 ft from Main St well, i.e., $r$ =39 ft.
Monitoring well cluster SC-10 is 6,805 ft from Main St well.
Solution types: C=confined, UC=unconfined, L=leaky
*Italics* indicate value assumed for, or inferred from, previous report.
AA and A refer to Purisima Formation aquifer units; Tu refers to an older undifferentiated sandstone below the Purisima Formation (Fig. 2-2).
See Figure 3-1 for well construction and aquifer-aquitard profile.

$K_V$ = vertical hydraulic condcutivity (Neuman method);$K$ or $K_H$ = horizontal hydrualic conductivity
$K'$ = aquitard hydrualic conductivity (Hantush and Hantush-Jacob methods
$K'/K$ ratios calculated to generate greatest range.

**Table 3-1**
**Summary of Main Street Well Aquifer-Test Analyses**

| Author | Pumping Well | Assumed Aquifer Thickness ($b$) (ft) | Assumed Aquitard Thickness ($b'$) (ft) | Obs. Well | Purisima Unit | Method | Type | Transmisivity ($T$) ($ft^2$/day) | Hydraulic Conductivity ($K$) (ft/day) | Solution Coefficients $r/B$ or β | Solution Coefficients $B$ or $S/S'$ | $K_V$ or $K'$ (ft/day) | $K_V$:$K_H$ or $K'/K$ Ratio | Storativity ($S$) | Specific Yield ($S_y$) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fugro, 1998 | Beltz 8 | *90* | *70* | Beltz 8 | A | Cooper-Jacob (avg) | C | 9,280 | *103* | - | - | - | - | - | - | |
| | | | | | | Theis | C | 8,920 | *99* | - | - | - | - | - | - | |
| | | | | | | Papadopulos-Cooper (avg) | C | 7,530 | *84* | - | - | - | - | - | - | |
| | | | | | | Moench | L | 5,220 | *58* | - | - | - | - | - | - | |
| | | | | | | Hantush | L | 4,790 | *53* | - | - | *5.4* | *0.1* | - | - | |
| | | | | | | Recovery (avg) | C | 7,260 | *81* | - | - | - | - | - | - | |
| | | | | Beltz 6 | A | Cooper-Jacob | C | 8,800 | *98* | - | - | - | - | 0.0015 | - | |
| | | | | | | Theis (avg) | C | 9,690 | *108* | - | - | - | - | 0.0010 | - | |
| | | | | | | Papadopulos-Cooper (avg) | C | 8,690 | *97* | - | - | - | - | 0.0047 | - | |
| | | | | | | Moench | L | 6,460 | *72* | - | - | - | - | 0.0044 | - | |
| | | | | | | Hantush | L | 6,690 | *74* | - | - | *0.05* | *0.001* | 0.0038 | - | |
| | | | | | | Recovery (avg) | C | 8,230 | *91* | - | - | - | - | - | - | |
| | Beltz 9 | *100* | *60* | Beltz 9 | A | Cooper-Jacob (avg) | C | 6,830 | *68* | - | - | - | - | - | - | |
| | | | | | | Theis | C | 5,570 | *56* | - | - | - | - | - | - | |
| | | | | | | Papadopulos-Cooper | C | 6,030 | *60* | - | - | - | - | - | - | |
| | | | | | | Moench | L | 3,880 | *39* | - | - | - | - | - | - | |
| | | | | | | Hantush | L | 3,780 | *38* | - | - | - | - | - | - | |
| | | | | | | Recovery | C | 5,030 | *50* | - | - | - | - | - | - | |
| Johnson, 2003 | Beltz 8 | 90 | 70 | Beltz 8 | A | Theis | C | 8,900 | 99 | - | - | - | - | - | - | |
| | | | | | | Hantush | L | 4,650 | 52 | 0.0041 | 0.01 | 0.9 | 0.017 | - | - | |
| | | | | Beltz 6 | A | Theis | C | 9,000 | 100 | - | - | - | - | 0.00016 | - | |
| | | | | | | Hantush-Jacob | L | 8,500 | 94 | 0.0033 | 11,500 | 0.005 | 5E-5 | 0.00024 | - | |
| | | | | | | Hantush | L | 5,250 | 58 | 0.05 | 0.1 | 1.0 | 0.017 | 0.00052 | - | |
| | | | | | | Neuman | UC | 5,100 | 57 | 0.0025 | - | 0.8 | 0.014 | 0.00087 | 0.013 | |
| | Beltz 9 | 90 | 60 | Beltz 9 | A | Theis | C | 4,825 | 54 | - | - | - | - | - | - | |
| | | | | | | Hantush-Jacob | L | 4,820 | 54 | 7.E-05 | 14,300 | - | - | - | - | |
| | | | | | | Hantush | L | 2,370 | 26 | 1.18 | 0.01 | - | - | - | - | |
| **this report** | Beltz 8 | 100 | - | Beltz 8 | A | $S_c$ x 2000 | C | 6,100 | 61 | - | - | - | - | - | - | $Sc$ =22.8 |
| | | | 12.5 | | | Moench | L | 3,650 | 37 | 0.0047 | 214 | 1.0 | 0.03 | 0.00019 | - | See Fig. 3-6 |
| | | | 47.5 | | | | | | | | | 3.8 | 0.10 | | | |
| | | 100 | 12.5 | Beltz 6 | A | Moench | L | 6,820 | 68 | 0.007 | 5,428 | 0.003 | 4E-5 | 0.00032 | - | See Fig 3-7 |
| | | | 47.5 | | | | | | | | | 0.01 | 0.0001 | | | |
| | Beltz 9 | 110 | - | Beltz 9 | A | $S_c$ x 2000 | C | 5,800 | 53 | - | - | - | - | - | - | $Sc$ =21.8 |
| | | | 20 | | | Moench | L | 4,340 | 40 | 0.00032 | 769 | 0.15 | 0.004 | 0.014 | - | See Fig 3-8 |
| | | | 50 | | | | | | | | | 0.37 | 0.01 | | | |
| | Beltz 7 | 100 | 50 | Beltz 7 | A/AA | Hantush-Jacob | L | 125 | 2.5 | 0.35 | - | - | - | - | - | See Fig 3-9 |
| | | | | | | Average | | 6,100 | 66 | n/a | n/a | 1.1 | 0.02 | 0.003 | 0.013 | |
| | | | | | | Minimum | | 125 | 2.5 | - | - | 0.003 | 4E-5 | 0.0002 | | |
| | | | | | | Maximum | | 9,700 | 108 | - | - | 5.4 | 0.10 | 0.01 | | |

See Figure 3-_ for configuration of wells.
Solution types: C=confined, UC=unconfined, L=leaky
Beltz 6 is 38 ft from Beltz 8.
Betlz wells 8 and 9 tested at 1,200 gpm for approximately 34 hrs, in February and March 1998, respectively (Fugro, 1998).
Time-drawdown data collected from Beltz 7 during nearly 20 minutes of pumping at 260 gpm in June 2002 (City of Santa Cruz, 200
*Italics* indicate value assumed for, or inferred from, previous repor
$K_V$ = vertical hydraulic condcutivity (Neuman method); $K$ or $K_H$ = horizontal hydrualic conductivity
$K'$ = aquitard hydrualic conductivity (Hantush, Hantush-Jacob, and Moench methods)

**Table 3-2**
**Summary of Beltz Well Aquifer-Test Analyses**

| Pumping Well/ Aquifer Unit | Test Date | Obs. Well (other than pumping well) | Test Duration (hrs) | Available Information: Data Sheets | Available Information: Data Plots | Pumping Rate (gpm) | Pumping Well Drawdown: At End of Test (ft) | Pumping Well Drawdown: Extrapolated to 24 hrs (ft) | Estimated Specific Capacity ($S_c$) at 24 hrs (gpm/ft) | Reported**: Transmisivity ($T$) (ft$^2$/day) | Reported**: Storativity ($S$) | *Transmisivity (T) Estimated from $S_c$*: *f* | *Transmisivity (T) Estimated from $S_c$*: *(ft$^2$/day)* | Screened Intervals: Sum $b_1$ (ft) | Screened Intervals: Range $b_2$ (ft) | *Est. Aquifer Thickness* $b_3$ (ft) | *Hydraulic Conductivity (K)* $b_1$ (ft/day) | *Hydraulic Conductivity (K)* $b_2$ (ft/day) | *Hydraulic Conductivity (K)* $b_3$ (ft/day) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Garnet A | ####### | | 2 | | x | 598 | 34 | - | 16.9 | - | - | *1,900* | *4,300* | 113 | | *200* | - | - | - |
| | | | 2 | | x | 828 | 44 | - | 15.1 | - | - | *1,900* | *3,800* | | | | | | |
| | | | 2 | | x | 1,010 | 63 | - | 14.8 | - | - | *1,900* | *3,800* | | | | | | |
| | ####### | Opal 4 | 8 | x | x | 799 | 52 | - | 15.0 | 4,480 | - | *1,900* | *3,800* | | | | *34* | | *19* |
| Rosedale AA/A | 7/18-19/83 | | ~2 | | (x) | 465 | 19 | *24* | *19.4* | - | - | *1,900* | *4,900* | 222 | 350 | | - | - | - |
| | | | ~2 | | (x) | 853 | 36 | *44* | *19.4* | - | - | *1,900* | *4,900* | | | | | | |
| | | | ~2 | | (x) | 1,015 | 42 | *54* | *18.8* | - | - | *1,900* | *4,800* | | | | *22* | *14* | |
| Tannery II A | ####### | | 2 | x | x | 600 | 44 | - | - | - | - | - | - | 220 | | *235* | - | - | - |
| | | | 2 | x | x | 800 | 59 | - | - | - | - | | | | | | | | |
| | | | 2 | x | x | 1,000 | 81 | - | - | - | - | | | | | | | | |
| | | | 2 | x | x | 1,400 | 120 | - | - | - | - | | | | | | | | |
| | ####### | | 8 | x | x | 900 | 84 | - | 9.3 | 2,020 | - | *1,800* | *2,200* | | | | *10* | | *10* |
| Estates A/BC | ####### | | 2 | | x | 700 | 62 | - | - | - | - | - | - | 415 | 615 | | - | - | - |
| | | | 2 | | x | 1,000 | 90 | - | - | - | - | | | | | | | | |
| | | | 2 | | x | 1,200 | 112 | - | - | - | - | | | | | | | | |
| | ####### | | 7 | | x | 1,000 | 95 | *100* | *10.0* | - | - | *1,800* | *2,400* | | | | *5.8* | *3.9* | |
| Madeline BC | ####### | | 12 | | x | 400 | 267 | *290* | *1.4* | -<br>- | -<br>- | *1,700* | *300* | 160 | 190 | *230* | *2.0* | *1.6* | *1.4* |
| Ledyard BC | ####### | | 1 | | x | 250 | 110 | *136* | *1.8* | - | - | *1,700* | *400* | 210 | | *215* | *1.9* | | *1.8* |
| | | | 1 | | x | 350 | 146 | *195* | *1.8* | - | - | *1,700* | *400* | | | | | | |
| | | | 1 | | x | 450 | 188 | *293* | *1.5* | - | - | *1,700* | *300* | | | | | | |
| Bonita F/Qa | 8/15-16/83 | | ~2 | | (x) | 508 | 13 | *13* | *39.1* | - | - | *1,700* | *8,900* | 248 | 398 | *475* | - | - | - |
| | | | ~2 | | (x) | 764 | 22 | *23* | *33.2* | - | - | *1,700* | *7,500* | | | | | | |
| | | | ~2 | | (x) | 1,050 | 30 | *33* | *31.8* | - | - | *1,700* | *7,200* | | | | *29* | *18* | *15* |
| San Andreas F/Qa | May-91 | | 2 | | x | 800 | 30 | - | 27.0 | - | - | *1,700* | *6,100* | 240 | 342 | *450* | - | - | - |
| | | | 2 | | x | 1,000 | 35 | - | 27.8 | - | - | *1,700* | *6,300* | | | | | | |
| | | | 2 | | x | 1,270 | 44 | - | 27.5 | - | - | *1,700* | *6,300* | | | | | | |
| | May-91 | | 8 | | x | 1,040 | 37 | - | 27.8 | - | - | *1,700* | *6,300* | | | | *26* | *18* | *14* |
| Seascape F/Qa | 1987* | SC-A5<br>SC-A2 | 6 | *<br>* | *<br>* | 970 | - | - | - | 12,000 | 0.0002 | - | | 100 | 240 | *420* | *120* | *50* | *29* |
| | 1984 (see Table 3-6) | | - | - | - | - | - | - | *24*<br>*31* | -<br>- | -<br>- | *1,700* | *6,300* | | | | *63* | *26* | *15* |
| Sells F/Qa | ####### | | ~2 | | x | 500 | 8 | *8* | *63* | - | - | *1,700* | *14,200* | 120 | 230 | *330* | *114* | *59* | *41* |
| | | | ~1 | | x | 750 | 13 | *13* | *58* | - | - | *1,700* | *13,100* | | | | | | |
| | | | ~2 | | x | 1,000 | 18 | *20* | *50* | - | - | *1,700* | *11,400* | | | | *95* | *49* | *34* |
| | 1987* | Sc-A3<br>Altivo | 6 | *<br>* | *<br>* | 560 | - | - | - | 66,800-73,500 | 0.0008 | - | - | | | | *580* | *310* | *210* |

Information obtained from District files, except where note
AA, A, BC, F, and Qa refer to the aquifer units defined in Figure 2-2.
(x) plot consists only of straight-line fit, no data point
*Italics* indicate values inferred or interpreted by this report.
* As reported in LSCE, 1987; no data or plots provided.
**Method of analysis not reported.

Estimated $T$ (gpd/ft) = $S_c$ x $f$ (see Section 3.1.4 for definition of $f$)
$T$ (ft$^2$/day) = $T$ (gpd/ft) / 7.48; $K = T/b$
Screened interval "range" is distance between uppermost and lowermost scree

**Table 3-3**
**Summary of Soquel Creek Water District Pumping Tests**

| Pumping Well / Aquifer Units | Test Date | Test Duration (hrs) | Pumping Rate (gpm) | Assumed Aquifer Thickness ($b$) (ft) | Assumed Aquitard Thickness ($b'$) (ft) | Obs. Well | Method | Type | Transmisivity ($T$) (ft$^2$/day) | Hydraulic Conductivity ($K$) (ft/day) | Solution Coefficients $r/B$ or $\beta$ | Solution Coefficients $B$ or $S/S'$ | $K_V$ or $K'$ (ft/day) | $K_V$:$K_H$ or $K'/K$ Ratio | Storativity ($S$) | Specific Yield ($S_y$) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Garnet A | ####### | 8 | 799 | 200 | 30 | Garnet | Moench | L | 3,350 | 17 | 0.0007 | 1,420 | 0.5 | 0.03 | 0.0002 | - | See Fig. 3-10 |
| | | | | | 60 | | | | | | | | 0.1 | 0.006 | | | |
| | | | | 200 | 30 | Opal 4 ($r$=30 ft) | Hantush-Jacob | L | 3,390 | 17 | 0.06 | 500 | 0.4 | 0.02 | 0.0016 | - | See Fig. 3-11 |
| | | | | | 60 | | | | | | | | 0.8 | 0.05 | | | |
| Tannery II A | ####### | 8 | 900 | 235 | 50 | Tannery II | Hantush-Jacob | L | 2,060 | 8.8 | 0.002 | 500 | 0.7 | 0.08 | 0.00055 | - | See Fig. 3-12 |
| | | | | | 200 | | | | | | | | 2.7 | 0.3 | | | |
| Estates A/BC | ####### | 7 | 1,000 | 415 [a] | - | Estates | Theis | C | 2,700 | 6.5 | - | - | - | - | 4E-5 | - | See Fig. 3-13 |
| | | | | 615 [b] | | | | | | 4.4 | | | | | | | |
| | | | | 415 [a] | 100 | | Hantush-Jacob | L | 2,380 | 5.7 | 0.0004 | 2,380 | 0.04 | 0.007 | 0.0002 | - | |
| | | | | 615 [b] | | | | | | 3.9 | | | | 0.01 | | | |
| Madeline BC | 5/4/1984 | 12 | 400 | 160 [a] | - | Madeline | Theis | C | 240 | 1.5 | - | - | - | - | 0.0045 | - | See Fig. 3-14 |
| | | | | 230 [b] | - | | | | | 1.0 | | | | | | | |
| | | | | 160 [a] | 100 | | Hantush-Jacob | L | 240 | 1.5 | 0.0010 | 1,000 | 0.02 | 0.02 | 0.0045 | - | |
| | | | | 230 [b] | 200 | | | | | 1.0 | | | 0.05 | 0.05 | | | |
| | | | | 160 [a] | 100 | | Hantush | L | 240 | 1.5 | 0.0002 | 1 | 0.02 | 0.01 | 0.0045 | - | |
| | | | | 230 [b] | 200 | | | | | 1.0 | | | 0.03 | 0.03 | | | |
| San Andreas F/$Qa_L$ | May-91 | 8 | 1,040 | 350 [b] | - | San Andreas | Theis | C | *25,000* | *71* | - | - | - | - | *8E-21* | - | See Fig. 3-15 |
| | | | | 350 [b] | 20 | | Hantush-Jacob | L | 4,700 | 13 | 0.005 | 200 | 2.4 | 0.2 | 0.001 | - | Assumes thin aquitard between upper and lower Aromas. |
| | | | | 450 [c] | - | | Neuman | UC | 6,800 | 15 | 2.E-06 | - | 1.5 | 0.1 | 0.0002 | 0.06 | Assumes 350-ft penetration of 450-ft aquifer. |

*Italics* indicate unreasonable values.

[a]Sum of screened intervals

[b]Sum of screened aquifer zones.

[c]Water table down to deepest screen.

Solution types: C=confined, UC=unconfined, L=leaky

AA, A, BC, F, and Qa refer to the aquifer units defined in Figure 2-2.

$K_V$ = vertical hydraulic condcutivity (Neuman method); $K$ or $K_H$ = horizontal hydrualic conductivity

$K'$ = aquitard hydrualic conductivity (Hantush-Jacob and Moench methods)

**Table 3-4**
**Summary of Re-Analyzed Pumping Tests**
**(other than Main Street and Beltz wells)**

| Well | Aquifer Unit: Hinkley Units | Aquifer Unit: *this report* | As Reported by Hickey (1968)*: Length of Perf. Interval $b_1$ (ft) | Assumed Aquifer Thickness $b_2$ (ft) | Well Yield (gpm) | Draw-down (ft) | Specific Capacity ($S_c$) (gpm/ft) | | *Transmisivity (T) Estimated from $S_c$*: *f* | *(ft$^2$/day)* | | *Hyd. Cond. (K) (ft/day) based on:* $b_1$ | $b_2$ | Comments by Hickey (added comments in italics) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **District Service Area I** | | | | | | | | | | | | | | |
| Opal No. 3 | B | *A* | 72 | *200* | 380 | 32 | 12 | - | *1,900* | *3,000* | - | *42* | *15* | |
| Rosedale | B | *A* | *90* | *250* | 240 | - | 7 | - | *1,900* | *1,800* | - | *20* | *7.1* | Lower $S_c$ & $T$ due to partial penetration, demonstrates low $K_v$. |
| | | | | | 173 | 17 | *10* | - | *1,900* | *2,600* | - | *29* | *10* | *Specific capcity suggested by provided information.* |
| Airport (Monterey) | B | *A* | *151* | *255* | 360 | 36 | 10 | - | *1,800* | *2,400* | - | *16* | *9.4* | |
| Malplethorpe | B | *A* | 260 | *250* | 800 | 40 | 20 | - | *1,800* | *4,800* | - | *19* | *19* | Fully penetrates unit B *(i.e., unit A).* |
| Aquifer Unit B (Hinkley) | B | *A* | - | 230 | - | - | - | - | *=K x b* | *6,150* | - | | 27 | Assuming $K$ = 200 gpd/ft$^2$ based on Maplethorpe well. |
| **District Service Area II** | | | | | | | | | | | | | | |
| Seacliff No. 1 (Hillcrest) | C | *EF* | *130* | *150* | 180 | 30 | 6 | - | *1,700* | *1,400* | - | *10* | *9.1* | |
| Seacliff No. 2 | C | *EF* | - | *150* | 90 | 33 | 1 | *3* | *1,700* | *200* | *600* | - | *1.5* | *Provided pumping rate and drawdown suggest a different specific capacity.* |
| Seacliff No. 3 | C | *EF* | - | *150* | 52 | 74 | 1 | - | *1,700* | *200* | - | - | *1.1* | Penetrates lower, siltier beds in unit C. |
| Seacliff No. 4 | C | *EF* | *149* | *150* | 185 | 54 | 3 | - | *1,700* | *800* | - | *5.2* | *5.2* | |
| Aptos Creek | BC | *BC/DEF* | 470 | *500* | 780 | 185 | 4 | - | *1,700* | *1,000* | - | *2.0* | *1.9* | |
| Cabrillo Jr. College | BC | *?* | 200 | *?* | 154 | 180 | 1 | - | *1,700* | *200* | - | *1.0* | - | |
| Aquifer Unit C (Hinkley) | C | *?* | - | *400* | - | - | 4 | - | *1,700* | *900* | - | - | 2.7 | $K$ = 20 gpd/ft$^2$. |
| **District Service Areas III & IV** | | | | | | | | | | | | | | |
| Palmer | C | *F* | 160 | *300* | 405 | 40 | 5 | *10* | *1,700* | *1,100* | *2,300* | *14* | *7.7* | *Provided pumping rate and drawdown suggest a different specific capacity.* |
| Cliff Drive | C | *F* | 200 | *350* | 208 | 46 | 5 | - | *1,700* | *1,000* | - | *5.1* | *2.9* | |
| Aptos School | C | *F* | *260* | *300* | 475 | 29 | 17 | - | *1,700* | *3,700* | - | *14* | *12* | Penetrates upper, sandier beds in unit C. |
| Berry Farm (Country Club) | C | *F/$Qa_L$* | 217 | *300* | 445 | 18 | 24 | - | *1,700* | *5,600* | - | *26* | *19* | Area of high $K$ in unit C near Valencia Ck and Rio del Mar; Aptos well similar. |
| D'Anna | C | *Qa* | 120 | *200* | 150 | 35 | 4 | - | *1,700* | *1,000* | - | *8.1* | *4.9* | |
| Waugman | C | *Qa* | 150 | *200* | 220 | 109 | 2 | - | *1,700* | *500* | - | *3.1* | *2.3* | |
| La Selva No. 1 | Aromas | *Qa* | 10 | *250* | 225 | - | 6 | - | *1,700* | *1,400* | - | *136* | *5.5* | |
| | | | | | 153 | 26 | *6* | - | *1,700* | *1,300* | - | *134* | | *Specific capcity suggested by provided information.* |
| La Selva No. 2 | Aromas | *Qa* | *10* | *250* | 540 | - | 10 | - | *1,700* | *2,300* | - | *227* | *9.1* | |
| | | | | | 116 | 21 | *6* | - | *1,700* | *1,300* | - | *126* | *5.0* | *Specific capcity suggested by provided information.* |
| **Other** | | | | | | | | | | | | | | |
| Beltz No. 3 | B | *A* | 45 | *100* | 940 | 30 | 30 | - | *2,000* | *8,400* | - | *186* | *84* | |
| Holm (up Soq Ck) | B | - | - | - | 20 | 185 | 0.1 | - | *1,200* | *20* | - | - | - | |
| Blake (SWN? Loc?) | B | - | - | - | 610 | - | 20 | - | *1,900* | *5,100* | - | - | - | |
| Rohr (Live Oak) | B | - | - | - | 440 | 44 | 10 | - | *1,900* | *2,500* | - | - | - | |
| CWD 2 (11S/1E-4Q2) | C | *Qa/?* | 140 | - | 220 | - | 7 | - | *1,700* | *1,600* | - | *11* | - | |

*Added values and comments are in italics.
AA and A through F refer to Purisima aquifer units; "Qa" indicates Aromas Sands aquifer.
Estimated $T$ (gpd/ft) = $S_c$ x $f$; $T$ (ft$^2$/day) = $T$ (gpd/ft) / 7.48; $K$ = $T/b$.
See Section 3.1.4 for definition of $f$.

**Table 3-5**
**Aquifer Properties Derived by and from 1968 USGS Report by Hickey**

| Well | Aquifer Unit | Specific Capacity ($S_c$) (Thorup, 1980) | (LSCE, 1984) Report Text | (LSCE, 1984) Hydrologic Data Appx.[a] | Screened Intervals Sum $b_1$ | Screened Intervals Range $b_2$ | Assumed Aquifer Thickness $b_3$ | $f$ | Transmisivity ($T$) Estimated from $S_c$ range | avg | Hydraulic Conductivity ($K$) Low $T$ $b_1$ | Low $T$ $b_2$ | Low $T$ $b_3$ | High $T$ $b_1$ | High $T$ $b_2$ | High $T$ $b_3$ | Avgerage $T$ $b_1$ | Avgerage $T$ $b_2$ | Avgerage $T$ $b_3$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | (gpm/ft) | | | (ft) | | | | (ft$^2$/day) | | (ft/day) | | | | | | | | |
| Opal | A | 8.5 | - | 5.7 - 7.6 | 102 | | 200 | 1,900 | 1,400 - 2,200 | 1,800 | 14 | | 7.2 | 21 | | 11 | 18 | | 9.0 |
| Opal Cliff | A | 3.1 | 6 | 2 - 6 | 80 | | 200 | 1,900 | 500 - 1,500 | 1,000 | 6.4 | | 2.5 | 19 | | 7.6 | 13 | | 5.1 |
| Rosedale | AA/A | - | 25 | 19 - 32 | 222 | 350 | 435 | 1,900 | 4,800 - 8,100 | 6,500 | 22 | 14 | 11 | 37 | 23 | 19 | 29 | 19 | 15 |
| Monterey | A | 16.3 | 19 | 10 - 19 | 151 | | 255 | 1,800 | 2,400 - 4,600 | 3,500 | 16 | | 9.4 | 30 | | 18 | 23 | | 14 |
| Maplethorpe | A | 20.8 | 18 | 7 - 21 | 260 | | 250 | 1,800 | 1,700 - 5,100 | 3,400 | 6.5 | | 6.7 | 19 | | 20 | 13 | | 13 |
| Tannery | A | 15.6 | 22 | 8 - 11 | 260 | | 260 | 1,800 | 1,900 - 5,300 | 3,600 | 7.4 | | 7.4 | 20 | | 20 | 13.9 | | 13.9 |
| Madeline | BC | 4.4 | 3 | 1.8 - 2.2 | 160 | 190 | 230 | 1,700 | 400 - 1,000 | 700 | 2.6 | 2.2 | 1.8 | 6.3 | 5.3 | 4.3 | 4.4 | 3.7 | 3.1 |
| Hillcrest | EF | 5.7 | 3 | 2.5 - 4.5 | 130 | | 150 | 1,700 | 600 - 1,300 | 900 | 4.4 | | 3.8 | 10.0 | | 8.6 | 7.2 | | 6.2 |
| Seacliff (4?) | EF | - | 2 | 1.4 - 2.5 | 149 | | 150 | 1,700 | 300 - 600 | 450 | 2.1 | | 2.1 | 3.8 | | 3.8 | 3.0 | | 3.0 |
| Aptos Creek | BC/DEF | 3.7 | 4 | 3.6 - 8.8 | 470 | | 500 | 1,700 | 800 - 2,000 | 1,400 | 1.7 | | 1.6 | 4.3 | | 4.0 | 3.0 | | 2.8 |
| Cliff | F | 7.6 | 2 | - | 200 | | 300 | 1,700 | 500 - 1,700 | 1,100 | 2.3 | | 1.5 | 8.6 | | 5.8 | 5.5 | | 3.6 |
| Aptos School | F | 8.1 | 8 | 5.7 - 8.5 | 260 | | 300 | 1,700 | 1,300 - 1,900 | 1,600 | 5.0 | | 4.3 | 7.4 | | 6.4 | 6.2 | | 5.4 |
| Country Club | F/$Qa_L$ | 18.1 | 20 | 19 - 23 | 169 | 241 | 300 | 1,700 | 4,100 - 5,200 | 4,700 | 24 | 17 | 14 | 31 | 22 | 17 | 28 | 19 | 16 |
| Bonita | F/$Qa_L$ | - | 31 | 28 - 38 | 248 | 398 | 475 | 1,700 | 6,400 - 8,600 | 7,500 | 26 | 16 | 13 | 35 | 22 | 18 | 30 | 19 | 16 |
| Seascape | F/$Qa_L$ | - | 30 | 24 - 31 | 100 | 240 | 420 | 1,700 | 5,500 - 7,000 | 6,300 | 55 | 23 | 13 | 70 | 29 | 17 | 63 | 26 | 15 |
| Altivo | F/$Qa_L$ | - | 40 | 35 - 41 | 100 | 150 | 330 | 1,700 | 8,000 - 9,300 | 8,600 | 80 | 53 | 24 | 93 | 62 | 28 | 86 | 58 | 26 |
| Sells | F/$Qa_L$ | - | 59 | 37 - 53 | 120 | 230 | 330 | 1,700 | 8,400 - 13,400 | 10,900 | 70 | 37 | 25 | 112 | 58 | 41 | 91 | 47 | 33 |

AA, A, BC, DEF, F, and Qa refer to the aquifer units defined in Figure 2-14.

[a]Selected range of "adjusted" specific capacities provided in Hydrologic Data Appendix of LSCE, 1984 (highest and lowest values excluded).

Screened interval "range" is distance between uppermost and lowermost screens.

Estimated $T$ (gpd/ft) = $S_c$ x $f$; $T$ (ft$^2$/day) = $T$ (gpd/ft) / 7.48; $K = T/b$.

See Section 3.1.4 for definition of $f$.

**Table 3-6**

**Transmissivity and Hydraulic Conductivity Estimated from Specific Capacities Reported by Thorup (1981) and LSCE (1984)**

| Assumed Aquifer Thickness (ft) | Well Yield (gpm) | Specific Capacity (gpm/ft) | Transmissivity (ft$^2$/day) | Hydraulic Conductivity (ft/day) |
|---|---|---|---|---|
| 200 - 2,000 | 5 - 400 | 2 (max) | *450* | *0.2 - 2* |

*Italics* indicate values inferred or interpreted by this report.

Estimated $T$ (gpd/ft) = $S_c$ x 1700; $T$ (ft$^2$/day) = $T$ (gpd/ft) / 7.48; $K = T/b$.

**Table 3-7**

**Transmissivity and Hydraulic Conductivity Estimated from Specific Capacity North of Zayante Fault (M.J. Johnson, 1980)**

| Well | Reported Specific Capacity ($S_c$) (gpm/ft) | Aquifer Unit | Screened Intervals Sum $b_1$ (ft) | Screened Intervals Range $b_2$ (ft) | Assumed Aquifer Thickness $b_3$ (ft) | Estimated Transmisivity ($T$) $f$ | Estimated Transmisivity ($T$) ($ft^2$/day) | Estimated Hydraulic Conductivity ($K$) $b_1$ (ft/day) | Estimated Hydraulic Conductivity ($K$) $b_2$ (ft/day) | Estimated Hydraulic Conductivity ($K$) $b_3$ (ft/day) |
|---|---|---|---|---|---|---|---|---|---|---|
| Main | 15.4 | Tu/AA | 266 | 420 | 400 | 1,900 | 3,900 | 15 | 9 | 10 |
| Garnet | 16.4 | A | 113 | | 200 | 1,900 | 4,200 | 37 | | 21 |
| Rosedale | 5.5 * | AA/A | 222 | 350 | 435 | 1,900 | 1,400 | 6.3 | 4.0 | 3.2 |
| Monterey | 14.3 | A | 151 | | 255 | 1,800 | 3,400 | 23 | | 13 |
| Maplethorpe | 12.3 | A | 260 | | 250 | 1,800 | 3,000 | 11 | | 12 |
| Tannery | 7.2 | A | 260 | | 235 | 1,800 | 1,700 | 6.7 | | 7.4 |
| Estates | 12.9 | A/BC | 415 | 615 | 615 | 1,800 | 3,100 | 7.5 | 5.0 | 5.0 |
| Madeline 2 | 1.7 | BC | 160 | 190 | 230 | 1,700 | 400 | 2.4 | 2.0 | 1.7 |
| Ledyard | 1.7 | BC | 210 | | 215 | 1,700 | 400 | 1.8 | | 1.8 |
| T. Hopkins | 2.2 | DEF | 255 | 345 | 385 | 1,700 | 500 | 2.0 | 1.4 | 1.3 |
| Aptos Creek | 7.1 | BC/DEF | 470 | | 500 | 1,700 | 1,600 | 3.4 | | 3.2 |

AA, A, BC, DEF, and F refer to the aquifer units defined in Figure 2-2.

Screened interval "range" is distance between uppermost and lowermost screens.

Estimated $T$ (gpd/ft) = $S_c$ x $f$; $T$ ($ft^2$/day) = $T$ (gpd/ft) / 7.48; $K = T/b$.

See Section 3.1.4 for definition of $f$.

Information other than column 1 original to this report.

*Low compared to pump test data summarized in Table 3-3.

**Table 3-8**
**Transmissivity and Hydraulic Conductivity Estimated from Specific Capacities Reported by LSCE (1999)**

| No. Wells | Aquifer Unit | Hyd. Cond. (ft/day) |
|---|---|---|
| 5 | A | 23 - 28 |
| 1 | A/B/C | 28 |
| 1 | A-D | 2.3 |
| 1 | B-E | 2.3 |
| 4 | E | 2.8 - 8.5 |

A through F refer to Purisima stratigraphic units (Fig. 2-2).

**Table 3-9**
**Hydraulic Conductivities Inferred from Specific Capacities (Essaid, 1992)**

| Well | Assumed Aquifer Unit M-W, 1998* | Assumed Aquifer Unit *this report* | Transmisivity ($T$) (ft$^2$/day) | Hydraulic Conductivity ($K$) (ft/day) | Storativity | *Suggested Specific Capactiy* *f* | *Suggested Specific Capactiy* *($S_c$) (gpm/ft)* | *Suggested Aquifer Thickness (b) (ft)* |
|---|---|---|---|---|---|---|---|---|
| District Service Area I | | | | | | | | |
| Main St | AA/A | *AA* | 4,300 | - | 1E-6 - 5E-6 | *1,900* | *17* | - |
| Garnet | A | *Tu/A* | 4,400 - 5,800 | 28 | 1E-6 - 5E-6 | *1,900* | *17 - 23* | *160 - 200* |
| Rosedale | AA/A | *AA/A* | 3,900 | 28 | - | *1,900* | *15* | *140* |
| Monterey | A | *A* | 7,100 | 23 | - | *1,800* | *30* | *310* |
| Maplethorpe | A | *A* | 5,300 - 7,500 | 23 | - | *1,800* | *22 - 31* | *230 - 330* |
| Tannery | A | *A* | 2,800 | 23 | - | *1,800* | *12* | *120* |
| District Service Area II | | | | | | | | |
| Estates | A-D | *A/BC* | 3,900 | - | - | *1,700* | *17* | - |
| Madeline | B/C | *BC* | 300 - 1,000 | 2.3 | - | *1,700* | *1 - 4* | *130 - 440* |
| Hillcrest | C/D/E | *EF* | 700 | 5.7 | - | *1,700* | *3* | *120* |
| Ledyard | B | *BC* | 400 | - | - | *1,700* | *2* | - |
| Seacliff (4) | D/E/F | *EF* | 300 | 5.7 | - | *1,700* | *1* | *50* |
| T. Hopkins | B-E | *DEF* | 400 | - | - | *1,700* | *2* | - |
| Aptos Creek | B-E | *BC/DEF* | 500 | 2.3 | - | *1,700* | *2* | *220* |
| District Service Area III & IV | | | | | | | | |
| Cliff | Qa | *F* | 2,350 | 2.8 | - | *1,700* | *10* | *830* |
| Country Club | Qa | *F/Qa$_L$* | 3,800 - 4,800 | - | - | *1,700* | *17 - 21* | - |
| Bonita | Qa | *F/Qa$_L$* | 15,000 - 22,000 | - | - | *1,700* | *66 - 97* | - |
| Seascape | Qa | *F/Qa$_L$* | 16,000 | - | - | *1,700* | *70* | - |
| San Andreas | Qa | *F/Qa$_L$* | 27,000 - 70,000 | - | - | *1,700* | *119 - 308* | - |
| Altivo | Qa | *F/Qa$_L$* | 54,000 | - | - | *1,700* | *238* | - |
| Sells | Qa | *F/Qa$_L$* | 40,000 - 50,000 | - | - | *1,700* | *176 - 220* | - |
| Outside District Service Area | | | | | | | | |
| Beltz (?) | A | *A* | 6,000 | - | - | *1,900* | *24* | - |
| Beltz 4 | A | *A* | 11,000 | - | - | *1,900* | *43* | - |
| Beltz 8 | A | *A* | 5,500 | - | 0.001 - 0.005 | *1,900* | *22* | - |
| Beltz 9 | A | *A* | 6,100 | - | 0.001 - 0.005 | *1,900* | *24* | - |

*Montgomery Watson et al., 1998

Transmissivities rounded, and averaged when narrow range provided.

*Italics* indicate values inferred or interpreted by this report.

AA and A through F refer to Purisima aquifer units; "Qa" indicates Aromas Sands aquifer.

Estimated $S_c = T$ (ft$^2$/day) / $f$ x 7.48); $b = T/b$ (see Section 3.1.4 for definition of $f$)

**Table 3-10**

**Aquifer Property Estimates for Individual Wells Reported in 1998 Model Report**

| Author | Well or Area | Aquifer Unit | Method | Transmisivity ($T$) ($ft^2$/day) | Stora-tivity ($S$) | Specific Yield ($S_y$) | Assumed Aquifer Thickness ($b$) (ft) | Hydraulic Conduc-tivity ($K$) (ft/day) |
|---|---|---|---|---|---|---|---|---|
| Woodward-Clyde Consultants, 1983 | irrigation well, Giberson Dunes (immediately south of Pajaro River mouth); observ. well at 39 ft; pumped 500 gpm for 48 hrs. | terrace deposits and possibly upper Aromas Sands | *$S_c$ x 1,700* | *7,000* | - | - | 103 - *200* | *35 - 70* |
| | | | Boulton | 19,400 | 0.00086 | 0.0077 | | 97 - 190 |
| | | | Cooper-Jacob | 17,400 | - | 0.012 | | 87 - 170 |
| LSCE, 1987 (for PVWMA) | Northern Pajaro Valley | Aromas Sands | not reported | 2,700 - 6,700 | - | - | *200* | *14 - 34* |
| | La Selva Beach south to Sunset State Beach | | | 2,900 - 5,600 | - | - | | *15 - 28* |
| | City of Watsonville well No. 17 | | | - | 0.00004 | - | | - |
| CH2M HILL, 1994 | Colleg Lake area | Aromas Sands | $S_c$ x 2000 drillers' reports | 1,800 - 5,800 | - | - | *150 - 300* | *10 - 40* |
| | San Andreas Sand Hills | | | 2,900 - 5,500 | - | - | *100 - 200* | *30 - 60* |
| | Watsonville area | | | 1,500 - 13,400 | - | - | *100 - 400* | *15 - 130* |
| CH2M HILL, 1995 | College Lake injection test well | Aromas Sands | Hantush | 4,100 | - | - | *200* | *21* |
| | | | Walton | 3,600 | - | - | | *18* |

*Italics* indicate values inferred or interpreted by this report.

Estimated $T$ (gpd/ft) = $S_c$ x $f$; $T$ ($ft^2$/day) = $T$ (gpd/ft) / 7.48; $K = T/b$.

Also see modeled values in Table 3-12.

**Table 3-11**

**Aquifer Properties Estimated for the Pajaro Valley**

| Author & Area Modeled | Method | Aquifer Unit/ Model Layer | Thick-ness ($b$) (ft) | Hyd. Cond. ($K$) (ft/day) | Transmisivity ($T$) (ft$^2$/day) | Leakance (1/day) | Vertical Hyd. Cond. ($K_V$) (ft/day) | $K_V$:$K_H$ Ratio | $K'/K$ Ratio | Storativity ($S = S_s$ x $b$) | Specific Storage ($S_s$) (1/ft) | Specific Yield ($S_y$) | Porosity | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Essaid, 1992 | initial guess | Purisima | *2,000* | 8.5 | *17,000* | 1E-5 | - | - | - | - | - | - | - | |
| Soquel-Aptos | model | E | 600 | 0.3 | *180* | 1E-6 - 1E-4 | - | - | - | *0.002* | 3E-6 | - | | "Discrepancy between |
| Basin | calibration | D | 100 | 0.3 | *30* | 1E-5 - 1E-4 | - | - | - | *3E-6 - 3E-5* | 3E-8 - 3E-7 | - | | initial guess and |
| | | C | 120 | 0.3 | *36* | 1E-5 - 1E-4 | - | - | - | *4E-5* | 3E-7 | - | 0.1 | calibrated *K*s because $S_c$ |
| | | B | 250 | 0.3 | *75* | 1E-6 - 1E-4 | - | - | - | *8E-6 - 3E-5* | 3E-8 - 3E-7 | - | | bias to higher *K* units |
| | | AA/A | 820 | 0.3 - 14 | *250 - 11,500* | 1E-8 - 1E-4 | - | - | - | *3E-5 - 3E-4* | 3E-8 - 3E-7 | - | | and effects of vertical |
| | | *sum AA-C* | *1,200* | - | *360 - 11,600* | | | | | | | | | leakage." |
| | | *sum AA-D* | *1,300* | - | *390 - 11,600* | - | - | - | - | - | - | - | - | |
| | | *sum B-E* | *1,070* | - | *320* | | | | | | | | | |
| | | *sum AA-E* | *1,900* | - | *570 - 11,800* | | | | | | | | | |
| M-W et al., 1998 | model | Qal | varies | 5 - 100 | varies | 0.5 | - | - | - | - | - | 0.1 | - | |
| Soquel-Aptos | calibration | $Qa_U$ | | 5 - 40 | | 0.14 | - | - | - | - | - | 0.06 | | |
| Basin | | $Qa_L$ | | 5 - 30 | | 0.2 - 2 | - | - | - | - | - | 0.06 | | |
| | | D/E/F | | 0.5 - 50 | | 0.1 - 1 | - | - | - | 1E-6 | - | ? | | Values of $S$ < 1E-6 not |
| | | C | | 0.5 - 35 | | 0.1 - 1 | - | - | - | 5E-7 - 2E-6 | - | | | realistic; perhaps are $S_s$ |
| | | B | | 0.05 - 0.4 | | 0.02 - 0.05 | - | - | - | 5E-7 - 2E-6 | - | | | values (?). |
| | | AA/A | | 0.02 - 0.4 | | 0.25 - 0.6 | - | - | - | 2E-7 - 5E-7 | - | | | |
| Handel et al., 1985 | initial guess | Purisima aquifer | varies | 86 | varies | - | - | - | - | - | - | - | - | UCSC graduatate-student |
| Soq-Ap basin | model calibration | | | 0.86 | | | | | | | | | | project |
| Johnson, 2003 | conceptual | above B | varies | 2 | varies | - | 1 | 0.5 | - | 5E-4 | - | 0.06 | 0.08 | |
| Live Oak-Soquel | model | B | 80 | 5 | 400 | *0.02* | 1 | 0.2 | 0.2 | | | | | |
| | | A-B aquitard | 40 | 1 | 40 | *0.02* | 1 | 1 | - | | | | | |
| | | A | 100 | 10 - 50 | 1,000 - 5,000 | *0.02* | 2 | 0.2 - 0.04 | 0.1 - 0.02 | | | | | |
| | | AA-A aquitard | 40 | 1 | 40 | *0.01* | 1 | 1 | - | | | | | |
| | | AA | 130 | 10 | 1,300 | *0.004* | 1 | 0.1 | 0.75 | | | | | |
| | | below AA | 400 | 7.5 | 3,000 | - | 1 | 0.13 | - | | | | | |
| | | *sum (B and below)* | *790* | *7 - 12* | *5,800 - 9,800* | - | - | - | - | | | | | |
| Todd Engineers, 2002; Aptos to La Selva Beach | conceptual model | Qa (and F?) | 267 | *106* | 28,350 | - | - | - | - | - | - | - | - | |
| RMC, 2000 Pajaro Valley | model calibration | Qa/Qt | *200* | 0.52 - 300 | *100 - 60,000* | - | 2E-7 - 0.5 | - | - | 1E-6 - 1E-4 | - | 0.04 - 0.14 | 0.15 | Aromas aquifer thickness representative of northern Pajaro Valley. |
| Bond and Bredehoeft, 1987 | conceptual model | Qal | - | - | 6,500 | - | - | - | - | 0.002 | - | - | - | |
| Pajaro Valley | | Qa | *300* | *43* | 13,000 | - | - | - | - | - | - | - | - | |
| Johnson, M. and | model | layer 1 | 120+ | 26 - 35 | varies | 9E-4 - 0.9 | - | - | - | - | - | 0.05 - 0.06 | | Upper and lower Aromas |
| others, 1988 | calibration | layer 2 | - | - | 13,000 | 0.0015 | - | - | - | 0.001 | - | 0.05 | | in Soquel-Aptos study |
| Pajaro Valley | | layer 3 | - | - | 7,800 | - | - | - | - | 1E-4 | - | - | | area. |

*Italics* indicate values inferred or interpreted by this report from information provided in the original studies.
AA and A through F = Purisima units; "Qa" = Aromas Sands aquifer; "Qal" and "Qt" = alluvial and terrace deposits, respectively.

**Table 3-12**
**Aquifer Properties Used in Previous Soquel-Aptos and Pajaro Valley Groundwater Models**

| Hydro-geologic Unit | Thickness* (ft) | | Transmisivity ($T$) (ft$^2$/day) | Hydraulic Conduc-tivity ($K$) (ft/day) | Vertical Hydraulic Cond. ($K_V$) (ft/day) | Storativity ($S$) | Specific Yield ($S_y$) |
|---|---|---|---|---|---|---|---|
| | Avg | Range | | | | | |
| $Qa_U$ | - | < 100 | - | 3 - 40 | 0.05 - 2 | - | 0.04 - 0.14 |
| $Qa_L$ | 175 | 130 - 220 | 1,200 - 10,000 | 6 - 50 | 0.05 - 2 | 1E-5 - 0.007 | |
| Tp inland** | | 200 - 2,000 | 200 - 500 | 0.2 - 2 | 0.001 - 0.1 | | 0.01 - 0.10 |
| F | 200 | 100 - 300 | 400 - 1,200 | 2 - 6 | 0.005 - 0.5 | | |
| DEF | 330 | 300 - 360 | 600 - 1,600 | 2 - 6 | 0.005 - 0.5 | | |
| D (aquitard) | 80 | 60 - 100 | 1 - 75 | 0.005 - 1 | 0.001 - 0.1 | | |
| BC | 200 | 150 - 230 | 200 - 450 | 1 - 3 | 0.005 - 0.1 | | |
| B (aquitard) | 150 | 130 - 185 | 1 - 150 | 0.005 - 1 | 0.001 - 0.1 | | |
| A | 250 | 200 - 280 | 2,000 - 3,500 | 7 - 18 | 0.05 - 2 | | |
| A (lower) | 100 | - | 3,600 - 6,800 | 30 - 65 | 0.1 - 2 | | |
| AA | 220 | 160 - 300 | 300 - 2,400 | 1 - 10 | 0.001 - 0.1 | | |
| Tp? (aquitard) | 100 | < 200 | 1 - 200 | 0.005 - 1 | 0.001 - 0.1 | | |
| Tu | 150 | < 300 | 100 - 3,000 | 1 - 20 | 0.01 - 0.5 | | |
| Purisima Total | 1,500 | 1,100 - 2,000 | 3,500 - 13,000 | 3 - 7 | - | - | - |

*All unit thicknesses range to zero where the unit pinches out due to erosion at the land surface.

**e.g., north of Zayante fault.

**Table 3-13**

**Estimated Aquifer Properties for Soquel-Aptos Hydrogeologic Units**

| Calendar Year | Reported Annual Totals* Purisima Wells | Aromas Wells | Total | Sum of Monthly Totals by Well** Service Area I | II | III | IV | Total | Sum of Months minus Reported Annual I & II | III & IV | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1966 | 1,468 | 613 | 2,081 | | | | | | | | |
| 1967 | 1,530 | 702 | 2,232 | | | | | | | | |
| 1968 | 1,729 | 610 | 2,339 | | | | | | | | |
| 1969 | 1,811 | 689 | 2,501 | | | | | | | | |
| 1970 | 1,894 | 768 | 2,662 | | | | | | | | |
| 1971 | 1,961 | 840 | 2,801 | | | | | | | | |
| 1972 | 2,319 | 958 | 3,277 | | | | | | | | |
| 1973 | 2,501 | 926 | 3,427 | | | | | | | | |
| 1974 | 2,256 | 953 | 3,208 | | | | | | | | |
| 1975 | 2,432 | 1,004 | 3,436 | | | | | | | | |
| 1976 | 2,541 | 1,054 | 3,595 | | | | | | | | |
| 1977 | 2,374 | 1,050 | 3,424 | | | | | | | | |
| 1978 | 2,749 | 1,239 | 3,988 | | | | | | | | |
| 1979 | 2,868 | 1,297 | 4,165 | | | | | | | | |
| 1980 | 2,994 | 1,345 | 4,339 | | | | | | | | |
| 1981 | 3,021 | 1,238 | 4,259 | | | | | | | | |
| 1982 | 3,107 | 1,311 | 4,418 | | | | | | | | |
| 1983 | 3,288 | 1,592 | 4,880 | | | | | | | | |
| 1984 | 3,218 | 1,701 | 4,919 | 2,209 | 1,008 | 1,518 | 242 | 4,977 | 0 | 59 | 58 |
| 1985 | 3,139 | 1,872 | 5,011 | 2,163 | 976 | 1,626 | 253 | 5,018 | 0 | 7 | 7 |
| 1986 | 3,245 | 1,892 | 5,137 | 2,257 | 988 | 1,408 | 276 | 4,929 | 0 | -208 | -208 |
| 1987 | 3,230 | 1,712 | 4,942 | 2,230 | 1,200 | 1,615 | 304 | 5,349 | 200 | 207 | 407 |
| 1988 | 3,170 | 2,007 | 5,177 | 2,182 | 993 | 1,708 | 300 | 5,183 | 5 | 1 | 6 |
| 1989 | 3,155 | 1,917 | 5,072 | 2,068 | 1,089 | 1,611 | 307 | 5,075 | 2 | 1 | 3 |
| 1990 | 3,268 | 1,738 | 5,006 | 2,030 | 1,239 | 1,441 | 298 | 5,008 | 2 | 1 | 3 |
| 1991 | 3,147 | 1,614 | 4,762 | 1,900 | 1,249 | 1,330 | 282 | 4,761 | 1 | -2 | -1 |
| 1992 | 3,329 | 1,756 | 5,085 | 1,978 | 1,353 | 1,448 | 309 | 5,087 | 2 | 1 | 3 |
| 1993 | 3,317 | 1,731 | 5,048 | 2,005 | 1,314 | 1,407 | 321 | 5,047 | 2 | -2 | 0 |
| 1994 | 3,438 | 1,768 | 5,206 | 2,023 | 1,413 | 1,422 | 345 | 5,203 | -2 | -1 | -3 |
| 1995 | 3,488 | 1,784 | 5,272 | 2,136 | 1,350 | 1,440 | 343 | 5,269 | -2 | -1 | -3 |
| 1996 | 3,591 | 1,831 | 5,421 | 2,228 | 1,361 | 1,482 | 347 | 5,418 | -2 | -1 | -3 |
| 1997 | 3,783 | 2,105 | 5,887 | 2,396 | 1,384 | 1,721 | 383 | 5,884 | -2 | -1 | -3 |
| 1998 | 3,353 | 1,766 | 5,119 | 2,278 | 1,073 | 1,421 | 344 | 5,116 | -2 | -1 | -3 |
| 1999 | 3,362 | 2,070 | 5,432 | 2,433 | 927 | 1,746 | 360 | 5,465 | -2 | 36 | 34 |
| 2000 | 3,446 | 2,028 | 5,474 | 2,497 | 939 | 1,661 | 366 | 5,463 | -10 | -1 | -11 |
| 2001 | 3,366 | 2,119 | 5,485 | 2,251 | 1,063 | 1,887 | 230 | 5,431 | -52 | -2 | -54 |
| 2002 | 3,421 | 2,196 | 5,617 | 2,316 | 1,104 | 2,079 | 114 | 5,613 | -1 | -3 | -4 |
| 2003 | *3,439* | *2,107* | *5,546* | | | | | | | | |
| N | 38 | 38 | 38 | 19 | 19 | 19 | 19 | 19 | | | |
| Avg | 2,888 | 1,471 | 4,359 | 2,188 | 1,159 | 1,577 | 301 | 5,226 | | | |
| % of Total | 66% | 34% | 100% | 42% | 22% | 30% | 6% | 100% | | | |
| Min | 1,468 | 610 | 2,081 | 1,900 | 927 | 1,330 | 114 | 4,761 | | | |
| Max | 3,783 | 2,196 | 5,887 | 2,497 | 1,413 | 2,079 | 383 | 5,884 | | | |

*LSCE, September 2003.

**SCWD data base and records for Hillcrest well.

**Table 4-1a**
**SCWD Annual Groundwater Production, 1966-2002**
**(ac-ft/yr)**

| CY | Service Area I: Opal #1 (A) | Garnet (A) | Main St (Tu/AA) | Rosedale (AA/A) | Monterey (A) | Maple-thorpe (A) | Tannery (A) | Service Area II: Estates (A/BC) | Madeline (BC) | Ledyard (BC) | Hillcrest (DEF) | Seacliff 4 (F) | T. Hopkins (DEF) | Aptos Ck (BC/DEF) | CY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1984 | 285 | - | - | 685 | 464 | 270 | 506 | - | 187 | - | 127 | 210 | - | 484 | 1984 |
| 1985 | 195 | - | - | 1,008 | 418 | 184 | 357 | - | 280 | - | 267 | 20 | - | 410 | 1985 |
| 1986 | 186 | - | - | 960 | 385 | 196 | 529 | 17 | 187 | 175 | 221 | - | - | 388 | 1986 |
| 1987 | 202 | - | - | 1,020 | 329 | 179 | 499 | 618 | 58 | 276 | 77 | - | - | 172 | 1987 |
| 1988 | 146 | - | 240 | 953 | 146 | 193 | 503 | 586 | 36 | 286 | - | - | - | 84 | 1988 |
| 1989 | 50 | - | 464 | 781 | 171 | 146 | 456 | 813 | 49 | 149 | - | - | - | 78 | 1989 |
| 1990 | 42 | - | 549 | 777 | 167 | 142 | 353 | 741 | 50 | 98 | - | - | 138 | 212 | 1990 |
| 1991 | 42 | - | 575 | 615 | 161 | 157 | 349 | 352 | 60 | 226 | - | - | 281 | 331 | 1991 |
| 1992 | 4 | - | 663 | 511 | 138 | 181 | 480 | 721 | 62 | 238 | - | - | 95 | 237 | 1992 |
| 1993 | 117 | - | 624 | 490 | 114 | 195 | 466 | 661 | 27 | 187 | - | - | 178 | 259 | 1993 |
| 1994 | 175 | - | 701 | 380 | 126 | 183 | 457 | 727 | 81 | 54 | - | - | 232 | 318 | 1994 |
| 1995 | 195 | - | 684 | 593 | 125 | 48 | 490 | 600 | 139 | 98 | - | - | 208 | 305 | 1995 |
| 1996 | 88 | 120 | 720 | 620 | 123 | 99 | 459 | 576 | 135 | 76 | - | - | 241 | 333 | 1996 |
| 1997 | - | 281 | 885 | 607 | 131 | 22 | 470 | 576 | 114 | 35 | - | - | 285 | 374 | 1997 |
| 1998 | - | 400 | 745 | 438 | 140 | 228 | 327 | 510 | 65 | 68 | - | - | 200 | 230 | 1998 |
| 1999 | - | 413 | 820 | 446 | 194 | 235 | 325 | 457 | 107 | 0 | - | - | 173 | 189 | 1999 |
| 2000 | - | 389 | 1,066 | 426 | 262 | 9 | 344 | 462 | 92 | 0 | - | - | 222 | 164 | 2000 |
| 2001 | - | 427 | 942 | 548 | 233 | - | 102 | 499 | 108 | 12 | - | - | 221 | 223 | 2001 |
| 2002 | - | 371 | 1,010 | 602 | 176 | - | 157 | 436 | 102 | 34 | - | - | 219 | 314 | 2002 |
| 2003 | | | | | | | | | | | | | | | 2003 |
| Avg | 133 | 343 | 712 | 656 | 157 | 211 | 402 | 550 | 102 | 118 | 173 | 115 | 207 | 269 | Avg |

| CY | Service Area III & IV: Cliff (F) | Aptos Jr. H.S. (F/Qa) | Country Club (F/Qa) | Bonita (F/Qa) | San Andreas (F/Qa) | Seascape (F/Qa) | Sells (F/Qa) | Altivo (F/Qa) | Service Areas: I | II | III | IV | Total | CY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1984 | 62 | 211 | 225 | 612 | - | 407 | 61 | 181 | 2,209 | 1,008 | 1,518 | 242 | 4,977 | 1984 |
| 1985 | 26 | 181 | 140 | 948 | - | 332 | 135 | 118 | 2,163 | 976 | 1,626 | 253 | 5,018 | 1985 |
| 1986 | - | 120 | 169 | 568 | - | 551 | 133 | 143 | 2,257 | 988 | 1,408 | 276 | 4,929 | 1986 |
| 1987 | - | - | 143 | 772 | - | 700 | 141 | 163 | 2,230 | 1,200 | 1,615 | 304 | 5,349 | 1987 |
| 1988 | - | - | 273 | 788 | - | 647 | 147 | 153 | 2,182 | 993 | 1,708 | 300 | 5,183 | 1988 |
| 1989 | - | - | 220 | 681 | - | 710 | 149 | 158 | 2,068 | 1,089 | 1,611 | 307 | 5,075 | 1989 |
| 1990 | - | - | 156 | 668 | - | 617 | 143 | 155 | 2,030 | 1,239 | 1,441 | 298 | 5,008 | 1990 |
| 1991 | - | - | 141 | 662 | - | 528 | 136 | 146 | 1,900 | 1,249 | 1,330 | 282 | 4,761 | 1991 |
| 1992 | - | - | 151 | 527 | 240 | 530 | 150 | 159 | 1,978 | 1,353 | 1,448 | 309 | 5,087 | 1992 |
| 1993 | - | - | 139 | 467 | 504 | 298 | 156 | 165 | 2,005 | 1,314 | 1,407 | 321 | 5,047 | 1993 |
| 1994 | - | - | 187 | 513 | 386 | 336 | 177 | 168 | 2,023 | 1,413 | 1,422 | 345 | 5,203 | 1994 |
| 1995 | - | - | 265 | 487 | 386 | 303 | 165 | 178 | 2,136 | 1,350 | 1,440 | 343 | 5,269 | 1995 |
| 1996 | - | - | 315 | 437 | 370 | 361 | 175 | 173 | 2,228 | 1,361 | 1,482 | 347 | 5,418 | 1996 |
| 1997 | - | - | 263 | 453 | 599 | 406 | 161 | 222 | 2,396 | 1,384 | 1,721 | 383 | 5,884 | 1997 |
| 1998 | - | - | 221 | 445 | 452 | 302 | 153 | 191 | 2,278 | 1,073 | 1,421 | 344 | 5,116 | 1998 |
| 1999 | - | - | 213 | 554 | 336 | 643 | 130 | 230 | 2,433 | 927 | 1,746 | 360 | 5,465 | 1999 |
| 2000 | - | - | 225 | 431 | 524 | 481 | 162 | 204 | 2,497 | 939 | 1,661 | 366 | 5,463 | 2000 |
| 2001 | - | - | 231 | 448 | 565 | 643 | 87 | 143 | 2,251 | 1,063 | 1,887 | 230 | 5,431 | 2001 |
| 2002 | - | - | 195 | 479 | 678 | 727 | 44 | 70 | 2,316 | 1,104 | 2,079 | 114 | 5,613 | 2002 |
| 2003 | | | | | | | | | | | | | | 2003 |
| Avg | 44 | 171 | 204 | 576 | 458 | 501 | 137 | 164 | 2,188 | 1,159 | 1,577 | 301 | 5,226 | Avg |

**Table 4-1b**

**SCWD Annual Groundwater Production (by well and service area), 1984-2002 (ac-ft/yr)**

| Calendar Year | City of Santa Cruz Beltz Wells | Central Water District Cox and Rob Roy Wells |
|---|---|---|
| 1962 | 583 | - |
| 1963 | 598 | - |
| 1964 | 752 | - |
| 1965 | 782 | 142 |
| 1966 | 813 | 140 |
| 1967 | 141 | 140 |
| 1968 | 170 | 140 |
| 1969 | 134 | 140 |
| 1970 | 133 | 140 |
| 1971 | 171 | 140 |
| 1972 | 817 | 140 |
| 1973 | 660 | 140 |
| 1974 | 420 | 132 |
| 1975 | 378 | - |
| 1976 | 763 | - |
| 1977 | 148 | - |
| 1978 | 262 | - |
| 1979 | 26 | - |
| 1980 | 105 | - |
| 1981 | 462 | - |
| 1982 | 235 | - |
| 1983 | 309 | - |
| 1984 | 446 | - |
| 1985 | 536 | - |
| 1986 | 103 | 418 |
| 1987 | 1,196 | 438 |
| 1988 | 1,319 | 435 |
| 1989 | 916 | 416 |
| 1990 | 698 | 440 |
| 1991 | 549 | 415 |
| 1992 | 811 | 475 |
| 1993 | 416 | 481 |
| 1994 | 519 | 469 |
| 1995 | 276 | 485 |
| 1996 | 168 | 521 |
| 1997 | 245 | 622 |
| 1998 | 306 | 531 |
| 1999 | 284 | 540 |
| 2000 | 574 | 538 |
| 2001 | 526 | 578 |
| 2002 | 441 | 595 |
| 2003 | | |
| N | 41 | 27 |
| Avg | 468 | 363 |
| Min | 26 | 132 |
| Max | 1,319 | 622 |

1962-1974 from Muir, 1980

1972-2002 Beltz from City of Santa Cruz Water Department (same as Muir for 1972-74)

1986-2002 from Central Water District

**Table 4-2**
**City of Santa Cruz and Central Water District Annual Groundwater Production (ac-ft/yr)**

| Quarter | Opal 1 (A) | Garnet (A) | Main Street (Tu/AA) | Rose-dale (AA/A) | Maple-thorpe (A) | Tannery (A) | Monterey (A) | Estates (A/BC) | Madeline (BC) | Hill-crest* (EF) | Seacliff 4** (EF) | Ledyard (BC) | Aptos Creek (BC/DEF) | T. Hopkins (DEF) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Service Area I | | | | | | | Service Area II | | | | | | |
| Aut-83 | 28.70 | | | | 43.60 | 98.57 | 69.80 | | 33.41 | 8.57 | | | 82.77 | |
| Win-84 | 42.55 | | | | 82.65 | 179.15 | 108.64 | | 9.12 | 7.40 | 39.90 | | 153.76 | |
| Spr-84 | 93.12 | | | 135.64 | 82.87 | 220.87 | 126.67 | | 2.16 | 10.52 | 56.70 | | 148.64 | |
| Sum-84 | 90.90 | | | 296.89 | 76.72 | 105.94 | 122.19 | | 101.31 | 64.79 | 67.20 | | 120.21 | |
| Aut-84 | 58.24 | | | 252.29 | 27.33 | 0.03 | 106.33 | | 74.73 | 44.54 | 46.20 | | 61.31 | |
| Win-85 | 54.60 | | | 224.12 | 30.78 | 19.25 | 102.55 | | 71.83 | 38.47 | 3.80 | | 42.20 | |
| Spr-85 | 49.22 | | | 285.28 | 46.24 | 88.97 | 111.85 | | 83.28 | 54.67 | 5.40 | | 123.94 | |
| Sum-85 | 51.90 | | | 293.42 | 68.92 | 143.99 | 109.53 | | 76.16 | 102.86 | 6.40 | | 146.71 | |
| Aut-85 | 39.17 | | | 205.38 | 38.16 | 105.11 | 94.30 | | 48.30 | 70.71 | 4.40 | | 97.11 | |
| Win-86 | 38.92 | | | 188.53 | 35.78 | 94.21 | 74.21 | | 20.86 | 61.07 | | 43.08 | 68.05 | |
| Spr-86 | 51.38 | | | 280.56 | 54.01 | 144.95 | 111.60 | 14.79 | 64.24 | 86.78 | | 54.81 | 101.72 | |
| Sum-86 | 57.76 | | | 279.86 | 56.95 | 155.11 | 113.14 | 2.24 | 67.20 | 43.24 | | 28.05 | 126.64 | |
| Aut-86 | 38.17 | | | 211.47 | 49.29 | 135.02 | 86.14 | | 34.36 | 29.73 | | 48.67 | 92.02 | |
| Win-87 | 24.30 | | | 183.32 | 37.01 | 106.83 | 89.88 | 10.82 | 21.01 | 25.67 | | 57.72 | 79.87 | |
| Spr-87 | 60.58 | | | 286.67 | 47.46 | 150.74 | 110.24 | 221.66 | 13.93 | 36.48 | | 64.74 | 36.33 | |
| Sum-87 | 91.04 | | | 304.03 | 54.15 | 162.82 | 92.09 | 245.44 | 11.53 | 14.73 | | 78.04 | 32.35 | |
| Aut-87 | 26.33 | | | 246.14 | 40.82 | 78.72 | 36.80 | 140.15 | 11.05 | | | 75.49 | 23.20 | |
| Win-88 | 22.28 | | 169.50 | 182.94 | 25.49 | 66.54 | 24.70 | 97.57 | 0.70 | | | 66.41 | 22.84 | |
| Spr-88 | 37.61 | | 38.01 | 279.66 | 57.98 | 125.94 | 46.66 | 156.62 | 7.58 | | | 69.66 | 25.32 | |
| Sum-88 | 67.03 | | 20.47 | 303.95 | 64.94 | 164.23 | 33.82 | 203.62 | 15.78 | | | 82.34 | 15.98 | |
| Aut-88 | 18.89 | | 12.07 | 186.89 | 44.71 | 146.72 | 40.65 | 128.30 | 12.01 | | | 67.73 | 20.05 | |
| Win-89 | 11.03 | | 10.94 | 177.11 | 38.74 | 119.00 | 42.06 | 114.30 | 10.58 | | | 53.50 | 14.14 | |
| Spr-89 | 16.13 | | 113.08 | 219.14 | 42.96 | 137.88 | 43.15 | 197.13 | 10.61 | | | 63.47 | 17.01 | |
| Sum-89 | 12.67 | | 208.84 | 199.39 | 36.82 | 120.86 | 44.86 | 256.52 | 13.69 | | | 32.47 | 22.52 | |
| Aut-89 | 10.21 | | 130.89 | 185.76 | 27.44 | 78.73 | 40.47 | 244.79 | 13.86 | | | | 23.90 | |
| Win-90 | 8.68 | | 141.35 | 189.76 | 10.52 | 31.61 | 38.65 | 202.90 | 11.19 | | | 23.94 | 14.80 | |
| Spr-90 | 11.18 | | 109.51 | 200.02 | 46.94 | 130.67 | 43.82 | 224.50 | 12.17 | | | 59.22 | 20.12 | |
| Sum-90 | 11.97 | | 157.04 | 195.91 | 59.80 | 136.29 | 43.95 | 259.06 | 12.80 | | | 15.20 | 52.98 | 15.86 |
| Aut-90 | 9.90 | | 141.31 | 191.47 | 24.29 | 54.80 | 40.54 | 54.19 | 13.66 | | | | 124.51 | 122.37 |
| Win-91 | 8.99 | | 108.64 | 140.48 | 26.66 | 59.73 | 39.03 | 25.03 | 9.00 | | | 46.29 | 91.94 | 84.92 |
| Spr-91 | 12.34 | | 155.39 | 156.16 | 44.72 | 96.77 | 40.70 | 70.22 | 9.30 | | | 61.60 | 103.70 | 85.71 |
| Sum-91 | 10.59 | | 169.38 | 179.42 | 54.78 | 121.75 | 40.30 | 143.48 | 20.26 | | | 61.54 | 81.15 | 66.25 |
| Aut-91 | 10.40 | | 141.82 | 139.03 | 30.81 | 71.11 | 40.94 | 112.82 | 21.18 | | | 56.10 | 53.80 | 44.38 |
| Win-92 | 3.98 | | 130.67 | 90.32 | 34.56 | 81.44 | 38.12 | 111.20 | 15.14 | | | 47.00 | 36.26 | 42.17 |
| Spr-92 | | | 155.70 | 159.47 | 52.09 | 152.59 | 38.54 | 182.92 | 16.00 | | | 55.47 | 65.49 | 52.91 |
| Sum-92 | | | 195.37 | 158.68 | 58.87 | 153.95 | 36.04 | 252.98 | 14.52 | | | 76.21 | 82.38 | |
| Aut-92 | | | 181.52 | 102.23 | 35.97 | 92.49 | 25.07 | 174.18 | 15.96 | | | 59.41 | 52.58 | |
| Win-93 | | | 165.77 | 82.11 | 35.05 | 84.09 | 16.44 | 132.03 | 13.54 | | | 30.81 | 59.17 | 18.20 |
| Spr-93 | 13.24 | | 193.31 | 141.11 | 53.76 | 130.01 | 3.31 | 178.02 | | | | 48.19 | 68.53 | 53.07 |
| Sum-93 | 61.90 | | 87.09 | 185.21 | 69.77 | 167.32 | 60.46 | 209.24 | 3.50 | | | 64.57 | 70.46 | 56.72 |
| Aut-93 | 41.78 | | 177.39 | 81.17 | 36.20 | 84.81 | 34.08 | 142.11 | 10.36 | | | 43.87 | 61.30 | 49.95 |
| Win-94 | 40.56 | | 143.14 | 64.38 | 37.17 | 86.93 | 31.44 | 157.16 | 3.43 | | | | 69.18 | 51.15 |
| Spr-94 | 41.33 | | 196.88 | 61.82 | 62.63 | 152.58 | 33.09 | 209.06 | 12.49 | | | 11.19 | 83.13 | 64.86 |
| Sum-94 | 45.45 | | 214.10 | 146.40 | 53.88 | 139.59 | 31.63 | 223.95 | 30.33 | | | 19.38 | 100.06 | 70.90 |
| Aut-94 | 47.73 | | 147.30 | 107.46 | 29.22 | 78.12 | 30.26 | 136.97 | 34.99 | | | 23.70 | 65.91 | 45.01 |
| Win-95 | 45.70 | | 136.88 | 92.18 | 9.00 | 70.78 | 30.90 | 115.82 | 31.68 | | | 24.27 | 58.61 | 39.40 |
| Spr-95 | 43.28 | | 158.98 | 146.68 | 21.26 | 119.76 | 31.27 | 152.91 | 35.76 | | | 24.29 | 77.85 | 51.94 |
| Sum-95 | 54.27 | | 224.61 | 206.70 | 11.93 | 183.69 | 33.78 | 187.19 | 37.69 | | | 24.97 | 96.74 | 64.94 |
| Aut-95 | 52.08 | | 163.50 | 147.82 | 5.70 | 115.83 | 29.31 | 144.45 | 33.68 | | | 24.79 | 71.66 | 51.44 |
| Win-96 | 49.29 | | 151.49 | 131.65 | 3.26 | 58.46 | 31.56 | 99.57 | 33.38 | | | 24.82 | 61.05 | 45.56 |
| Spr-96 | 29.73 | | 202.97 | 176.73 | 9.35 | 152.58 | 31.44 | 171.22 | 32.64 | | | 25.18 | 82.57 | 63.14 |
| Sum-96 | 8.79 | 59.52 | 220.54 | 190.02 | 50.27 | 148.48 | 30.69 | 178.72 | 36.36 | | | 25.35 | 100.89 | 70.25 |
| Aut-96 | | 60.06 | 144.75 | 121.88 | 35.83 | 98.98 | 29.40 | 126.58 | 33.08 | | | 0.22 | 88.11 | 62.02 |
| Win-97 | | 76.76 | 140.33 | 105.41 | 20.97 | 73.57 | 33.65 | 127.18 | 29.09 | | | | 68.31 | 56.59 |
| Spr-97 | | 85.84 | 236.13 | 191.39 | | 151.77 | 34.79 | 184.63 | 32.98 | | | 1.08 | 100.32 | 80.47 |
| Sum-97 | | 41.80 | 315.71 | 193.68 | 1.35 | 156.28 | 48.42 | 136.03 | 34.47 | | | 11.69 | 116.97 | 84.74 |
| Aut-97 | | 76.35 | 192.55 | 117.00 | 0.01 | 88.79 | 13.92 | 128.49 | 17.01 | | | 22.15 | 88.25 | 63.32 |
| Win-98 | | 94.77 | 162.48 | 82.83 | 19.38 | 59.53 | | 117.68 | 10.97 | | | 11.16 | 66.75 | 45.87 |
| Spr-98 | | 95.11 | 167.98 | 92.73 | 51.13 | 67.23 | 44.66 | 154.41 | 5.89 | | | 13.63 | 74.22 | 57.46 |
| Sum-98 | | 106.16 | 248.86 | 165.39 | 110.56 | 128.22 | 49.07 | 103.46 | 23.68 | | | 36.64 | 72.18 | 38.17 |
| Aut-98 | | 104.05 | 165.76 | 97.06 | 46.58 | 71.75 | 46.55 | 134.05 | 24.64 | | | 6.27 | 17.30 | 58.68 |
| Win-99 | | 99.89 | 156.86 | 79.96 | 42.68 | 57.23 | 46.73 | 78.51 | 26.63 | | | 0.11 | 17.79 | 18.12 |
| Spr-99 | | 107.16 | 205.71 | 127.12 | 71.29 | 92.90 | 51.87 | 122.05 | 27.06 | | | 0.04 | 60.05 | 53.50 |
| Sum-99 | | 107.46 | 262.54 | 140.16 | 76.94 | 107.51 | 48.79 | 158.92 | 26.99 | | | | 66.34 | 61.53 |
| Aut-99 | | 98.32 | 194.43 | 98.72 | 44.48 | 67.78 | 46.79 | 97.44 | 26.53 | | | | 45.14 | 39.77 |
| Win-00 | | 98.51 | 223.50 | 83.21 | 8.81 | 72.93 | 54.38 | 55.79 | 27.28 | | | | 23.78 | 21.55 |
| Spr-00 | | 85.59 | 319.47 | 72.64 | | 135.19 | 81.14 | 73.76 | 30.93 | | | | 79.52 | 77.45 |
| Sum-00 | | 104.46 | 315.57 | 173.25 | | 51.03 | 77.99 | 186.76 | 27.38 | | | | 60.44 | 72.31 |
| Aut-00 | | 100.60 | 207.93 | 97.20 | | 84.42 | 48.89 | 145.96 | 5.97 | | | | | 50.45 |
| Win-01 | | 91.67 | 187.60 | 96.74 | | 72.97 | 50.63 | 89.02 | 26.45 | | | | | 32.29 |
| Spr-01 | | 116.63 | 293.07 | 157.36 | 0.07 | 28.97 | 69.23 | 139.38 | 28.70 | | | 8.28 | 51.24 | 53.37 |
| Sum-01 | | 114.69 | 298.53 | 159.79 | 0.00 | 0.03 | 79.01 | 142.95 | 26.93 | | | | 96.36 | 77.96 |
| Aut-01 | | 103.87 | 162.33 | 133.71 | | 0.01 | 33.99 | 127.87 | 26.29 | | | 3.71 | 75.09 | 57.32 |
| Win-02 | | 99.35 | 191.86 | 116.16 | | | 27.51 | 17.84 | 27.60 | | | 10.34 | 86.52 | 62.97 |
| Spr-02 | | 103.21 | 309.94 | 169.85 | | 5.89 | 60.43 | 140.64 | 26.55 | | | 10.77 | 79.75 | 53.68 |
| Sum-02 | | 97.75 | 278.94 | 158.09 | | 85.29 | 47.63 | 196.04 | 25.66 | | | 13.02 | 102.30 | 67.50 |
| Aut-02 | | 70.38 | 228.84 | 158.09 | | 66.22 | 40.23 | 81.16 | 22.19 | | | 0.04 | 45.00 | 34.91 |
| Win-03 | | 91.43 | 128.26 | 147.96 | | 16.56 | 38.96 | 92.01 | 26.78 | | | | 55.87 | 43.28 |
| Spr-03 | | 88.23 | 116.73 | 157.54 | | 196.58 | 35.84 | 118.41 | 26.06 | | | | 69.67 | 54.45 |
| Sum-03 | | 167.58 | 121.67 | 182.58 | | 228.18 | 35.18 | 182.65 | 27.16 | | | | 101.89 | 79.46 |
| N | 48 | 29 | 63 | 78 | 67 | 79 | 79 | 69 | 79 | 16 | 8 | 56 | 78 | 51 |
| Avg | 37 | 95 | 175 | 166 | 40 | 103 | 53 | 141 | 26 | 44 | 29 | 36 | 69 | 56 |
| Min | 4 | 42 | 11 | 62 | 0 | 0 | 3 | 2 | 1 | 7 | 4 | 0 | 14 | 16 |
| Max | 93 | 168 | 319 | 304 | 111 | 228 | 127 | 259 | 101 | 103 | 67 | 82 | 154 | 122 |

*Estimated from fiscal-year totals.
**Estimated from difference between total and sum of wells.

**Table 4-3a**
**Quarterly Groundwater Production, 1983-1993 (ac-ft)**
**Service Area I and II Wells**

| | Service Area III | | | | | | S.A. IV | | Service Area Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Quarter | Aptos Jr. H.S. (F/Qa) | Country Club (F/Qa) | Sea-scape (F/Qa) | Bonita (F/Qa) | San Andreas (F/Qa) | Cliff (F) | Sells (F/Qa) | Altivo (F/Qa) | I | II | III | IV |
| Aut-83 | 20.48 | 48.45 | 89.22 | | | 8.51 | | 25.43 | 240.66 | 124.75 | 166.65 | 25.43 |
| Win-84 | 45.75 | 79.65 | 131.73 | | | 14.85 | | 41.44 | 413.00 | 210.18 | 271.99 | 41.44 |
| Spr-84 | 72.70 | 81.50 | 129.78 | 144.24 | | 25.11 | | 70.47 | 659.18 | 218.02 | 453.33 | 70.47 |
| Sum-84 | 60.41 | 44.14 | 110.51 | 267.80 | | 12.86 | 36.54 | 49.24 | 692.64 | 353.51 | 495.72 | 85.78 |
| Aut-84 | 32.62 | 20.20 | 35.19 | 200.08 | | 8.85 | 24.57 | 19.60 | 444.23 | 226.78 | 296.94 | 44.16 |
| Win-85 | 35.19 | 19.55 | 68.66 | 180.26 | | 7.48 | 22.43 | 23.55 | 431.30 | 156.30 | 311.14 | 45.98 |
| Spr-85 | 59.22 | 34.08 | 70.86 | 272.45 | | 6.87 | 41.85 | 31.55 | 581.56 | 267.28 | 443.48 | 73.40 |
| Sum-85 | 52.40 | 52.40 | 108.21 | 302.16 | | 8.85 | 43.14 | 37.23 | 667.76 | 332.13 | 524.03 | 80.37 |
| Aut-85 | 33.96 | 33.96 | 83.89 | 193.25 | | 2.71 | 27.61 | 25.20 | 482.11 | 220.52 | 347.76 | 52.81 |
| Win-86 | 26.93 | 37.03 | 86.68 | 86.68 | | | 24.07 | 22.78 | 431.66 | 193.06 | 237.33 | 46.85 |
| Spr-86 | 45.64 | 49.63 | 108.30 | 108.30 | | | 39.07 | 43.11 | 642.51 | 322.35 | 311.87 | 82.18 |
| Sum-86 | 47.08 | 59.19 | 180.01 | 199.72 | | | 40.85 | 44.35 | 662.82 | 267.38 | 485.99 | 85.20 |
| Aut-86 | | 23.10 | 176.19 | 173.64 | | | 28.88 | 33.19 | 520.09 | 204.78 | 372.93 | 62.07 |
| Win-87 | | 19.99 | 160.63 | 110.51 | | | 24.98 | 25.34 | 441.34 | 195.10 | 291.13 | 50.31 |
| Spr-87 | | 23.74 | 186.03 | 214.37 | | | 40.29 | 50.63 | 655.69 | 373.14 | 424.14 | 90.92 |
| Sum-87 | | 29.56 | 267.59 | 273.60 | | | 47.42 | 51.90 | 704.13 | 382.08 | 570.75 | 99.32 |
| Aut-87 | | 69.63 | 85.66 | 173.79 | | | 28.79 | 34.83 | 428.81 | 249.90 | 329.08 | 63.61 |
| Win-88 | | 63.43 | 92.69 | 219.06 | | | 30.12 | 31.99 | 491.45 | 187.51 | 375.18 | 62.11 |
| Spr-88 | | 93.89 | 204.41 | 164.18 | | | 39.25 | 44.94 | 585.86 | 259.19 | 462.48 | 84.19 |
| Sum-88 | | 67.80 | 216.72 | 223.67 | | | 48.55 | 45.48 | 654.44 | 317.72 | 508.18 | 94.03 |
| Aut-88 | | 48.31 | 133.41 | 180.75 | | | 29.10 | 30.66 | 449.92 | 228.09 | 362.48 | 59.76 |
| Win-89 | | 40.28 | 120.79 | 153.38 | | | 25.64 | 26.85 | 398.90 | 192.53 | 314.44 | 52.49 |
| Spr-89 | | 63.62 | 215.72 | 180.23 | | | 41.89 | 46.45 | 572.33 | 288.22 | 459.57 | 88.34 |
| Sum-89 | | 68.24 | 245.93 | 190.34 | | | 47.87 | 49.87 | 623.44 | 325.21 | 504.51 | 97.74 |
| Aut-89 | | 48.03 | 127.44 | 157.05 | | | 34.06 | 34.51 | 473.50 | 282.56 | 332.52 | 68.56 |
| Win-90 | | 36.09 | 91.43 | 147.68 | | | 25.60 | 28.41 | 420.56 | 252.82 | 275.20 | 54.00 |
| Spr-90 | | 47.07 | 176.95 | 164.52 | | | 42.93 | 39.92 | 542.14 | 316.01 | 388.54 | 82.85 |
| Sum-90 | | 36.21 | 209.03 | 198.83 | | | 41.89 | 50.14 | 604.97 | 355.89 | 444.07 | 92.03 |
| Aut-90 | | 36.65 | 139.89 | 156.63 | | | 32.28 | 36.79 | 462.32 | 314.73 | 333.16 | 69.07 |
| Win-91 | | 37.14 | 86.71 | 132.32 | | | 24.01 | 27.49 | 383.52 | 257.17 | 256.17 | 51.50 |
| Spr-91 | | 33.60 | 153.74 | 172.03 | | | 35.68 | 39.22 | 506.06 | 330.53 | 359.36 | 74.90 |
| Sum-91 | | 35.09 | 169.64 | 203.72 | | | 44.12 | 45.84 | 576.22 | 372.67 | 408.45 | 89.95 |
| Aut-91 | | 34.92 | 118.00 | 153.54 | | | 32.07 | 33.32 | 434.12 | 288.28 | 306.45 | 65.39 |
| Win-92 | | 32.94 | 69.01 | 151.08 | 29.78 | | 24.57 | 26.44 | 379.09 | 251.77 | 253.02 | 51.01 |
| Spr-92 | | 38.64 | 182.79 | 174.51 | 29.78 | | 43.79 | 47.20 | 558.39 | 372.79 | 425.71 | 90.99 |
| Sum-92 | | 45.07 | 183.88 | 110.02 | 114.53 | | 48.57 | 52.11 | 602.92 | 426.08 | 453.50 | 100.68 |
| Aut-92 | | 34.72 | 93.86 | 91.25 | 95.58 | | 32.86 | 33.68 | 437.28 | 302.13 | 315.42 | 66.54 |
| Win-93 | | 31.24 | 50.21 | 83.68 | 80.45 | | 22.00 | 25.70 | 383.45 | 253.73 | 245.58 | 47.69 |
| Spr-93 | | 36.68 | 154.02 | 98.90 | 91.89 | | 43.45 | 43.75 | 534.75 | 347.82 | 381.48 | 87.20 |
| Sum-93 | | 38.03 | 56.90 | 168.73 | 198.11 | | 48.19 | 62.78 | 631.76 | 404.48 | 461.76 | 110.97 |
| Aut-93 | | 32.60 | 36.67 | 115.47 | 133.23 | | 42.48 | 33.14 | 455.42 | 307.59 | 317.97 | 75.63 |
| Win-94 | | 31.55 | 42.43 | 108.33 | 96.93 | | 41.58 | 22.23 | 403.63 | 280.92 | 279.24 | 63.81 |
| Spr-94 | | 33.28 | 84.97 | 139.44 | 133.26 | | 45.36 | 51.56 | 548.33 | 380.73 | 390.94 | 96.92 |
| Sum-94 | | 55.90 | 149.81 | 175.18 | 68.88 | | 54.61 | 59.82 | 631.05 | 444.63 | 449.77 | 114.43 |
| Aut-94 | | 66.19 | 59.16 | 90.09 | 86.68 | | 35.17 | 34.40 | 440.08 | 306.58 | 302.13 | 69.57 |
| Win-95 | | 63.26 | 29.71 | 86.82 | 73.28 | | 30.21 | 28.33 | 385.44 | 269.78 | 253.07 | 58.54 |
| Spr-95 | | 66.18 | 71.50 | 121.37 | 99.74 | | 45.40 | 39.74 | 521.21 | 342.75 | 358.79 | 85.15 |
| Sum-95 | | 65.89 | 141.60 | 155.71 | 114.37 | | 50.56 | 69.11 | 714.99 | 411.52 | 477.57 | 119.67 |
| Aut-95 | | 69.62 | 59.86 | 122.73 | 98.33 | | 38.66 | 40.89 | 514.24 | 326.03 | 350.54 | 79.55 |
| Win-96 | | 77.82 | 28.92 | 85.01 | 65.88 | | 31.26 | 26.30 | 425.71 | 264.39 | 257.63 | 57.56 |
| Spr-96 | | 77.47 | 116.79 | 115.95 | 107.22 | | 49.38 | 49.81 | 602.81 | 374.75 | 417.41 | 99.20 |
| Sum-96 | | 80.47 | 159.43 | 127.30 | 114.17 | | 56.82 | 60.49 | 708.32 | 411.58 | 481.38 | 117.30 |
| Aut-96 | | 78.78 | 55.78 | 108.73 | 82.40 | | 37.19 | 36.14 | 490.89 | 310.01 | 325.69 | 73.34 |
| Win-97 | | 64.42 | 40.29 | 111.62 | 102.24 | | 24.71 | 39.60 | 450.69 | 281.17 | 318.57 | 64.31 |
| Spr-97 | | 67.28 | 143.06 | 97.40 | 196.68 | | 38.36 | 75.59 | 699.92 | 399.49 | 504.42 | 113.95 |
| Sum-97 | | 66.91 | 168.64 | 134.69 | 180.88 | | 58.94 | 64.88 | 757.25 | 383.90 | 551.12 | 123.83 |
| Aut-97 | | 64.47 | 53.85 | 109.52 | 118.78 | | 39.41 | 41.47 | 488.62 | 319.22 | 346.62 | 80.88 |
| Win-98 | | 60.83 | 8.20 | 88.71 | 93.68 | | 29.02 | 29.52 | 418.99 | 252.43 | 251.42 | 58.54 |
| Spr-98 | | 59.94 | 76.58 | 115.73 | 101.37 | | 41.19 | 40.33 | 518.86 | 305.60 | 353.62 | 81.51 |
| Sum-98 | | 65.27 | 121.92 | 135.28 | 150.76 | | 56.66 | 71.77 | 808.25 | 274.13 | 473.23 | 128.43 |
| Aut-98 | | 34.81 | 95.71 | 105.67 | 106.21 | | 26.35 | 49.46 | 531.75 | 240.94 | 342.40 | 75.81 |
| Win-99 | | 39.54 | 98.95 | 82.18 | 93.74 | | 0.06 | 59.61 | 483.35 | 141.16 | 314.42 | 59.67 |
| Spr-99 | | 58.47 | 194.14 | 108.84 | 125.40 | | 34.39 | 65.70 | 656.06 | 262.70 | 486.84 | 100.09 |
| Sum-99 | | 59.50 | 256.11 | 192.70 | 22.96 | | 57.67 | 62.88 | 743.38 | 313.78 | 531.27 | 120.55 |
| Aut-99 | | 55.66 | 93.56 | 170.20 | 93.56 | | 37.84 | 41.85 | 550.53 | 208.88 | 412.98 | 79.69 |
| Win-00 | | 55.87 | 21.91 | 117.72 | 98.28 | | 30.93 | 36.94 | 541.34 | 128.40 | 293.78 | 67.87 |
| Spr-00 | | 54.91 | 164.99 | 101.37 | 160.76 | | 40.54 | 66.14 | 694.03 | 261.66 | 482.03 | 106.68 |
| Sum-00 | | 57.28 | 228.30 | 118.78 | 133.13 | | 54.94 | 63.27 | 722.30 | 346.89 | 537.49 | 118.21 |
| Aut-00 | | 57.36 | 66.03 | 92.80 | 131.46 | | 35.52 | 38.03 | 539.04 | 202.38 | 347.65 | 73.55 |
| Win-01 | | 46.80 | 33.34 | 119.70 | 94.55 | | 33.76 | 32.26 | 499.62 | 147.7589 | 294.38 | 66.02 |
| Spr-01 | | 54.36 | 172.55 | 150.45 | 130.06 | | 43.59 | 60.18 | 665.33 | 280.98 | 507.42 | 103.77 |
| Sum-01 | | 70.61 | 263.08 | 136.42 | 175.09 | | 1.77 | 33.18 | 652.05 | 344.21 | 645.21 | 34.95 |
| Aut-01 | | 59.15 | 173.68 | 41.37 | 165.57 | | 7.58 | 17.44 | 433.92 | 290.28 | 439.77 | 25.02 |
| Win-02 | | 30.75 | 109.70 | 100.09 | 108.80 | | 10.85 | 12.87 | 434.88 | 205.27 | 349.33 | 23.72 |
| Spr-02 | | 55.57 | 242.47 | 123.95 | 180.39 | | 9.12 | 13.12 | 649.32 | 311.39 | 602.38 | 22.25 |
| Sum-02 | | 55.87 | 262.29 | 126.01 | 231.46 | | 14.21 | 27.04 | 667.71 | 404.53 | 675.63 | 41.26 |
| Aut-02 | | 53.26 | 112.23 | 129.02 | 157.62 | | 9.44 | 17.05 | 563.77 | 183.30 | 452.13 | 26.49 |
| Win-03 | | 51.36 | | 129.94 | 192.02 | | 4.81 | 11.47 | 423.17 | 217.94 | 373.32 | 16.27 |
| Spr-03 | | 59.38 | 75.85 | 147.36 | 258.98 | | 11.07 | 12.81 | 594.92 | 268.59 | 541.56 | 23.87 |
| Sum-03 | | 71.01 | 269.48 | 158.24 | 202.49 | | 9.40 | 38.72 | 735.19 | 391.16 | 701.21 | 48.12 |
| N | 12 | 80 | 79 | 78 | 46 | 9 | 77 | 80 | 80 | 80 | 80 | 80 |
| Avg | 44 | 51 | 126 | 146 | 124 | 11 | 34 | 40 | 545 | 288 | 397 | 73 |
| Min | 20 | 20 | 8 | 41 | 23 | 3 | 0 | 11 | 241 | 125 | 167 | 16 |
| Max | 73 | 94 | 269 | 302 | 259 | 25 | 59 | 76 | 808 | 445 | 701 | 128 |

**Table 4-3b**

**Quarterly Groundwater Production, 1983-1993 (ac-ft)**

**Service Area III and IV Wells and Service Area Totals**

| Water Year | Autumn Oct-Dec | Winter Jan-Mar | Spring Apr-Jun | Summer Jul-Sep | Total | % of Avg |
|---|---|---|---|---|---|---|
| 1965 | 18.54 | 8.47 | 3.52 | 0.11 | 30.64 | 99% |
| 1966 | 11.59 | 7.28 | 1.04 | 0.57 | 20.48 | 66% |
| 1967 | 13.09 | 16.74 | 10.17 | 0.00 | 40.00 | 130% |
| 1968 | 5.37 | 14.39 | 1.15 | 0.55 | 21.46 | 70% |
| 1969 | 13.08 | 28.80 | 2.99 | 0.07 | 44.94 | 146% |
| 1970 | 9.86 | 19.53 | 0.79 | 0.00 | 30.18 | 98% |
| 1971 | 18.97 | 5.91 | 1.98 | 0.38 | 27.24 | 88% |
| 1972 | 11.70 | 3.92 | 2.09 | 1.37 | 19.08 | 62% |
| 1973 | 17.33 | 25.84 | 0.09 | 0.41 | 43.67 | 142% |
| 1974 | 18.54 | 15.34 | 5.19 | 2.89 | 41.96 | 136% |
| 1975 | 6.92 | 13.65 | 2.73 | 0.99 | 24.29 | 79% |
| 1976 | 4.44 | 6.14 | 2.31 | 2.48 | 15.37 | 50% |
| 1977 | 6.89 | 5.54 | 1.02 | 1.36 | 14.81 | 48% |
| 1978 | 8.07 | 23.51 | 5.39 | 0.62 | 37.59 | 122% |
| 1979 | 5.56 | 21.44 | 1.95 | 0.20 | 29.15 | 94% |
| 1980 | 12.76 | 20.68 | 2.99 | 0.71 | 37.14 | 120% |
| 1981 | 2.78 | 18.18 | 0.61 | 0.17 | 21.74 | 70% |
| 1982 | 12.67 | 27.85 | 6.37 | 1.25 | 48.14 | 156% |
| 1983 | 11.96 | 34.06 | 5.68 | 2.23 | 53.93 | 175% |
| 1984 | 17.79 | 4.67 | 1.44 | 0.11 | 24.01 | 78% |
| 1985 | 17.04 | 11.59 | 0.76 | 0.29 | 29.68 | 96% |
| 1986 | 10.51 | 27.37 | 1.37 | 1.74 | 40.99 | 133% |
| 1987 | 1.78 | 13.23 | 0.84 | 0.00 | 15.85 | 51% |
| 1988 | 11.15 | 5.23 | 2.35 | 0.00 | 18.73 | 61% |
| 1989 | 12.54 | 9.88 | 0.84 | 0.94 | 24.20 | 78% |
| 1990 | 3.36 | 8.62 | 4.57 | 0.21 | 16.76 | 54% |
| 1991 | 2.79 | 16.33 | 1.12 | 0.12 | 20.36 | 66% |
| 1992 | 8.02 | 18.64 | 0.83 | 0.02 | 27.51 | 89% |
| 1993 | 8.51 | 25.31 | 2.87 | 0.00 | 36.69 | 119% |
| 1994 | 7.34 | 11.51 | 3.80 | 0.06 | 22.71 | 74% |
| 1995 | 8.48 | 26.52 | 8.01 | 0.00 | 43.01 | 139% |
| 1996 | 6.73 | 20.75 | 4.01 | 0.00 | 31.49 | 102% |
| 1997 | 23.51 | 11.67 | 0.96 | 0.46 | 36.60 | 119% |
| 1998 | 13.73 | 38.89 | 7.12 | 0.08 | 59.82 | 194% |
| 1999 | 7.92 | 22.18 | 3.35 | 0.20 | 33.65 | 109% |
| 2000 | 4.47 | 28.33 | 3.06 | 0.53 | 36.39 | 118% |
| 2001 | 7.16 | 16.21 | 1.86 | 0.22 | 25.45 | 82% |
| 2002 | 18.05 | 9.53 | 1.16 | 0.05 | 28.79 | 93% |
| 2003 | 19.48 | 5.14 | 4.26 | 0.00 | 28.88 | 94% |
| 2004 | | | | | | |
| N | 39 | 39 | 39 | 39 | 39 | 39 |
| Avg | 10.78 | 16.64 | 2.89 | 0.55 | 30.86 | 100% |
| Min | 1.78 | 3.92 | 0.09 | 0.00 | 14.81 | 48% |
| Max | 23.51 | 38.89 | 10.17 | 2.89 | 59.82 | 194% |

Station's monthly record extends back to 1867.

**Table 4-4**
**Quarterly and Water-Year Precipitation**
**Santa Cruz NOAA Station, 1965-2003**
**(inches/year)**

| Well | | Date | Cal-cium (Ca) | Magne-sium (Mg) | So-dium (Na) | Potas-sium (K) | Car-bonate ($CO_3$) | Bicar-bonate ($HCO_3$) | Sul-fate ($SO_4$) | Chlor-ide (Cl) | Nitrate ($NO_3$) | Iron (Fe) | TDS | Na:Cl Molar Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (mg/L) | | | | | | | | | | | |
| **Main Street (AA,Tu)** | N | 21 | 12 | 12 | 12 | 12 | 11 | 11 | 11 | 17 | 10 | 11 | 11 | 11 |
| | Min | 4/25/1988 | 31 | 13 | 5.4 | 4.0 | | 150 | 31 | 13 | | ND | 270 | 0.64 |
| | Max | 10/7/2003 | 57 | 21 | 52 | 6.8 | | 190 | 80 | 28 | | 0.46 | 370 | 4.17 |
| | **Avg** | **4/14/1997** | **42** | **16** | **34** | **5.3** | **ND** | **172** | **49** | **20** | **ND** | **0.29** | **330** | **2.49** |
| Opal 1 (A) | N | 49 | 29 | 29 | 23 | 21 | 20 | 21 | 22 | 46 | 21 | 49 | 24 | 22 |
| | Min | ######## | 64 | 11 | 27 | 4.5 | | 140 | 106 | 39 | ND | ND | 480 | 0.43 |
| | Max | 1/27/1998 | 260 | 132 | 39 | 6.4 | | 226 | 200 | 100 | 2.5 | 100 | 660 | 0.95 |
| | **Avg** | **1/22/1971** | **128** | **38** | **30** | **5.5** | **ND** | **178** | **146** | **67** | **0.66** | **3.80** | **566** | **0.65** |
| Opal 2 (A) | N | 6 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 5 | 1 | 6 | 2 | 1 |
| | Min | 4/28/1950 | | | | | | | | 29 | | ND | 250 | 0.48 |
| | Max | 5/25/1993 | | | | | | | | 86 | | 270 | 598 | 0.48 |
| | **Avg** | **########** | **104** | **22** | **27** | **5.7** | **ND** | **180** | **146** | **51** | **ND** | **7.02** | **424** | **0.48** |
| Opal 3 (A) | N | 34 | 18 | 18 | 12 | 11 | 9 | 10 | 12 | 31 | 12 | 34 | 13 | 12 |
| | Min | 7/6/1951 | 82 | 13 | 27 | 4.4 | ND | 145 | 83 | 27 | ND | 0.05 | 250 | 0.51 |
| | Max | 4/17/1986 | 258 | 98 | 43 | 6.4 | 7.2 | 235 | 177 | 87 | 3.6 | 6.20 | 612 | 1.14 |
| | **Avg** | **6/2/1968** | **138** | **37** | **32** | **5.5** | **7.2** | **187** | **139** | **53** | **0.87** | **1.09** | **526** | **0.78** |
| Opal 4 (A) | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| | Min | 9/3/1981 | 91 | 15 | 28 | 5.4 | | 150 | 128 | 63 | ND | 0.47 | 490 | 0.46 |
| | Max | 4/18/1989 | 117 | 22 | 37 | 6.1 | | 195 | 162 | 94 | 0.5 | 1.20 | 571 | 0.69 |
| | **Avg** | **6/12/1984** | **104** | **18** | **30** | **5.7** | **ND** | **178** | **145** | **78** | **0.50** | **0.68** | **545** | **0.61** |
| Garnet (A) | N | 11 | 10 | 10 | 10 | 10 | 8 | 8 | 8 | 8 | 7 | 10 | 8 | 8 |
| | Min | 9/15/1998 | 94 | 19 | 30 | 5.5 | | 140 | 160 | 69 | | ND | 540 | 0.58 |
| | Max | ######## | 120 | 26 | 35 | 6.8 | | 160 | 180 | 88 | | 1.50 | 670 | 0.73 |
| | **Avg** | **5/11/2002** | **112** | **24** | **33** | **6.0** | **ND** | **156** | **170** | **81** | **ND** | **1.39** | **599** | **0.63** |
| Monterey (A) | N | 61 | 19 | 19 | 13 | 12 | 11 | 11 | 12 | 54 | 11 | 30 | 12 | 12 |
| | Min | 4/4/1945 | 69 | 17 | 55 | 6.9 | | 220 | 87 | 54 | | ND | 420 | 1.39 |
| | Max | 10/7/2003 | 221 | 156 | 75 | 9.4 | | 370 | 120 | 71 | | 10.10 | 710 | 1.99 |
| | **Avg** | **5/21/1980** | **115** | **42** | **63** | **7.9** | **ND** | **246** | **95** | **62** | **ND** | **0.71** | **542** | **1.64** |
| Rosedale (AA,A) | N | 52 | 13 | 13 | 13 | 13 | 10 | 11 | 11 | 46 | 9 | 21 | 12 | 11 |
| | Min | 3/21/1949 | 52 | 14 | 48 | 5.1 | | 210 | 69 | 35 | ND | ND | 320 | 1.51 |
| | Max | 10/7/2003 | 100 | 24 | 55 | 8.0 | | 230 | 120 | 68 | 1.5 | 3.90 | 550 | 2.21 |
| | **Avg** | **5/2/1976** | **71** | **18** | **52** | **6.5** | **ND** | **221** | **87** | **50** | **1.5** | **0.90** | **474** | **1.92** |
| Maplethrope (A) | N | 36 | 29 | 29 | 24 | 22 | 23 | 23 | 25 | 32 | 24 | 36 | 25 | 23 |
| | Min | 4/21/1965 | 70 | 15 | 7.1 | 6.5 | | 200 | 96 | 64 | ND | ND | 471 | 0.16 |
| | Max | 6/13/2001 | 226 | 97 | 94 | 64.0 | | 308 | 230 | 150 | 2.3 | 2.60 | 850 | 1.63 |
| | **Avg** | **3/23/1979** | **104** | **33** | **67** | **10.3** | **ND** | **269** | **121** | **76** | **0.50** | **0.38** | **585** | **1.37** |
| Tannery (A) | N | 39 | 14 | 14 | 14 | 13 | 11 | 11 | 12 | 35 | 11 | 14 | 12 | 12 |
| | Min | 9/12/1973 | 20 | 17 | 57 | 6.4 | | 230 | 55 | 39 | | ND | 421 | 1.01 |
| | Max | 10/7/2003 | 100 | 31 | 100 | 9.4 | | 260 | 160 | 110 | | 0.88 | 990 | 3.95 |
| | **Avg** | **5/14/1990** | **82** | **22** | **69** | **8.0** | **ND** | **246** | **105** | **65** | **ND** | **0.31** | **604** | **1.80** |
| **Service Area I (except Main St) (AA,A)** | N | 293 | 138 | 138 | 115 | 108 | 98 | 101 | 108 | 262 | 101 | 205 | 113 | 106 |
| | Min | ######## | 20 | 11 | 7 | 4.4 | ND | 140 | 55 | 27 | ND | 0.05 | 250 | 0.16 |
| | Max | ######## | 260 | 156 | 100 | 64.0 | 7.2 | 370 | 230 | 150 | 3.6 | 100 | 990 | 3.95 |
| | **Avg** | **12/7/1979** | **106** | **30** | **45** | **7** | **7** | **207** | **128** | **65** | **1** | **1.81** | **541** | **1.10** |

**Table 4-5a**
**Production Well Water Quality, SCWD Wells**

| Well | | Date | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Carbonate ($CO_3$) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Nitrate ($NO_3$) | Iron (Fe) | TDS | Na:Cl Molar Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (mg/L) | | | | | | | | | | | |
| Estates | N | 26 | 15 | 15 | 15 | 15 | 13 | 13 | 13 | 23 | 11 | 13 | 13 | 12 |
| (A,BC) | Min | 5/31/1985 | 52 | 13 | 70 | 6.4 | | 230 | 61 | 41 | | ND | 440 | 2.34 |
| | Max | 10/7/2003 | 72 | 17 | 86 | 8.5 | | 290 | 78 | 63 | | 0.30 | 550 | 2.90 |
| | **Avg** | **########** | **64** | **16** | **78** | **7.6** | **ND** | **258** | **67** | **48** | **ND** | **0.20** | **493** | **2.60** |
| Madeline | N | 33 | 13 | 13 | 13 | 12 | 11 | 11 | 13 | 31 | 12 | 12 | 12 | 13 |
| (BC) | Min | 9/12/1973 | 32 | 19 | 64 | 3.0 | ND | 240 | 43 | 21 | ND | ND | 280 | 1.61 |
| | Max | 8/5/2003 | 82 | 73 | 100 | 5.3 | 60 | 270 | 91 | 71 | 1 | 0.47 | 587 | 4.82 |
| | **Avg** | **3/6/1990** | **40** | **27** | **81** | **3.7** | **60** | **253** | **58** | **36** | | **0.25** | **422** | **3.17** |
| Ledyard | N | 16 | 7 | 7 | 7 | 7 | 6 | 6 | 7 | 15 | 7 | 6 | 6 | 14 |
| (BC) | Min | 5/24/1985 | 16 | 15 | 55 | 3.0 | | 210 | 45 | 28 | | ND | 270 | 1.77 |
| | Max | 8/7/2002 | 30 | 40 | 110 | 4.1 | | 260 | 72 | 87 | | 0.23 | 460 | 12.00 |
| | **Avg** | **9/13/1993** | **25** | **23** | **89** | **3.5** | **ND** | **226** | **64** | **44** | **ND** | **0.13** | **382** | **4.07** |
| T-Hopkins | N | 19 | 12 | 12 | 12 | 12 | 11 | 11 | 12 | 13 | 10 | 13 | 12 | 10 |
| (DEF) | Min | 4/16/1991 | 30 | 25 | 39 | 4.8 | | 200 | 49 | 38 | | ND | 290 | 1.07 |
| | Max | 10/7/2003 | 49 | 48 | 67 | 7.0 | | 260 | 70 | 59 | | 0.95 | 460 | 2.60 |
| | **Avg** | **1/10/1999** | **40** | **37** | **51** | **6.0** | **ND** | **226** | **61** | **47** | **ND** | **0.22** | **408** | **1.64** |
| Aptos Creek | N | 49 | 42 | 42 | 36 | 33 | 33 | 33 | 35 | 44 | 34 | 45 | 35 | 32 |
| (BC,DEF) | Min | 1/21/1965 | 22 | 19 | 24 | 2.0 | ND | 170 | 34 | 29 | ND | ND | 310 | 0.88 |
| | Max | 10/7/2003 | 98 | 221 | 69 | 9.7 | 7.2 | 318 | 110 | 50 | 7 | 2.44 | 550 | 3.13 |
| | **Avg** | **1/4/1986** | **47** | **52** | **51** | **5.8** | **6.1** | **264** | **81** | **41** | **1.63** | **0.37** | **437** | **1.90** |
| **Service Area** | N | 143 | 89 | 89 | 83 | 79 | 74 | 74 | 80 | 126 | 74 | 89 | 78 | 81 |
| **II** | Min | 1/21/1965 | 16 | 13 | 24 | 2.0 | 0 | 170 | 34 | 21 | 0 | 0.00 | 270 | 0.88 |
| **(A,BC,DEF)** | Max | 10/7/2003 | 98 | 221 | 110 | 9.7 | 60 | 318 | 110 | 87 | 7 | 2.44 | 587 | 12.00 |
| | **Avg** | **########** | **43** | **31** | **70** | **5.3** | **33** | **245** | **66** | **43** | **1.63** | **0.23** | **428** | **2.68** |
| Hillcrest | N | 30 | 22 | 22 | 16 | 14 | 14 | 14 | 15 | 28 | 15 | 29 | 15 | 15 |
| (DEF) | Min | 10/2/1951 | 25 | 19 | 21 | 2.8 | ND | 204 | 50 | 22 | ND | ND | 376 | 0.43 |
| | Max | 4/9/1987 | 178 | 160 | 89 | 5.8 | 32 | 304 | 98 | 135 | 2.5 | 2,000 | 590 | 4.16 |
| | **Avg** | **5/11/1973** | **83** | **68** | **44** | **3.9** | | **258** | **77** | **63** | **0.71** | **77** | **465** | **1.19** |
| Seacliff 2 | N | 3 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 3 | 0 | 3 | 1 | 1 |
| (DEF) | Min | 6/6/1951 | | | | | | | | 34 | | 0.17 | | |
| | Max | 7/10/1967 | | | | | | | | 45 | | 0.25 | | |
| | **Avg** | **########** | | | **35** | | **ND** | **352** | | **40** | | **0.21** | **364** | **1.35** |
| Seacliff 3 | N | 2 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 2 | 0 | 2 | 0 | 1 |
| (DEF) | Min | 10/2/1951 | | | | | | | | 44 | | ND | | |
| | Max | ######## | | | 40 | | ND | 320 | 44 | 48 | | 0.85 | | 1.40 |
| Seacliff 4 | N | 32 | 22 | 22 | 15 | 14 | 14 | 14 | 15 | 31 | 15 | 32 | 15 | 15 |
| (DEF) | Min | 3/18/1955 | 14 | 8.3 | 29 | 2.0 | ND | 151 | 28 | 25 | ND | ND | 276 | 0.73 |
| | Max | 4/9/1987 | 80 | 117 | 125 | 5.9 | 23 | 283 | 73 | 64 | 29 | 2.40 | 462 | 7.71 |
| | **Avg** | **9/13/1972** | **36** | **55** | **43** | **5.1** | **14.5** | **194** | **46** | **52** | **3.03** | **0.34** | **342** | **1.60** |
| State Park | N | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 | 0 | 0 |
| (DEF) | Min | 5/15/1959 | | | | | | | | 44 | | 0.21 | | |
| | Max | 10/6/1961 | | | | | | | | 113 | | 8.20 | | |
| | **Avg** | **3/3/1960** | | | | | | | | **68** | | **3.40** | | |
| **Old Seacliff** | N | 70 | 44 | 44 | 33 | 28 | 30 | 30 | 31 | 67 | 30 | 69 | 31 | 32 |
| **Wells** | Min | 6/6/1951 | 14 | 8 | 21 | 2.0 | 0 | 151 | 28 | 22 | 0 | 0.17 | 276 | 0.43 |
| **(DEF)** | Max | 4/9/1987 | 178 | 160 | 125 | 5.9 | 32 | 304 | 98 | 135 | 29 | 2,000 | 590 | 7.71 |
| | **Avg** | **1/30/1964** | **59** | **62** | **41** | **4.5** | **14.5** | **281** | **56** | **54** | **1.87** | **16** | **390** | **1.38** |

**Table 4-5a**

**Production Well Water Quality, SCWD Wells**

| Well | | Date | Cal-cium (Ca) | Magne-sium (Mg) | So-dium (Na) | Potas-sium (K) | Car-bonate ($CO_3$) | Bicar-bonate ($HCO_3$) | Sul-fate ($SO_4$) | Chlor-ide (Cl) | Nitrate ($NO_3$) | Iron (Fe) | TDS | Na:Cl Molar Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (mg/L) | | | | | | | | | | | |
| Country Club (Qa/F) | N | 34 | 25 | 25 | 19 | 18 | 16 | 18 | 20 | 32 | 18 | 31 | 19 | 19 |
| | Min | 10/2/1956 | 27 | 21 | 20 | 1.9 | | 135 | 28 | 21 | 1 | ND | 220 | 1.04 |
| | Max | 8/6/2003 | 119 | 136 | 44 | 6.0 | | 212 | 37 | 33 | 24 | 0.65 | 342 | 2.12 |
| | **Avg** | **12/4/1984** | **46** | **48** | **25** | **2.8** | **ND** | **173** | **34** | **28** | **13** | **0.15** | **303** | **1.32** |
| Bonita (Qa/F) | N | 20 | 18 | 18 | 18 | 18 | 17 | 17 | 18 | 18 | 16 | 17 | 17 | 18 |
| | Min | 3/28/1995 | 26 | 19 | 19 | 2.3 | | 150 | 25 | 18 | 4.9 | ND | 230 | 1.23 |
| | Max | 8/6/2003 | 37 | 33 | 24 | 3.4 | | 190 | 34 | 26 | 14 | 0.07 | 310 | 1.77 |
| | **Avg** | **10/7/1999** | **32** | **26** | **22** | **2.9** | **ND** | **166** | **30** | **22** | **8.21** | **0.05** | **284** | **1.51** |
| San Andreas (Qa/F) | N | 22 | 20 | 20 | 20 | 20 | 19 | 19 | 20 | 20 | 18 | 19 | 19 | 19 |
| | Min | 5/20/1993 | 24 | 18 | 15 | 2.3 | | 150 | 8.6 | 16 | 1.8 | ND | 190 | 1.39 |
| | Max | 8/6/2003 | 34 | 28 | 24 | 3.8 | | 170 | 42 | 22 | 12 | 0.05 | 340 | 2.18 |
| | **Avg** | **3/9/1999** | **30** | **23** | **20** | **3.0** | **ND** | **160** | **23** | **19** | **5.56** | **0.04** | **257** | **1.64** |
| Seascape (Qa/F) | N | 45 | 22 | 22 | 17 | 16 | 15 | 15 | 17 | 44 | 15 | 22 | 16 | 17 |
| | Min | 9/21/1964 | 24 | 17 | 16 | 2.4 | | 120 | 14 | 13 | 2.5 | ND | 170 | 1.07 |
| | Max | 8/6/2003 | 94 | 82 | 19 | 3.0 | | 140 | 18 | 26 | 8 | 0.19 | 251 | 1.64 |
| | **Avg** | **########** | **38** | **33** | **17** | **2.8** | **ND** | **133** | **16** | **20** | **6.33** | **0.06** | **228** | **1.28** |
| Altivo (Qa/F) | N | 20 | 18 | 18 | 18 | 18 | 17 | 17 | 18 | 18 | 16 | 17 | 17 | 18 |
| | Min | 3/28/1995 | 16 | 10 | 8.9 | 1.8 | | 80 | 4 | 11 | 3.8 | ND | 95 | 0.85 |
| | Max | 8/6/2003 | 31 | 25 | 21 | 3.0 | | 150 | 22 | 22 | 9.7 | 0.02 | 250 | 1.47 |
| | **Avg** | **10/6/1999** | **21** | **13** | **12** | **2.1** | **ND** | **98** | **8** | **15** | **6.05** | **0.02** | **173** | **1.19** |
| Sells (Qa/F) | N | 20 | 18 | 18 | 18 | 18 | 17 | 17 | 18 | 18 | 16 | 17 | 17 | 18 |
| | Min | 3/28/1995 | 18 | 11 | 10 | 1.3 | | 86 | 5 | 12 | 6.9 | ND | 100 | 0.81 |
| | Max | 8/6/2003 | 33 | 26 | 24 | 2.9 | | 150 | 23 | 29 | 27 | 0.03 | 280 | 2.44 |
| | **Avg** | **10/7/1999** | **24** | **16** | **16** | **1.9** | **ND** | **113** | **11** | **19** | **15** | **0.03** | **207** | **1.31** |
| **Service Areas III & IV (Qa/F)** | N | 161 | 121 | 121 | 110 | 108 | 101 | 103 | 111 | 150 | 99 | 123 | 105 | 109 |
| | Min | 10/2/1956 | 16 | 10 | 8.9 | 1.3 | 0 | 80 | 4 | 11 | 1 | ND | 95 | 0.81 |
| | Max | 8/6/2003 | 119 | 136 | 44 | 6 | 0 | 212 | 42 | 33 | 27 | 0.65 | 342 | 2.44 |
| | **Avg** | **1/16/1995** | **32** | **27** | **19** | **2.57** | **ND** | **141** | **20** | **21** | **8.89** | **0.06** | **242.1** | **1.38** |

Max and min dates correspond to the period of record and not dates of other max and min values.
Averages ignore "non-detects" (ND); service area averages are averages of averages.
TDS = total dissolved solids

**Table 4-5a**
**Production Well Water Quality, SCWD Wells**

| Well | | Date | Cal-cium (Ca) | Magne-sium (Mg) | So-dium (Na) | Potas-sium (K) | Alka-linity | Sul-fate ($SO_4$) | Chlor-ide (Cl) | Nitrate ($NO_3$) | Iron (Fe) | Mang anese (Mn) | Conduc-tivity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (mg/L) | | | | | | | | | | (uS/cm) |
| Beltz 2 | N | 21 | 9 | 9 | | 16 | 16 | 12 | 12 | 13 | 12 | 13 | 16 |
| (A) | Min | 7/24/1974 | 48 | 14 | | 7.4 | 110 | 40 | 65 | 0.04 | 0.4 | 0.02 | 480 |
| | Max | 4/21/1999 | 96 | 31 | | 8.1 | 138 | 59 | 180 | 0.5 | 1.6 | 0.34 | 1,230 |
| | **Avg** | **6/25/1990** | **65** | **19** | | **7.6** | **125** | **49** | **116** | **0.2** | **1.0** | **0.23** | **840** |
| Beltz 4 | N | 11 | 6 | 6 | | 7 | 7 | 7 | 7 | 5 | 6 | 6 | 7 |
| (A) | Min | 5/23/1980 | 76 | 16 | | 6.75 | 120 | 2 | 54 | 0.09 | 3.5 | 0.44 | 740 |
| | Max | ######## | 117 | 22 | | 7.5 | 158 | 68 | 60 | 1.1 | 14 | 0.72 | 925 |
| | **Avg** | **########** | **91** | **18** | | **7.2** | **141** | **41** | **57** | **0.4** | **6.6** | **0.54** | **816** |
| Beltz 6 | N | 25 | 11 | 11 | | 15 | 14 | 14 | 14 | 14 | 15 | 15 | 15 |
| (A) | Min | 7/7/1970 | 38 | 10 | | 7.2 | 94 | 27 | 39 | 0.004 | 0.8 | 0.10 | 360 |
| | Max | 8/30/1995 | 56 | 31 | | 7.6 | 139 | 39 | 50 | 1.0 | 2.8 | 0.36 | 690 |
| | **Avg** | **11/6/1984** | **50** | **14** | | **7.4** | **112** | **32** | **44** | **0.2** | **1.3** | **0.17** | **508** |
| Beltz 7 | N | 124 | 13 | 13 | 1 | 19 | 35 | 97 | 97 | 102 | 96 | 15 | 116 |
| (AA,A) | Min | 5/17/1974 | 49 | 10 | | 7.2 | 134 | ND | 11 | 0.001 | 0.2 | 0.22 | 225 |
| | Max | ######## | 167 | 83 | | 7.8 | 178 | 239 | 67 | 3.2 | 87 | 1.0 | 1,240 |
| | **Avg** | **5/27/2000** | **128** | **28** | **20** | **7.6** | **157** | **69** | **37** | **0.9** | **5.9** | **0.75** | **638** |
| Beltz 8 | N | 39 | 1 | 1 | | 1 | 22 | 5 | 5 | 11 | 11 | 7 | 26 |
| (A) | Min | 9/29/1999 | | | | | 88 | 37 | 43 | 0.1 | 1.5 | 0.11 | 410 |
| | Max | ######## | | | | | 152 | 120 | 46 | 0.5 | 1.7 | 0.18 | 1,180 |
| | **Avg** | **1/11/2002** | **60** | **18** | | **7.4** | **122** | **78** | **45** | **0.3** | **1.6** | **0.15** | **672** |
| Beltz 9 | N | 31 | 1 | 1 | | 1 | 20 | 5 | 5 | 11 | 5 | 1 | 24 |
| (A) | Min | 2/16/2000 | | | | | 84 | 77 | 35 | 0.2 | ND | | 450 |
| | Max | ######## | | | | | 170 | 97 | 67 | 0.7 | 0.4 | | 975 |
| | **Avg** | **8/4/2002** | **43** | **14** | | **7.8** | **131** | **87** | **51** | **0.5** | **0.4** | **0.04** | **675** |
| **Beltz Wells** | N | 251 | 41 | 41 | 1 | 59 | 114 | 140 | 140 | 156 | 145 | 57 | 204 |
| **(AA,A)** | Min | 7/7/1970 | 38 | 10 | | 6.8 | 84 | 2 | 11 | 0.001 | 0.2 | 0.017 | 225 |
| | Max | ######## | 167 | 83 | | 8.1 | 178 | 239 | 180 | 3.2 | 87 | 1.0 | 1,240 |
| | **Avg** | **########** | **73** | **19** | **20** | **7.5** | **131** | **59** | **58** | **0.4** | **2.8** | **0.3** | **692** |

Max and min dates correspond to the period of record and not dates of other max and min values.
Averages ignore "non-detects" (ND)
TDS = total dissolved solids

**Table 4-5b**
**Production Well Water Quality**
**Beltz Wells**

| Well | | Date | Cal-cium (Ca) | Magne-sium (Mg) | So-dium (Na) | Potas-sium (K) | Car-bonate ($CO_3$) | Bicar-bonate ($HCO_3$) | Sul-fate ($SO_4$) | Chlor-ide (Cl) | Nitrate ($NO_3$) | Iron (Fe) | TDS | Na:Cl Molar Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (mg/L) | | | | | | | | | | | |
| SC-1A | N | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| | Min | 1/5/1996 | 40 | 8.3 | 19 | 3.4 | | 105 | 41 | 21 | | 0.43 | 190 | 0.71 |
| | Max | 1/6/2003 | 91 | 19 | 26 | 4.6 | | 140 | 180 | 54 | | 4.3 | 630 | 1.76 |
| | **Avg** | **7/11/1999** | **58** | **11** | **23** | **3.8** | **ND** | **121** | **77** | **32** | **ND** | **1.48** | **318** | **1.19** |
| SC-3A | N | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| | Min | 1/9/1996 | 41 | 7 | 39 | 5.1 | | 200 | 98 | 25 | | 0.22 | 360 | 1.72 |
| | Max | 1/22/2003 | 49 | 8.9 | 105 | 6.1 | | 220 | 110 | 42 | | 1.5 | 510 | 5.49 |
| | **Avg** | **7/14/1999** | **46** | **8** | **86** | **5.5** | **ND** | **209** | **102** | **36** | **ND** | **0.74** | **433** | **3.74** |
| SC-3B | N | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| | Min | 1/9/1996 | 16 | 1.2 | 72 | 3 | | 110 | 56 | 30 | | 0.66 | 255 | 2.52 |
| | Max | 1/22/2003 | 48 | 10 | 94 | 4.3 | | 180 | 73 | 44 | | 20 | 380 | 4.68 |
| | **Avg** | **7/14/1999** | **25** | **4** | **82** | **3.7** | **ND** | **129** | **63** | **35** | **ND** | **7.23** | **303** | **3.71** |
| SC-3C | N | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| | Min | 1/9/1996 | 70 | 18 | 34 | 3.1 | | 170 | 94 | 40 | | 1.15 | 375 | 0.78 |
| | Max | 1/22/2003 | 100 | 26 | 80 | 4.8 | | 260 | 110 | 75 | | 3.8 | 540 | 2.47 |
| | **Avg** | **4/28/1999** | **90** | **21** | **43** | **3.9** | **ND** | **209** | **99** | **54** | **ND** | **2.38** | **450** | **1.26** |
| SC-5A | N | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| | Min | 1/9/1996 | 59 | 13 | 38 | 5.3 | | 235 | 81 | 30 | | 0.91 | 460 | 1.20 |
| | Max | 1/16/2002 | 73 | 18 | 91 | 6.5 | | 270 | 130 | 67 | | 13 | 570 | 4.68 |
| | **Avg** | **7/14/1998** | **65** | **15** | **79** | **5.9** | **ND** | **250** | **104** | **52** | **ND** | **3.46** | **518** | **2.54** |
| SC-5B | N | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 5 |
| | Min | 1/11/1996 | 43 | 13 | 140 | 3.2 | | 145 | 190 | 120 | 2.5 | 0.17 | 640 | 1.35 |
| | Max | 1/16/2002 | 64 | 30 | 170 | 4.9 | | 180 | 240 | 160 | 2.5 | 4.9 | 780 | 2.18 |
| | **Avg** | **7/15/1998** | **50** | **18** | **160** | **3.8** | **ND** | **162** | **215** | **132** | **2.5** | **1.37** | **708** | **1.87** |
| SC-5C | N | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | Min | 1/13/1999 | 77 | 42 | 66 | 6.9 | | 190 | 200 | 130 | | 4 | 700 | 0.78 |
| | Max | 1/14/2002 | 100 | 47 | 91 | 7.5 | | 200 | 220 | 130 | | 5 | 720 | 1.08 |
| | **Avg** | **7/15/2000** | **89** | **45** | **79** | **7.2** | **ND** | **195** | **210** | **130** | **ND** | **4.50** | **710** | **0.93** |
| SC-8A | N | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| | Min | 1/14/1997 | 1.7 | | 100 | 1.7 | 0 | 45 | 78 | 11 | | 0.06 | 310 | 12.12 |
| | Max | 1/14/2003 | 1.7 | | 120 | 3.5 | 105 | 150 | 88 | 14 | | 0.24 | 340 | 16.12 |
| | **Avg** | **1/15/2000** | **2** | **ND** | **112** | **2.1** | **73** | **77** | **82** | **12** | **ND** | **0.14** | **331** | **14.50** |
| SC-8B | N | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| | Min | 1/15/1997 | 5 | 0 | 61 | 2.3 | 0 | 160 | 61 | 12 | | 0.07 | 310 | 3.76 |
| | Max | 1/15/2003 | 22 | 17 | 165 | 6.7 | 33 | 185 | 135 | 32 | | 0.18 | 460 | 19.92 |
| | **Avg** | **########** | **12** | **10** | **116** | **3.6** | **12** | **167** | **98** | **20** | **ND** | **0.11** | **389** | **11.58** |
| SC-8C | N | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| | Min | 1/16/1997 | 3.5 | | 96 | 2.3 | 0 | 177 | 42 | 12 | | 0.05 | 320 | 7.79 |
| | Max | 1/15/2003 | 7 | | 160 | 4.3 | 26 | 200 | 135 | 22 | | 0.28 | 440 | 20.56 |
| | **Avg** | **1/17/2000** | **5** | **ND** | **119** | **2.6** | **11** | **187** | **58** | **18** | **ND** | **0.18** | **351** | **10.76** |
| SC-8D | N | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| | Min | 1/15/1997 | 3.2 | | 100 | 2.3 | 0 | 182 | 43 | 17 | | 0.06 | 320 | 8.06 |
| | Max | 1/15/2003 | 6 | | 125 | 4.1 | 20 | 200 | 50 | 22 | | 0.11 | 360 | 9.74 |
| | **Avg** | **1/16/2000** | **5** | **ND** | **114** | **2.6** | **8** | **191** | **46** | **19** | **ND** | **0.08** | **337** | **9.10** |
| SC-8E | N | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| | Min | 1/16/1997 | 14 | 14 | 57 | 4.3 | | 155 | 59 | 25 | | 0.06 | 310 | 3.33 |
| | Max | 1/15/2003 | 21 | 18 | 70 | 6 | | 160 | 68 | 31 | | 0.09 | 340 | 4.13 |
| | **Avg** | **1/15/2000** | **17** | **17** | **66** | **4.8** | **ND** | **159** | **63** | **28** | **ND** | **0.08** | **325** | **3.64** |
| SC-8F | N | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| | Min | 1/16/1997 | 86 | 115 | 205 | 11.5 | | 5 | 100 | 620 | 3.5 | 0.76 | 1,400 | 0.34 |
| | Max | 1/16/2003 | 820 | 390 | 950 | 61 | | 150 | 310 | 3,650 | 3.5 | 5.2 | 8,500 | 0.51 |
| | **Avg** | **1/17/2000** | **417** | **284** | **637** | **39.8** | **ND** | **61** | **229** | **2,490** | **3.5** | **2.08** | **5,040** | **0.41** |



**Table 4-6**
**SCWD Monitoring Well Water Quality**

| Well | | Date | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Carbonate ($CO_3$) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Nitrate ($NO_3$) | Iron (Fe) | TDS | Na:Cl Molar Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (mg/L) | | | | | | | | | | | |
| SC-9A | N | 8 | 7 | 7 | 7 | 7 | 8 | 8 | 8 | 8 | 7 | 8 | 8 | 7 |
| | Min | 1/10/1996 | 5.8 | 1.3 | 77 | 2.3 | | 160 | 4.4 | 16 | | ND | 315 | 2.16 |
| | Max | 1/21/2003 | 23 | 11 | 130 | 5.1 | | 250 | 110 | 55 | | 31 | 470 | 12.05 |
| | **Avg** | **7/18/1999** | **15** | **8** | **105** | **3.7** | **ND** | **195** | **52** | **34** | **ND** | **10.63** | **368** | **6.52** |
| SC-9B | N | 7 | 6 | 6 | 6 | 6 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 6 |
| | Min | 1/11/1996 | 4.7 | | 130 | 1.2 | 0 | 150 | 140 | 19 | | ND | 375 | 9.39 |
| | Max | 1/21/2003 | 7 | | 160 | 2.6 | 20 | 180 | 160 | 23 | | 0.91 | 510 | 12.99 |
| | **Avg** | **########** | **6** | **ND** | **148** | **2.2** | **3.33** | **169** | **150** | **21** | **ND** | **0.31** | **454** | **11.1** |
| SC-9C | N | 7 | 6 | 6 | 6 | 6 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 6 |
| | Min | 1/11/1996 | 11 | 1.7 | 100 | 4.6 | 0 | 190 | 53 | 30 | | ND | 340 | 4.79 |
| | Max | 1/21/2003 | 19 | 4.6 | 125 | 6.3 | 15 | 330 | 60 | 37 | | 3.5 | 420 | 6.17 |
| | **Avg** | **########** | **16** | **3** | **117** | **5.4** | **4.17** | **233** | **57** | **34** | **ND** | **1.51** | **394** | **5.40** |
| SC-9D | N | 7 | 6 | 6 | 6 | 6 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 6 |
| | Min | 1/10/1996 | 26 | 12 | 65 | 2.7 | | 205 | 27 | 43 | | ND | 325 | 1.88 |
| | Max | 1/21/2003 | 31 | 18 | 87 | 5 | | 220 | 44 | 58 | | 4.7 | 420 | 3.05 |
| | **Avg** | **########** | **30** | **15** | **78** | **4.1** | **ND** | **211** | **33** | **51** | **ND** | **1.51** | **378** | **2.48** |
| SC-9E | N | 7 | 6 | 6 | 6 | 6 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 6 |
| | Min | 1/10/1996 | 65 | 35 | 26 | 3.3 | 0 | 218 | 125 | 36 | 3.5 | ND | 460 | 0.89 |
| | Max | 1/21/2003 | 86 | 49 | 59 | 3.8 | 10 | 280 | 140 | 86 | 3.5 | 6.8 | 580 | 1.29 |
| | **Avg** | **########** | **75** | **42** | **34** | **3.5** | **1.67** | **243** | **131** | **47** | **3.5** | **2.86** | **522** | **1.12** |
| SC-10A | N | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 8 | 8 |
| | Min | 1/5/1996 | 91 | 19 | 31 | 4.8 | | 220 | 125 | 34 | | 2.1 | 425 | 0.92 |
| | Max | 1/6/2003 | 110 | 28 | 38 | 5.9 | | 260 | 175 | 53 | | 7.6 | 600 | 1.59 |
| | **Avg** | **7/12/1999** | **100** | **25** | **35** | **5.4** | **ND** | **232** | **141** | **46** | **ND** | **3.86** | **517** | **1.21** |
| SC-10AA | N | 8 | 7 | 7 | 7 | 7 | 8 | 8 | 8 | 8 | 7 | 8 | 8 | 7 |
| | Min | 1/11/1996 | 35 | 12 | 11 | 3.6 | | 150 | 9.5 | 7.7 | | ND | 165 | 1.41 |
| | Max | 1/8/2003 | 43 | 14 | 13 | 4 | | 160 | 14 | 12 | | 4.6 | 260 | 2.40 |
| | **Avg** | **7/12/1999** | **38** | **14** | **12** | **3.8** | **ND** | **155** | **11** | **10** | **ND** | **1.97** | **216** | **1.80** |
| SC-A1A | N | 6 | 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 4 | 6 | 6 | 5 |
| | Min | 12/5/1995 | 18 | 19 | 26 | 2.6 | 0 | 137 | 15 | 25 | | ND | 210 | 1.24 |
| | Max | ######## | 23 | 22 | 29 | 8.8 | 20 | 145 | 20 | 36 | | 0.69 | 260 | 1.73 |
| | **Avg** | **6/8/1999** | **20** | **20** | **28** | **7.1** | **5** | **142** | **17** | **29** | **ND** | **0.30** | **237** | **1.53** |
| SC-A1B | N | 6 | 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 4 | 6 | 6 | 5 |
| | Min | 12/5/1995 | 2.7 | 20 | 19 | 2.9 | | 150 | 11 | 22 | | ND | 230 | 1.06 |
| | Max | ######## | 32 | 28 | 22 | 3.4 | | 175 | 18 | 32 | | 0.07 | 270 | 1.41 |
| | **Avg** | **6/8/1999** | **24** | **24** | **20** | **3.1** | **ND** | **165** | **15** | **26** | **ND** | **0.04** | **251** | **1.23** |
| SC-A1C | N | 6 | 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 5 | 6 | 6 | 5 |
| | Min | 12/5/1995 | 34 | 20 | 22 | 2.6 | | 160 | 39 | 25 | 3 | ND | 250 | 0.97 |
| | Max | ######## | 37 | 29 | 24 | 2.9 | | 180 | 45 | 35 | 4.5 | 0.94 | 330 | 1.42 |
| | **Avg** | **6/9/1999** | **36** | **26** | **23** | **2.7** | **ND** | **167** | **42** | **30** | **3.62** | **0.59** | **303** | **1.20** |
| SC-A1D | N | 6 | 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 5 | 6 | 6 | 5 |
| | Min | 12/5/1995 | 31 | 19 | 21 | 2.6 | | 150 | 35 | 17 | 3.1 | ND | 260 | 1.12 |
| | Max | ######## | 39 | 28 | 25 | 2.8 | | 180 | 44 | 30 | 3.1 | 0.5 | 320 | 2.00 |
| | **Avg** | **6/10/1999** | **35** | **23** | **22** | **2.7** | **ND** | **168** | **40** | **24** | **3.1** | **0.21** | **299** | **1.50** |
| SC-A2A | N | 8 | 7 | 7 | 7 | 7 | 8 | 8 | 8 | 8 | 7 | 8 | 8 | 7 |
| | Min | 12/5/1995 | 1,700 | 1,275 | 1,930 | 28 | | 120 | 120 | 9,120 | 1.3 | ND | 18,000 | 0.27 |
| | Max | 12/9/2002 | 2,070 | 1,800 | 2,500 | 115 | | 140 | 1,600 | 13,000 | 40 | 0.23 | 23,400 | 0.34 |
| | **Avg** | **6/5/1999** | **1,880** | **1,550** | **2,120** | **54** | **ND** | **129** | **1,210** | **10,800** | **26** | **0.17** | **21,000** | **0.31** |



**Table 4-6**
**SCWD Monitoring Well Water Quality**

| Well | | Date | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Carbonate ($CO_3$) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Nitrate ($NO_3$) | Iron (Fe) | TDS | Na:Cl Molar Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (mg/L) | | | | | | | | | | | |
| SC-A2B | N | 7 | 6 | 6 | 6 | 6 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 6 |
| | Min | 12/5/1995 | 55 | 28 | 39 | 3.8 | | 49 | 100 | 94 | | ND | 460 | 0.29 |
| | Max | 12/9/2002 | 70 | 63 | 52 | 4.9 | | 140 | 120 | 280 | | 2.3 | 750 | 0.69 |
| | **Avg** | **8/26/1999** | **65** | **48** | **47** | **4.3** | **ND** | **123** | **109** | **161** | **ND** | **0.50** | **604** | **0.46** |
| SC-A2C | N | 8 | 7 | 7 | 7 | 7 | 8 | 8 | 8 | 8 | 7 | 8 | 8 | 7 |
| | Min | 12/5/1995 | 44 | 36 | 45 | 2 | | 90 | 71 | 150 | 16 | ND | 530 | 0.46 |
| | Max | 12/9/2002 | 74 | 46 | 75 | 2.7 | | 130 | 89 | 245 | 27 | 0.26 | 700 | 0.66 |
| | **Avg** | **6/5/1999** | **58** | **40** | **65** | **2.3** | **ND** | **108** | **77** | **199** | **19.571** | **0.11** | **624** | **0.51** |
| SC-A3A | N | 8 | 7 | 7 | 7 | 7 | 8 | 8 | 8 | 8 | 7 | 8 | 8 | 7 |
| | Min | 12/5/1995 | 760 | 690 | 7,760 | 37 | | 150 | 2,010 | 15,800 | 52 | ND | 35,000 | 0.75 |
| | Max | ######## | 1,240 | 1,100 | 10,200 | 3,160 | | 170 | 3,100 | 22,000 | 58 | 0.85 | 37,800 | 0.83 |
| | **Avg** | **4/21/1999** | **988** | **942** | **8,750** | **500** | **ND** | **158** | **2530** | **17,800** | **55** | **0.61** | **36,200** | **0.78** |
| SC-A3B | N | 7 | 6 | 6 | 6 | 6 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 6 |
| | Min | 12/5/1995 | 515 | 215 | 190 | 9.1 | | 110 | 190 | 1,800 | 1.5 | ND | 3,700 | 0.15 |
| | Max | ######## | 900 | 475 | 605 | 33 | | 130 | 390 | 2,750 | 2.7 | 0.9 | 8,800 | 0.34 |
| | **Avg** | **5/10/1999** | **664** | **348** | **357** | **17** | **ND** | **116** | **255** | **2,330** | **2.1** | **0.43** | **5,140** | **0.22** |
| SC-A3C | N | 9 | 7 | 7 | 7 | 7 | 8 | 8 | 8 | 8 | 8 | 9 | 8 | 7 |
| | Min | 12/5/1995 | 37 | 8.7 | 28 | 2 | | 99 | 18 | 23 | 24 | ND | 270 | 1.06 |
| | Max | ######## | 50 | 23 | 44 | 3.1 | | 170 | 24 | 64 | 56 | 0.66 | 380 | 2.61 |
| | **Avg** | **8/26/1999** | **44** | **15** | **37** | **2.3** | **ND** | **136** | **21** | **39** | **43** | **0.16** | **334** | **1.64** |
| SC-A4A | N | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 8 | 9 | 9 | 9 |
| | Min | ######## | 1,300 | 780 | 995 | 20 | | 115 | 680 | 6,530 | | 0.1 | 12,000 | 0.21 |
| | Max | ######## | 1,750 | 1,130 | 1,650 | 190 | | 140 | 1,000 | 8,740 | | 0.19 | 16,400 | 0.33 |
| | **Avg** | **10/9/1999** | **1,600** | **953** | **1,175** | **42** | **ND** | **124** | **811** | **7,540** | **ND** | **0.15** | **14,200** | **0.24** |
| SC-A4B | N | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 8 | 8 |
| | Min | ######## | 39 | 20 | 16 | 3.1 | | 170 | 39 | 14 | | 0.13 | 260 | 0.90 |
| | Max | ######## | 47 | 23 | 18 | 4.4 | | 185 | 50 | 29 | | 0.32 | 320 | 1.98 |
| | **Avg** | **10/2/1999** | **44** | **22** | **17** | **3.6** | **ND** | **176** | **42** | **18** | **ND** | **0.25** | **289** | **1.53** |
| SC-A4C | N | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| | Min | ######## | 34 | 21 | 19 | 2.2 | | 180 | 37 | 9.4 | 1.2 | | 270 | 1.81 |
| | Max | ######## | 46 | 26 | 21 | 3.4 | | 190 | 46 | 17 | 1.2 | | 300 | 3.45 |
| | **Avg** | **4/1/2000** | **41** | **23** | **21** | **2.8** | **ND** | **185** | **39** | **13** | **1.2** | **ND** | **289** | **2.50** |
| SC-A4D | N | 8 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 8 | 8 | 6 | 6 |
| | Min | 12/4/1998 | 24 | 14 | 26 | 1.4 | | 83 | 10 | 16 | 49 | ND | 220 | 1.01 |
| | Max | ######## | 33 | 19 | 30 | 2 | | 180 | 46 | 46 | 74 | 0.068 | 290 | 2.60 |
| | **Avg** | **2/19/2001** | **28** | **16** | **28** | **1.6** | **ND** | **106** | **27** | **33** | **58** | **0.04** | **257** | **1.48** |
| SC-A5A | N | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 8 | 8 |
| | Min | ######## | 875 | 815 | 400 | 34 | | 92 | 485 | 4,150 | | 0.07 | 9,000 | 0.12 |
| | Max | ######## | 1,100 | 1,100 | 490 | 48 | | 120 | 610 | 5,600 | | 0.14 | 11,200 | 0.17 |
| | **Avg** | **5/2/1999** | **971** | **981** | **441** | **39.5** | **ND** | **103** | **553** | **5,060** | **ND** | **0.10** | **10,129** | **0.14** |
| SC-A5B | N | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 8 | 8 |
| | Min | ######## | 26 | 24 | 37 | 2.6 | | 140 | 115 | 16 | | 0.15 | 340 | 1.58 |
| | Max | ######## | 36 | 37 | 40 | 3.2 | | 150 | 130 | 39 | | 0.54 | 460 | 3.86 |
| | **Avg** | **6/13/1999** | **31** | **31** | **39** | **2.8** | **ND** | **144** | **122** | **24** | **ND** | **0.32** | **381** | **2.82** |
| SC-A5C | N | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 8 | 8 |
| | Min | ######## | 22 | 16 | 15 | 2.1 | | 135 | 15 | 11 | 1.3 | | 220 | 1.22 |
| | Max | ######## | 27 | 26 | 17 | 2.7 | | 160 | 29 | 21 | 1.7 | | 555 | 2.10 |
| | **Avg** | **6/12/1999** | **26** | **21** | **16** | **2.4** | **ND** | **143** | **21** | **18** | **1.47** | **ND** | **274** | **1.44** |
| SC-A5D | N | 8 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 8 | 7 | 7 |
| | Min | ######## | 19 | 11 | 16 | 1.8 | | 88 | 2.7 | 26 | 6.8 | ND | 175 | 0.73 |
| | Max | ######## | 26 | 13 | 18 | 2.1 | | 120 | 7.1 | 36 | 15 | 0.4 | 200 | 1.07 |
| | **Avg** | **1/8/2000** | **22** | **12** | **17** | **2.0** | **ND** | **93** | **5** | **31** | **10** | **0.14** | **185** | **0.87** |

Averages ignore "non-detects" (ND); TDS = total dissolved solids.



**Table 4-6**
**SCWD Monitoring Well Water Quality**

| Aquifer | | Date | Cal-cium (Ca) | Magne-sium (Mg) | So-dium (Na) | Potas-sium (K) | Car-bonate ($CO_3$) | Bicar-bonate ($HCO_3$) | Sul-fate ($SO_4$) | Chlor-ide (Cl) | Nitrate ($NO_3$) | Iron (Fe) | TDS | Na:Cl Molar Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (mg/L) | | | | | | | | | | | |
| **Tp-F** | N | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| (SC-8F) | Min | 1/16/1997 | 86 | 115 | 205 | 11.5 | | 5 | 100 | 620 | 3.5 | 0.76 | 1,400 | 0.34 |
| | Max | 1/16/2003 | 820 | 390 | 950 | 61 | | 150 | 310 | 3,650 | 3.5 | 5.2 | 8,500 | 0.51 |
| | **Avg** | **1/17/2000** | **417** | **284** | **637** | **40** | **ND** | **61** | **229** | **2,490** | **3.5** | **2.1** | **5,040** | **0.41** |
| **Tp-E** | N | 14 | 13 | 13 | 13 | 13 | 14 | 14 | 14 | 14 | 13 | 14 | 14 | 13 |
| | Min | 1/10/1996 | 14 | 14 | 26 | 3.3 | 0 | 155 | 59 | 25 | | ND | 310 | 0.89 |
| | Max | 1/21/2003 | 86 | 49 | 70 | 6 | 10 | 280 | 140 | 86 | | 6.8 | 580 | 4.1 |
| | **Avg** | **########** | **46** | **30** | **50** | **4.2** | **1.7** | **201** | **97** | **38** | **ND** | **1.5** | **424** | **2.38** |
| | | Wells: | SC-8E | SC-9E | | | | | | | | | | |
| **Tp-D** | N | 14 | 13 | 13 | 13 | 13 | 14 | 14 | 14 | 14 | 13 | 14 | 14 | 13 |
| | Min | 1/10/1996 | 3.2 | 12 | 65 | 2.3 | 0 | 182 | 27 | 17 | | ND | 320 | 1.88 |
| | Max | 1/21/2003 | 31 | 18 | 125 | 5 | 20 | 220 | 50 | 58 | | 4.7 | 420 | 9.7 |
| | **Avg** | **########** | **17** | **15** | **96** | **3.4** | **8.0** | **201** | **39** | **35** | **ND** | **0.79** | **358** | **5.79** |
| | | Wells: | SC-8D | SC-9D | | | | | | | | | | |
| **Tp-C** | N | 23 | 22 | 22 | 22 | 22 | 23 | 23 | 23 | 23 | 22 | 23 | 23 | 22 |
| | Min | 1/9/1996 | 3.5 | 1.7 | 34 | 2.3 | 0 | 170 | 42 | 12 | | ND | 320 | 0.78 |
| | Max | 1/22/2003 | 100 | 47 | 160 | 7.5 | 26 | 330 | 220 | 130 | | 5 | 720 | 20.6 |
| | **Avg** | **########** | **50** | **23** | **89** | **4.8** | **7.5** | **206** | **106** | **59** | **ND** | **2.1** | **476** | **4.59** |
| | | Wells: | SC-3C | SC-5C | SC-8C | SC-9C | | | | | | | | |
| **Tp-B** | N | 28 | 27 | 27 | 27 | 27 | 28 | 28 | 28 | 28 | 27 | 28 | 28 | 26 |
| | Min | 1/9/1996 | 4.7 | 0 | 61 | 1.2 | 0 | 110 | 56 | 12 | 2.5 | ND | 255 | 1.35 |
| | Max | 1/22/2003 | 64 | 30 | 170 | 6.7 | 33 | 185 | 240 | 160 | 2.5 | 20 | 780 | 19.9 |
| | **Avg** | **6/20/1999** | **23** | **10** | **126** | **3.3** | **7.8** | **157** | **131** | **52** | **2.5** | **2.3** | **463** | **7.06** |
| | | Wells: | SC-3B | SC-5B | SC-8B | SC-9B | | | | | | | | |
| **Tp-A** | N | 45 | 44 | 44 | 44 | 44 | 45 | 45 | 45 | 45 | 43 | 45 | 45 | 44 |
| | Min | 1/5/1996 | 1.7 | 1.3 | 19 | 1.7 | 0 | 45 | 4.4 | 11 | | 0 | 190 | 0.71 |
| | Max | 1/22/2003 | 110 | 28 | 130 | 6.5 | 105 | 270 | 180 | 67 | | 31 | 630 | 16.1 |
| | **Avg** | **6/14/1999** | **47** | **13** | **73** | **4.4** | **73** | **181** | **93** | **35** | **ND** | **3.4** | **414** | **4.95** |
| | | Wells: | SC-1A | SC-3A | SC-5A | SC-8A | SC-9A | SC-10A | | | | | | |
| **AA** | N | 8 | 7 | 7 | 7 | 7 | 8 | 8 | 8 | 8 | 7 | 8 | 8 | 7 |
| (SC-10AA) | Min | 1/11/1996 | 35 | 12 | 11 | 3.6 | | 150 | 9.5 | 7.7 | | ND | 165 | 1.41 |
| | Max | 1/8/2003 | 43 | 14 | 13 | 4 | | 160 | 14 | 12 | | 4.6 | 260 | 2.40 |
| | **Avg** | **7/12/1999** | **38** | **14** | **12** | **3.8** | **ND** | **155** | **11** | **10** | **ND** | **2.0** | **216** | **1.80** |
| **Qa/F** | N | 65 | 56 | 56 | 56 | 56 | 61 | 61 | 61 | 61 | 56 | 65 | 61 | 56 |
| **(not** | Min | 12/5/1995 | 2.7 | 8.7 | 15 | 1.4 | 0 | 83 | 2.7 | 9.4 | 1.2 | ND | 175 | 0.73 |
| **intruded)** | Max | ######## | 50 | 29 | 44 | 8.8 | 20 | 190 | 46 | 64 | 74 | 0.94 | 555 | 3.4 |
| | **Avg** | **########** | **31** | **20** | **24** | **3.0** | **5.0** | **145** | **25** | **27** | **17** | **0.21** | **270** | **1.49** |
| | | Wells: | SC-A1A | SC-A1B | SC-A1C | SC-A1D | SC-A3C | SC-A4C | SC-A4D | SC-A5C | SC-A5D | | | |
| **Qa/F** | N | 31 | 29 | 29 | 29 | 29 | 31 | 31 | 31 | 31 | 27 | 31 | 31 | 29 |
| **(transi-** | Min | 12/5/1995 | 26 | 20 | 16 | 2 | | 49 | 39 | 14 | 16 | ND | 260 | 0.29 |
| **tional)** | Max | ######## | 74 | 63 | 75 | 4.9 | | 185 | 130 | 280 | 27 | 2.3 | 750 | 3.9 |
| | **Avg** | **7/27/1999** | **49** | **35** | **42** | **3.2** | **ND** | **138** | **88** | **101** | **20** | **0.30** | **475** | **1.33** |
| | | Wells: | SC-A2B | SC-A2C | SC-A4B | SC-A5B | | | | | | | | |
| **Qa/F** | N | 40 | 37 | 37 | 37 | 37 | 40 | 40 | 40 | 40 | 35 | 40 | 40 | 37 |
| **(intruded)** | Min | 12/5/1995 | 515 | 215 | 190 | 9.1 | | 92 | 120 | 1,800 | 1.3 | ND | 3,700 | 0.12 |
| | Max | ######## | 2,070 | 1,800 | 10,200 | 3,160 | | 170 | 3,100 | 22,000 | 58 | 0.9 | 37,800 | 0.8 |
| | **Avg** | **6/9/1999** | **1,220** | **955** | **2,570** | **131** | **ND** | **126** | **1,070** | **8,710** | **28** | **0.29** | **17,300** | **0.34** |
| | | Wells: | SC-A2A | SC-A3A | SC-A3B | SC-A4A | SC-A5A | | | | | | | |
| **Seawater (Hem, 1989)** | | | 410 | 1,350 | 10,500 | 390 | 0 | 142 | 2,700 | 19,000 | 0.7 | 0.003 | 35,000 | 0.85 |

Averages ignore "non-detects" (ND); TDS = total dissolved solids.

**Table 4-7**

**Groundwater Quality Summarized by Aquifer Zone**

| Flow Range (cfs) | | Date | Stream-flow* (cfs) | Specific Conduc-tance (uS/cm) | pH | Cal-cium | Mag-nesium | So-dium | Pota-sium | Car-bonate | Bicar-bonate | Sul-fate | Chlo-ride | Nitrate (as N) | Iron | Manganese | TDS Residue | TDS Sum |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | (mg/L) | | | | | | | | | | | | |
| | | **Soquel Creek at Soquel** | | | | | | | | | | | | | | | | |
| <10 | N | 83 | 83 | 83 | 42 | 35 | 34 | 83 | 35 | 42 | 83 | 19 | 83 | 1 | 1 | | 9 | 10 |
| | Min | ######## | 0.1 | 661 | 7.7 | 69 | 20 | 15 | 1.3 | 0 | 208 | 75 | 44 | | | | 435 | 442 |
| | Max | ######## | 9.9 | 1,000 | 8.7 | 83 | 28 | 73 | 6.8 | 17 | 264 | 117 | 106 | | | | 502 | 494 |
| | **Avg** | **########** | **4.6** | **767** | **8.3** | **77** | **24** | **50** | **4.7** | **6.5** | **243** | **98** | **66** | **0.01** | **0.03** | | **484** | **464** |
| 10-40 | N | 38 | 38 | 38 | 15 | 19 | 19 | 38 | 20 | 15 | 38 | 9 | 38 | | | | 2 | 6 |
| | Min | ######## | 10 | 575 | 8.2 | 63 | 16 | 30 | 2.9 | 0 | 182 | 91 | 25 | | | | 421 | 365 |
| | Max | ######## | 32 | 797 | 8.7 | 84 | 25 | 58 | 5.5 | 20 | 262 | 132 | 70 | | | | 475 | 420 |
| | **Avg** | **########** | **19** | **670** | **8.5** | **70** | **20** | **41** | **3.8** | **10** | **212** | **107** | **41** | | | | **448** | **389** |
| 40-100 | N | 15 | 15 | 15 | 5 | 8 | 8 | 15 | 8 | 5 | 15 | 1 | 15 | | | | 1 | |
| | Min | ######## | 41 | 416 | 8.1 | 44 | 11 | 10 | 2.6 | 0 | 126 | | 14 | | | | 383 | |
| | Max | ######## | 84 | 630 | 8.5 | 72 | 18 | 35 | 3.6 | 7 | 209 | | 44 | | | | 383 | |
| | **Avg** | **########** | **54** | **530** | **8.3** | **57** | **15** | **27** | **2.9** | **3.4** | **169** | **111** | **23** | | | | **383** | |
| >100 | N | 12 | 10 | 10 | 4 | 3 | 3 | 10 | 3 | 4 | 10 | | 10 | | | | | |
| | Min | ######## | 105 | 270 | 7.5 | 28 | 7.3 | 12 | 2.2 | 0 | 78 | | 9.8 | | | | | |
| | Max | 4/9/1965 | 428 | 535 | 8.5 | 45 | 14 | 26 | 2.8 | 4 | 164 | | 19 | | | | | |
| | **Avg** | **########** | **207** | **398** | **8.0** | **39** | **11** | **20** | **2.4** | **1.0** | **125** | | **14** | | | | | |
| Brown & | | ######## | 414 | 280 | 7.0 | 26 | 8.3 | 15 | 3.8 | 0 | 82 | 44 | 13 | 0.81 | 56 | 1.1 | 210 | |
| Caldwell, | | 3/4/1981 | 30 | 550 | 7.7 | 55 | 19 | 34 | 6.0 | 0 | 166 | 91 | 35 | 0.41 | 14 | 0.2 | 386 | |
| | | **West Branch Soquel Creek** | | | | | | | | | | | | | | | | |
| | | ######## | 0.73 | 625 | 7.6 | 53 | 25 | 55 | 5 | 0 | 260 | 48 | 70 | 0.08 | 0 | | 433 | |
| | | **Aptos Creek near Aptos** | | | | | | | | | | | | | | | | |
| | | ######## | 0.5 | 900 | 7.8 | 72 | 37 | 110 | 5.6 | 0 | 350 | 100 | 110 | 0.09 | 0 | | 645 | |
| | | **Aptos Creek at Aptos** | | | | | | | | | | | | | | | | |
| | | ######## | 0.4 | 1,080 | 7.9 | 73 | 38 | 86 | 5.5 | 0 | 350 | 91 | 100 | 0.14 | 0 | | 604 | |

*Instantaneous flows, except for the two 1981 samples which are mean daily flows reported by USGS.

TDS = total dissolved solids

Source: http://nwis.waterdata.usgs.gov/ca/nwis/qwdata, except as noted.

# Table 4-8

## Soquel-Aptos Surface Water Quality

| Source | No. Wells | Total Dissolved Solids (mg/L) | Major Cations (meq/L) | | | | Major Anions (meq/L) | | | | Sum Cations (meq/L) | Sum Anions (meq/L) | Total (meq/L) | Major Cations (Percent of Cations) | | | | Major Anions (Percent of Anions) | | | | Water Type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Carbonate ($CO_3$) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | | | | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Carbonate ($CO_3$) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | |
| **Production Wells** | | | | | | | | | | | | | | | | | | | | | | |
| Beltz wells (AA,A)* | 6 | 430 | 3.6 | 1.5 | 0.87 | 0.19 | 0.00 | 2.1 | 1.2 | 1.6 | 6.2 | 5.0 | 11 | **58%** | 25% | 14% | 3% | 0% | **43%** | 25% | 33% | Mixed Calcium |
| Main Street well (AA,Tu) | 1 | 330 | 2.1 | 1.3 | 1.5 | 0.14 | 0.00 | 2.8 | 1.0 | 0.57 | 5.1 | 4.4 | 9.5 | **42%** | 27% | 29% | 3% | 0% | **64%** | 23% | 13% | Mixed Bicarbonate |
| Service Area I wells** (AA,A) | ~6 | 550 | 5.3 | 2.5 | 1.9 | 0.17 | 0.24 | 3.4 | 2.7 | 1.8 | 9.9 | 8.1 | 18 | **53%** | 25% | 20% | 2% | 3% | **42%** | 33% | 22% | Mixed Calcium |
| Service Area II wells (A,BC,DEF) | 5 | 430 | 2.1 | 2.5 | 3.0 | 0.14 | 1.1 | 4.0 | 1.4 | 1.2 | 7.9 | 7.7 | 16 | 27% | 32% | **39%** | 2% | 14% | **52%** | 18% | 16% | Mixed Bicarbonate |
| Old Seacliff wells (DEF) | 5 | 400 | 3.0 | 5.1 | 1.8 | 0.11 | 0.48 | 4.6 | 1.2 | 1.5 | 9.9 | 7.8 | 18 | 30% | **51%** | 18% | 1% | 6% | **59%** | 15% | 20% | Magnesium-Bicarbonate |
| Service Areas III & IV wells (Qa/F) | 6 | 250 | 1.6 | 2.2 | 0.81 | 0.07 | 0.00 | 2.3 | 0.42 | 0.58 | 4.6 | 3.3 | 8.0 | 34% | **47%** | 17% | 1% | 0% | **70%** | 13% | 18% | Mixed Bicarbonate |
| **Aquifer** (monitoring wells) | | | | | | | | | | | | | | | | | | | | | | |
| Tp-AA (SC-10AA) | 1 | 220 | 1.9 | 1.1 | 0.51 | 0.10 | 0.00 | 2.5 | 0.22 | 0.29 | 3.6 | 3.1 | 6.7 | **52%** | 31% | 14% | 3% | 0% | **83%** | 7% | 9% | Calcium-Bicarbonate |
| Tp-A | 6 | 410 | 2.4 | 1.1 | 3.2 | 0.11 | 2.4 | 3.0 | 1.9 | 1.0 | 6.8 | 8.3 | 15 | 35% | 16% | **47%** | 2% | **29%** | 36% | 23% | 12% | Mixed |
| Tp-B (includes aquitard) | 4 | 460 | 1.2 | 0.85 | 5.5 | 0.08 | 0.26 | 2.6 | 2.7 | 1.5 | 7.6 | 7.0 | 15 | 15% | 11% | **72%** | 1% | 4% | 37% | **39%** | 21% | Mixed Sodium |
| Tp-C | 4 | 480 | 2.5 | 1.9 | 3.9 | 0.12 | 0.25 | 3.4 | 2.2 | 1.7 | 8.4 | 7.5 | 16 | 30% | 23% | **46%** | 1% | 3% | **45%** | 29% | 22% | Mixed Sodium Bicarbonate |
| Tp-D (includes aquitard) | 2 | 360 | 0.86 | 1.2 | 4.2 | 0.09 | 0.27 | 3.3 | 0.82 | 0.99 | 6.3 | 5.4 | 12 | 14% | 19% | **66%** | 1% | 5% | **61%** | 15% | 18% | Sodium-Bicarbonate |
| Tp-E | 2 | 420 | 2.3 | 2.4 | 2.2 | 0.11 | 0.06 | 3.3 | 2.0 | 1.1 | 7.0 | 6.4 | 13 | 33% | 35% | 31% | 2% | 1% | **51%** | 31% | 17% | Mixed Bicarbonate |
| Tp-F (SC-8F, saline) | 1 | 5,000 | 21 | 23 | 28 | 1.0 | 0.00 | 1.0 | 4.8 | 70 | 73 | 76 | 149 | 29% | 32% | **38%** | 1% | 0% | 1% | 6% | **92%** | Mixed chloride |
| Qa/F (not intruded) | 9 | 270 | 1.5 | 1.7 | 1.0 | 0.08 | 0.17 | 2.4 | 0.52 | 0.76 | 4.3 | 3.8 | 8.1 | 36% | **39%** | 24% | 2% | 4% | **62%** | 14% | 20% | Mixed Bicarbonate |
| Qa/F (transitional) | 4 | 480 | 2.5 | 2.9 | 1.8 | 0.08 | 0.00 | 2.3 | 1.8 | 2.8 | 7.3 | 6.9 | 14 | 34% | **40%** | 25% | 1% | 0% | 33% | 26% | 41% | Mixed |
| Qa/F (intruded) | 5 | 17,000 | 61 | 79 | 112 | 3.3 | 0.00 | 2.1 | 22 | 246 | 255 | 270 | 525 | 24% | 31% | **44%** | 1% | 0% | 1% | 8% | **91%** | Mixed Chloride |
| Seawater (Hem, 1989) | | 35,000 | 20 | 111 | 457 | 10.0 | 0.00 | 2.3 | 56 | 536 | 598 | 595 | 1,193 | 3% | 19% | **76%** | 2% | 0% | 0% | 9% | **90%** | Sodium-Chloride |
| **Stream** | | | | | | | | | | | | | | | | | | | | | | |
| Soquel Creek at Soquel (cfs) | | | | | | | | | | | | | | | | | | | | | | |
| <10 | | 480 | 3.9 | 1.9 | 2.2 | 0.12 | 0.22 | 4.0 | 2.0 | 1.9 | 8.1 | 8.1 | 16 | **48%** | 24% | 27% | 1% | 3% | **49%** | 25% | 23% | Calcium-Bicarbonate |
| 10-40 | | 450 | 3.5 | 1.7 | 1.8 | 0.10 | 0.33 | 3.5 | 2.2 | 1.2 | 7.0 | 7.2 | 14 | **50%** | 23% | 25% | 1% | 5% | **48%** | 31% | 16% | Calcium-Bicarbonate |
| 40-100 | | 380 | 2.8 | 1.3 | 1.2 | 0.07 | 0.11 | 2.8 | 2.3 | 0.66 | 5.4 | 5.8 | 11 | **53%** | 24% | 22% | 1% | 2% | **47%** | **40%** | 11% | Calcium-Bicarbonate |
| >100 | | *250* | 1.9 | 0.94 | 0.85 | 0.06 | 0.03 | 2.1 | *1.5* | 0.41 | 3.8 | 4.0 | 7.8 | **51%** | 25% | 22% | 2% | 1% | **52%** | 37% | 10% | Calcium-Bicarbonate |
| West Branch Soquel Creek (<1 cfs) | | 430 | 2.6 | 2.1 | 2.4 | 0.13 | 0.00 | 4.3 | 1.0 | 2.0 | 7.2 | 7.2 | 14 | 37% | 28% | 33% | 2% | 0% | **59%** | 14% | 27% | Mixed Bicarbonate |
| Aptos Creek near Aptos (<1 cfs) | | 650 | 3.6 | 3.0 | 4.8 | 0.14 | 0.00 | 5.7 | 2.1 | 3.1 | 12 | 11 | 22 | 31% | 26% | **41%** | 1% | 0% | **53%** | 19% | 28% | Mixed Bicarbonate |
| Aptos Creek at Aptos (<1 cfs) | | 600 | 3.6 | 3.1 | 3.7 | 0.14 | 0.00 | 5.7 | 1.9 | 2.8 | 11 | 10 | 21 | 34% | 29% | 35% | 1% | 0% | **55%** | 18% | 27% | Mixed Bicarbonate |

*Alkalinity used as an estimate of bicarbonate.

**Except Main St. well.

Shading indicates the dominant cations and anions that define the water type.

**Table 4-9**

**Soquel-Aptos Water Quality Types**

| Author<br>subarea<br>user | Total Through-flow ≅ Total Recharge | "Aquifer Yield" ≅ Onshore Discharge | Native Out-flow to Ocean | Offshore Discharge Needed to Prevent Seawater Intrusion | Recharge Rate and Area: Average Rate | Recharge Rate and Area: Area | "Potential", "Safe", "Sustainable", "Practical Developable" Yield |
|---|---|---|---|---|---|---|---|
| | (ac-ft/yr) | | | | (in/yr) | (mi.$^2$) | (ac-ft/yr) |
| Hickey, 1968 | | | | | | | |
| primary Purisima aquifers | 10,000 *a* | | | | 4 | *46* | |
| M. Johnson, 1980 | | | | | 5.6 | | |
| North of Zayante fault | | | | | 4 - 7.2 | | |
| Muir, 1980 | | | | | | | 4,100 to |
| Purisima | | | | | | | 4,400 *b* |
| Aromas | | | | | | | 1,500 *c* |
| Total | | | | | | 50 | *5,900* |
| Thorup, 1981 | | *10,200 to* | | 1,200 to | | | |
| Purisima (& Aromas?) | 12,670 | *11,600* | | 2,400 | *4.6* | 51 | 8,000 |
| LSCE, 1984a | | | *>9,500* | | | | 12,000 to |
| Purisima | | | | | | | 13,000 |
| UCSC grad students, 1985 | | | | | | | |
| Purisima | 10,475 | 9,975 | 500 | | | | |
| LSCE, 1987, 1990 | | | | | | | |
| Aromas | | | *>12,000* | | | | |
| Essaid, 1992 | | | | | | | |
| Purisima | | | | | | | |
| concep. model (Table 5-4) | 6,000 to | | | | | | |
| | 17,000 | | | | 2 - 9 | ? | |
| numerical model (Fig. 5-3) | 13,000 | 12,000 | 1,000 | | | ? | |
| Montgomery-Watson, 1998 | | | | | | | |
| Purisima & Aromas | | | | | | | |
| concep. model (Table 5-5) | | | | | | | |
| areal recharge | | | | | *6.1* | *64* | |
| num. model (Table 5-6) | | | | | | | |
| areal recharge | *20,000* | | | | *5.9* | *64* | |
| boundary inflow | *2,600* | | | | | | |
| Montgomery-Watson, 1999 | | | | | | | |
| Purisima | | | | | | | |
| SCWD | | | | | | | 3,070 *d* |
| Other | | | | | | | *3,160* |
| Total | | | | | | | 6,230 |
| LSCE, 1997, 2004; | | | | | | | |
| SCWD, 1998 | | | | | | | |
| Aromas | | | | | | | |
| SCWD | | | | | | | 1,800 *e* |
| This Study (Table 5-12) | | | | | | | |
| Purisima | 12,200 | | | | 4.4 | 52 | |
| Aromas | 3,600 | | | | 4.7 | 14 | |
| Total | 15,800 | | | | 4.5 | 66 | |

Notes

This table summarizes a wide variety of estimates and approaches. See Sec. 5.2 for further explanation.

*Italics* indicate values inferred from provided information.

(*a*) Discharge from "primary water bearing units" only.

(*b*) Estimated from 1962-74 average annual pumpage and pumpage corresponding to zero change in water level.

(*c*) Estimated from 1966-77average annual pumpage and pumpage corresponding to zero change in water level.

(*d*) Based on prevention of saltwater intrusion given current well configuration and recommended reduced pumping from selected wells.

(*e*) Applies to existing SCWD wellfield only.

**Table 5-1**

**Summary of Previous and Current Estimates of Groundwater Yield**

| Author | Producer | Groundwater Production Period Purisima | Groundwater Production Period Aromas | Groundwater Production Period Total | On-Shore Discharge (non-pumping) Purisima | On-Shore Discharge (non-pumping) Aromas | Offshore Discharge (Outflow to Ocean) Purisima | Offshore Discharge (Outflow to Ocean) Aromas | "Potential", "Safe", "Sustainable", "Practical Developable" Yield Purisima | "Potential", "Safe", "Sustainable", "Practical Developable" Yield Aromas | "Potential", "Safe", "Sustainable", "Practical Developable" Yield Total | "Over-draft" |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | (ac-ft/yr) | | | | | | | | | | |
| Hickey, 1968 | | 1966 | | | | | | | | | | |
| | Total | 3,300 | | | | | | | | | | |
| Muir, 1980 | | 1974 | 1,977 | 1974-77 | | | | | | | | |
| | SCWD | 2,820 | 400 | *3,220* | | | | | | | | |
| | Beltz | 420 | | *420* | | | | | | | | |
| | CWD | 106 | 44 | *150* | | | | | | | | |
| | Other | 2,050 | 1,160 | *3,210* | | | | | | | | |
| | Total | 5,400 | 1,600 | *7,000* | | | | | 4,100 to 4,400 *a* | | | *1,000* |
| | | | | | | | | | | 1,500 *b* | | *100* |
| | | | | | | | | | | | *5,900* | *1,100* |
| Thorup, 1981 (& Aromas?) | | 1974-80 | | | | | | | | | | |
| | SCWD | 2,940 | | | | | | | | | | |
| | Beltz | 330 | | | | | | | | | | |
| | CWD | 130 | | | | | | | | | | |
| | Other | 2,200 | | | | | | | | | | |
| | Total | 5,600 | | | | | | | 8,000 | | | 0 |
| LSCE, 1984 | | 1983 | | | | | | | | | | |
| | SCWD | 3,350 | | | | | | | | | | |
| | Other | <1,000 | | | | | | | | | | |
| | Total | *<4,400* | | | | | 9,500 | | 12,000 to 13,000 | | | 0 |
| LSCE, 1987, 1990 | | | 1986-89 | | | | | | | | | |
| | SCWD | | *~1,900* | | | | | 12,000 | | *>1,900* | | 0 |
| Essaid, 1992 (see Figure 5-2) | | 1984 | | | | | | | | | | |
| | Total | 3,600 *c* | | | 10,600 | | 400 | | | | | |
| LSCE, 1994 | | 1990 | | | | | | | | | | |
| | Total | 11,400 *d* | | | | | | | | | *~11,400* | *0* |
| | "locally" *e* | | | | | | | | | | | *>0* |
| Montgomery-Watson, 1998 (see Table 5-6) | | 1982-93 | | | | | | | | | | |
| | Total | *17,650* | | | *5,450* | | *1,700* | | | | | |
| Montgomery-Watson, 1999 | | ~1992-99 | | | | | | | | | | |
| | SCWD | 3,680 | | | | | | | 3,070 *f* | | | |
| | Other | *3,160* | | | | | | | *3,160* | | | |
| | Total | 6,840 | | | | | | | 6,230 | | | 610 |
| LSCE, 1997, 2004; SCWD, 1998 | | | 1997-2003 | | | | | | | | | |
| | SCWD | | *2,100* | | | | | | | 1,800 *g* | | *~300 g* |
| Wolcott, 1999; Pingree, 1997; Faler, 1992 and This Study (see Tables 5-7 and 5-11) | | 1990s Total Production | | | | | | | | | | |
| | SCWD | 3,800 | 2,200 | 6,000 | | | | | | | | |
| | Beltz | 570 | 0 | 570 | | | | | | | | |
| | CWD | 140 | 480 | 620 | | | | | | | | |
| | Other | 2,200 | 900 | 3,100 | | | | | | | | |
| | Total | 6,700 | 3,600 | 10,300 | | | | | | | | |
| | | Consumptive Use | | | | | | | | | | |
| | SCWD | 3,550 | 2,060 | 5,600 | | | | | | | | |
| | Beltz | 540 | 0 | 540 | | | | | | | | |
| | CWD | 140 | 180 | 330 | | | | | | | | |
| | Other | 1,500 | 560 | 2,000 | | | | | | | | |
| | Total | 5,700 | | 8,500 | 6,100 | | 400 | | | | | >0? |
| | | | 2,800 | | | 700 | | 0 | | | | >0 |

Notes

This table summarizes a wide variety of estimates and approaches. There is some reduncancy with Table 5-1. See Section 5.2 for further explanation.

*Italics* indicate values inferred from provided information. Sums may reflect small roundoff errors.

(*a*) Estimated from 1962-74 average annual pumpage and pumpage corresponding to zero change in water level.

(*b*) Estimated from 1966-747average annual pumpage and pumpage corresponding to zero change in water level.

(*c*) Modeled SCWD production only.

(*d*) Based on water use estimates by Faler (1992).

(e) LSCE, 1994, p. 40.

(*f*) Given current well configuration and recommended reductions in selected wells.

(*g*) Applies to existing SCWD wellfield only.

**Table 5-2**

**Summary of Previous Estimates of Developed Groundwater Conditions**

| Watershed | Rain-fall | Run-off | Evapotrans-piration | Recharge |
|---|---|---|---|---|
| | (in/yr) | | | |
| Soquel Creek | 43.9 | 13.9 | 22.8 - 25.9 | 4.0 - 7.1 |
| Aptos Creek | 39.3 | 12.0 | 20.0 - 22.9 | 4.0 - 6.8 |
| Corralitos Creek | 37.9 | 10.9 | 19.7 - 22.3 | 4.6 - 7.2 |
| Total | 41.5 | 12.9 | 21.6 - 24.5 | 4.2 - 7.1 |
| Average | | | 23.1 | 5.6 |

**Table 5-3**

**Estimated Water Budget North of Zayante Fault**

(adopted from Johnson, M., 1980)

| Watershed | Watershed Area: Upstream of USGS Gage (mi²) | Watershed Area: Reported Portion in Essaid Model (mi²) | Estimate No. 1: Reported Unit Rates (ET estimated from 1953 Pajaro Valley study): Precip-itation (in/yr) | "Run-off"[b] (in/yr) | ET (in/yr) | **Estimated Recharge**: *Unit Rate from Balance of Terms*[c] (in/yr) | Reported Volu-metric Rate (ac-ft/yr) | *Implied Area* (mi2) | Estimate No. 2[a]: ET Est. as 55% of Precip.: ET (in/yr) | **Estimated Recharge**: *Unit Rate from Balance of Terms*[c] (in/yr) | Reported Volu-metric Rate (ac-ft/yr) | *Implied Area* (mi2) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Soquel Creek at Soquel | 40.2 | 13.6 | 40.2 | 13.4 | 24.4 | *2.4* | 3,320 | *26.4* | 22.0 | *4.8* | 6,900 | *27.2* | Recharge volume based on 27-mi² area of uncertain significance. |
| West Branch Soquel Ck | 12.2 | 4.5 | 44.1 | 15.5 | 25.6 | *3.0* | 1,890 | *11.8* | 24.2 | *4.4* | 2,810 | *12.1* | Recharge volume based on entire watershed, not the portion within the model area. |
| Aptos Creek | 12.2 | 6.5 | 36.0 | 9.4 | 23.2 | *3.3* | 2,200 | *12.3* | 19.8 | *6.7* | 4,350 | *12.1* | |
| Branciforte Creek | 17.3 | 10.3 | 39.0 | 14.6 | 24.1 | *0.3* | 280 | *16.7* | 21.5 | *2.9* | 2,810 | *18.1* | |
| Total | 81.9 | 34.9 | | | | | **7,700** | *67.2* | | | **16,900** | *69.4* | Large disparity between unit and volumetric rates depending on area applied to. |
| Average Rate | Total Volumetric Rate/Total Implied Area | | | | | *2.1* | | | | *4.7* | | | |
| | Unit Rates Weighted by Gaged Areas | | | | | *2.2* | | | | *4.6* | | | |
| | Unit Rates Weighted by Model Areas | | | | | *2.0* | | | | *4.5* | | | |
| | Total Volumetric Rate/Modeled Area | | | | | *4.1* | | | | *9.1* | | | |

[a]Uses same values of precipitation and runoff as Estimate No. 1. Differences in "implied area" probably due to roundoff error.

[b]Although referred to as "runoff," this represents total gaged flow, which includes baseflow, which is derived from recharge, which thus should not be used to estimate recharge.

[c]Recharge = Precipiation -Runoff - ET

| Watershed | Watershed Area: Upstream of USGS Gage (mi²) | Watershed Area: Reported Portion in Essaid Model (mi²) | **Estimated Mean Annual Baseflow** — Gaged Area: Reported Volumetric Rate* (cfs) | Gaged Area: Reported Volumetric Rate* (ac-ft/yr) | Gaged Area: *Unit Rate* (in/yr) | Model Area: Reported Volumetric Rate (cfs) | Model Area: Reported Volumetric Rate (ac-ft/yr) | Model Area: *Unit Rate* (in/yr) | Comments |
|---|---|---|---|---|---|---|---|---|---|
| Soquel Creek at Soquel | 40.2 | 13.6 | 13.1 | 9,460 | *4.4* | 4.2 | 3,070 | *4.2* | Using baseflow as an estimate of total recharge ignores groundwater discharge to wells and ocean. |
| West Branch Soquel Ck | 12.2 | 4.5 | 3.2 | 2,300 | *3.5* | 1.1 | 770 | *3.2* | |
| Aptos Creek | 12.2 | 6.5 | 3.5 | 2,560 | *3.9* | 1.8 | 1,280 | *3.7* | |
| Branciforte Creek | 17.3 | 10.3 | 2.5 | 1,790 | *1.9* | 1.4 | 1,020 | *1.9* | |
| Total | 81.9 | 34.9 | 22.2 | **16,100** | | 8.5 | **6,100** | | |
| Weighted Average | | | | | *3.7* | | | *3.3* | |

## Table 5-4
## USGS Conceptual Model Estimate of Soquel-Aptos Groundwater Throughflow (Essaid, 1992)

*Baseflow estimated by "simple straight-line hydrograph separation."

Reported values originally in metric units (km², mm/yr, m³/sec)

*Italics* indicate values inferred from provided information.

**Bold** values are provided as estimates of basin throughflow.

None of the above estimates accounts for recharge in the Arana, Rodeo, Porter, or Valencia creek watersheds, or along the coastal terrace.

| IGSM Subregions Comprising Current Study Area[a] | Area ($mi^2$) | Area (acres) | As Reported: Precip. (in/yr) | Irrigation/ Water Use (in/yr) | Irrigation/ Water Use (ac-ft/yr) | ET (in/yr) | Precip. Runoff[c] (in/yr) | Irrig. Runoff (in/yr) | Recharge Rate (in/yr) | Recharge Volume (ac-ft/yr) | Recharge Estimated as Balance of Reported Terms[d]: Rate (in/yr) | Error? (in/yr) | Volume (ac-ft/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Agricultural Land** | | | | | | | | | | | | | |
| 1 Live Oak | | 76 | 30.0 | 27.8 | 176 | 34.1 | 17.1 | 0.6 | 5.8 | 37 | 6.0 | 0.2 | 38 |
| 2 Service Areas I & II | | 400 | 29.3 | 28.6 | 953 | 34.2 | 10.4 | 0.6 | 12.6 | 420 | 12.7 | 0.1 | 423 |
| 3 Service Areas III & IV | | 269 | 22.9 | 25.1 | 563 | 30.6 | 3.8 | 1.3 | 12.2 | 273 | 12.3 | 0.1 | 276 |
| 4 Watersheds south of Zayante fault | | 1,708 | 35.6 | 26.0 | 3,701 | 32.2 | 14.4 | 0.5 | 14.6 | 2,078 | 14.5 | -0.1 | 2,064 |
| 5 North of Zayante fault | | 19 | 38.3 | 27.2 | 43 | 32.9 | 11.8 | 0.5 | 20.5 | 32 | 20.3 | -0.2 | 32 |
| 7 Aromas Hills (25%)[b] | | 353 | 25.0 | 24.9 | 732 | 30.0 | 11.8 | 0.6 | 6.5 | 191 | 7.5 | 1.0 | 220 |
| Weighted Total | 4.4 | 2,825 | 32.0 | 26.2 | 6,168 | 32.1 | 12.6 | 0.6 | 12.9 | 3,032 | 13.0 | 0.1 | 3,054 |
| **Non-Agricultural Developed Land** | | | | | | | | | | | | | |
| 1 Live Oak | | 3,653 | 29.1 | 14.3 | 4,353 | 14.2 | 18.0 | 0.0 | 3.2 | 974 | 11.2 | ***8.0*** | 3,409 |
| 2 Service Areas I & II | | 3,548 | 29.0 | 17.9 | 5,292 | 15.2 | 16.2 | 0.0 | 5.4 | 1,597 | 15.5 | ***10.1*** | 4,583 |
| 3 Service Areas III & IV | | 851 | 24.9 | 22.3 | 1,581 | 14.4 | 13.5 | 0.0 | 6.6 | 468 | 19.3 | ***12.7*** | 1,369 |
| 4 Watersheds south of Zayante fault | | 1,266 | 33.4 | 36.4 | 3,840 | 18.2 | 20.9 | 0.0 | 30.7 | 3,239 | 30.7 | 0.0 | 3,239 |
| 5 North of Zayante fault | | 9 | 39.0 | 29.6 | 22 | 16.6 | 25.0 | 0.0 | 27.0 | 20 | 27.0 | 0.0 | 20 |
| 7 Aromas Hills (25%)[b] | | 134 | 24.3 | 22.8 | 255 | 15.3 | 16.8 | 0.0 | 15.0 | 168 | 15.0 | 0.0 | 168 |
| Weighted Total | 14.8 | 9,461 | 29.2 | 19.5 | 15,344 | 15.1 | 17.3 | 0.0 | 8.2 | 6,465 | 16.2 | 8.0 | 12,788 |
| d **Undeveloped Land** | | | | | | | | | | | | | |
| 1 Live Oak | | 497 | 29.3 | 0.0 | 0 | 21.2 | 7.5 | 0.0 | 0.6 | 25 | 0.6 | 0.0 | 25 |
| 2 Service Areas I & II | | 2,159 | 30.9 | 0.0 | 0 | 21.9 | 6.9 | 0.0 | 2.0 | 360 | 2.1 | 0.1 | 378 |
| 3 Service Areas III & IV | | 915 | 26.8 | 0.0 | 0 | 19.8 | 3.6 | 0.0 | 3.4 | 259 | 3.4 | 0.0 | 259 |
| 4 Watersheds south of Zayante fault | | 18,730 | 36.1 | 0.0 | 0 | 22.7 | 8.5 | 0.0 | 4.9 | 7,648 | 4.9 | 0.0 | 7,648 |
| 5 North of Zayante fault | | 4,833 | 39.4 | 0.0 | 0 | 22.9 | 9.6 | 0.0 | 6.9 | 2,779 | 6.9 | 0.0 | 2,779 |
| 7 Aromas Hills (25%)[b] | | 1,523 | 25.5 | 0.0 | 0 | 19.5 | 4.5 | 0.0 | 1.4 | 178 | 1.5 | 0.1 | 190 |
| Weighted Total | 44.8 | 28,657 | 35.3 | 0.0 | 0 | 22.4 | 8.2 | 0.0 | 4.7 | 11,249 | 4.7 | 0.0 | 11,279 |
| **Weighted Total** | | | | | | | | | | | | | |
| 1 Live Oak | 6.6 | 4,226 | 29.1 | 12.9 | 4,529 | 15.4 | 16.7 | 0.0 | 2.9 | 1,036 | 9.9 | 6.9 | 3,472 |
| 2 Service Areas I & II | 9.5 | 6,107 | 29.7 | 12.3 | 6,246 | 18.8 | 12.5 | 0.0 | 4.7 | 2,376 | 10.6 | 5.9 | 5,384 |
| 3 Service Areas III & IV | 3.2 | 2,035 | 25.5 | 12.6 | 2,144 | 19.0 | 7.8 | 0.2 | 5.9 | 1,001 | 11.2 | 5.3 | 1,904 |
| 4 Watersheds south of Zayante fault | 33.9 | 21,704 | 35.9 | 4.2 | 7,541 | 23.2 | 9.7 | 0.0 | 7.2 | 12,965 | 7.2 | 0.0 | 12,951 |
| 5 North of Zayante fault | 7.6 | 4,861 | 39.4 | 0.2 | 65 | 22.9 | 9.6 | 0.0 | 7.0 | 2,832 | 7.0 | 0.0 | 2,831 |
| 7 Aromas Hills (25%)[b] | 3.1 | 2,010 | 25.3 | 5.9 | 987 | 21.1 | 6.6 | 0.1 | 3.2 | 536 | 3.5 | 0.3 | 578 |
| Weighted Total | 64.0 | 40,943 | 33.7 | 6.3 | 21,512 | 21.4 | 10.6 | 0.0 | **6.1** | 20,746 | **7.9** | 1.9 | 27,120 |

[a]Excluded IGSM subregions 6, 8, and most of 7 (a total of 48 $mi^2$), which lie within or are tributary to Pajaro Valley.

[b]Acreage adjusted to reflect that only about 25% of subregion 7 lies within current study area.

[c]Appears to include most stream baseflow.

[d]Recharge = (Precip. + Irrig.) - (ET + Runoff)

Shaded values seem anomalously high.

Italic values indicate apparent discrepancy.

**Table 5-5**

**Soquel-Aptos IGSM Estimated Recharge, 1982-93 Average**

(adapted from Montgomery Watson et al., 1998)

| IGSM Subregions Comprising Current Study Area[a] | Area (acres) | Recharge (in/yr) | Recharge (ac-ft/yr) | As Reported: Discharge to Stream[b] (ac-ft/yr) | Stream Perc. (ac-ft/yr) | Boundary Flow (ac-ft/yr) | Sub-boundary Flow (ac-ft/yr) | Pumping (ac-ft/yr) | Change in Storage (ac-ft/yr) |
|---|---|---|---|---|---|---|---|---|---|
| 1 Live Oak | 4,226 | 2.9 | 1,021 | 1,490 | 0 | 295 | -182 | 790 | -1,146 |
| 2 Service Areas I & II | 6,107 | 4.6 | 2,359 | 1,853 | 0 | -3 | 3,169 | 6,209 | -2,537 |
| 3 Service Areas III & IV | 2,035 | 5.6 | 956 | 0 | 0 | -68 | -854 | 2,125 | -2,092 |
| 4 Watersheds south of Zayante fault | 21,704 | 6.9 | 12,496 | 79 | 0 | 1,619 | -5,518 | 7,506 | 1,011 |
| 5 North of Zayante fault | 4,861 | 6.5 | 2,631 | 2,023 | 0 | 664 | -1,040 | 62 | 170 |
| 7 Aromas Hills (25%)[c] | 2,010 | 3.1 | 525 | 0 | 160 | 18 | 302 | 954 | 51 |
| 9 Offshore next to subregions 1 & 2 | - | - | - | - | - | -57 | 1,652 | - | - |
| Total (64 mi$^2$) | 40,943 | 5.9 | 19,988 | 5,445 | 160 | 2,468 | -2,471 | 17,646 | -4,543 |
| | | | | Inferred[d] (ac-ft/yr) | | | | | |
| Inflow from outside study area | | | | 2,596 | | | | | |
| Outflow to ocean | | | | 1,723 | | | | | |
| Outflow to Pajaro Valley | | | | 854 | | | | | |

[a] Excluded IGSM subregions 6, 8, and 75% of 7 (a total of 48 mi$^2$), which lie within or are tributary to Pajaro Valley.

[b] Groundwater discharge to stream baseflow appears to be only partially compensated for (e.g., seems low for subregion 4).

[c] Approximately 25 percent of IGSM subregion 7 is within Soquel-Aptos study area.

[d] Based on net boundary flows, thus these are minimum values.

**Table 5-6**

**Soquel-Aptos IGSM Simulated Groundwater Budget, 1982-93 Average**

(adapted from Montgomery Watson et al., 1998)

| User | Purisima (Wocott, 1999; and this study) No. of Devel-oped Parcels | No. of Active Wells | Total Water Use (ac-ft/yr) | Consumptive Use (ac-ft/yr) Indoor % of use | Indoor % lost | Indoor Sub-total | Outdoor % of use | Outdoor % lost | Outdoor Sub-total | Total | Retrun Flow (ac-ft/yr) | Aromas (Faler, 1992; and this study) No. of Active Wells | Total Water Use ac-ft/yr | Consumptive Use (ac-ft/yr) Indoor % of use | Indoor % lost | Indoor Sub-total | Outdoor % of use | Outdoor % lost | Outdoor Sub-total | Total | Retrun Flow (ac-ft/yr) | Total Water Use (ac-ft/yr) | Total Con-sump-tive Use (ac-ft/yr) | Total Return Flow (ac-ft/yr) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Private Parcels** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Urban | | | | | | | | | | | | | | | | | | | | | | | | | |
| Residential and Commercial | 217 | 200 | 124 | 70% | 100% | 87 | 30% | 80% | 30 | 117 | 7 | | | | | | | | | | | 124 | 117 | 7 | may include stream diversions. |
| Agriculture | 17 | 21 | 93 | 0% | 0% | 0 | 100% | 80% | 74 | 74 | 19 | | | | | | | | | | | 93 | 74 | 19 | |
| Seascape Golf Course | 8 | | 232 | 0% | 0% | 0 | 100% | 80% | 186 | 186 | 46 | | | | | | | | | | | 232 | 186 | 46 | |
| Rural | | | | | | | | | | | | | | | | | | | | | | | | | |
| Residential and Commercial | 2,223 | 700 | 1,099 | 50% | 25% | 137 | 50% | 80% | 440 | 577 | 522 | - | 557 | 50% | 25% | 70 | 50% | 80% | 223 | 292 | 265 | 1,656 | 869 | 787 | Aromas estimates from tables |
| Agriculture | 42 | 48 | 163 | 0% | 0% | 0 | 100% | 80% | 130 | 130 | 33 | - | 309 | 0% | 0% | 0 | 100% | 80% | 247 | 247 | 62 | 472 | 378 | 94 | below. |
| **Small Water Systems** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cabrillo College indoor | 5 | 3 | 200 | 100% | 100% | 200 | 0% | 0% | 0 | 200 | 0 | | | | | | | | | | | 200 | 200 | 0 | |
| outdoor | | | 85 | 0% | 0% | 0 | 100% | 80% | 68 | 68 | 17 | | | | | | | | | | | 85 | 68 | 17 | |
| Other Urban | 68 | 4 | 29 | 70% | 100% | 20 | 30% | 80% | 7 | 27 | 2 | | | | | | | | | | | 29 | 27 | 2 | |
| Rural | 325 | 23 | 211 | 50% | 25% | 26 | 50% | 80% | 84 | 111 | 100 | - | 58 | 50% | 25% | 7 | 50% | 80% | 23 | 30 | 27 | 269 | 141 | 128 | Aromas est. from tables below. |
| **Central Water Distric** | 799 | 2 | 143 | 50% | 100% | 72 | 50% | 100% | 72 | 143 | 0 | 3 | 479 | 50% | 25% | 60 | 50% | 80% | 192 | 184 | 295 | 622 | 327 | 295 | 1997 use. |
| **City of Santa Cruz Beltz Wells** | - | 3 | 574 | 70% | 100% | 402 | 30% | 80% | 138 | 540 | 34 | | 0 | | | | | | | 0 | 0 | 574 | 540 | 34 | 2000 use. |
| **Soquel Creek Water Distric** | - | 11 | 3,780 | 70% | 100% | 2,646 | 30% | 80% | 907 | 3,553 | 227 | 6 | 2,193 | 70% | 100% | 1,535 | 30% | 80% | 526 | 2,061 | 132 | 5,973 | 5,615 | 358 | Purisima 1997; Aromas 2002. |
| **Total non-SCWD** | | | 2,953 | | | | | | | 2,173 | 780 | | 1,403 | | | | | | | 754 | 649 | 4,356 | 2,926 | 1,430 | |
| **Total** | | | 6,733 | | | | | | | 5,726 | 1,007 | | 3,596 | | | | | | | 2,815 | 781 | 10,329 | 8,541 | 1,788 | |

| Aromas Study Area Small Water Systems Compiled by Faler (1992)[a] | No. Connec-tions | Water Use Factor | Total Use (ac-ft/yr) |
|---|---|---|---|
| Aptos Hills Mutual | 18 | 0.442 | 8 |
| Calabasas Rd Mutual | 7 | 0.442 | 3 |
| East Bel Mar Drive Water | 6 | 0.442 | 3 |
| Emerald City Water Co. | 12 | 0.442 | 5 |
| Freedom Mutual | 3 | 0.442 | 1 |
| Larkin Valley Ridge | 5 | 0.442 | 2 |
| Milky Way Mutual | 10 | 0.442 | 4 |
| Senda Ledera Mutual | 5 | 0.442 | 2 |
| Spring Valley Water | 8 | 0.442 | 4 |
| White Calabasas Mutual | 11 | 0.442 | 5 |
| Aptos High School | | | 11 |
| Aptos Ridge Mutual | 13 | 0.442 | 6 |
| Rancho Aptos Subdivision | | | 2 |
| Renaissance High School | | | 2 |
| Total | 98 | | 58 |

Aromas Study Area Parcel Water Use Compiled by Faler (1992)[a,b]

| Use Code | No. of Parcels APN Zone No. 45 | 46 | 49 | 107 | 108 | Total | Water Use Factor | Total Use (ac-ft/yr) |
|---|---|---|---|---|---|---|---|---|
| none | | 2 | 3 | | | 5 | 0.5 | 3 |
| res 010-041 | | 3 | 8 | | | 11 | 0.5 | 6 |
| res 050-054 | | 7 | 9 | | | 16 | - | 14 |
| res 060-062 | | 20 | 101 | | 1 | 122 | 1 | 122 |
| res 063-065 | | | 4 | | | 4 | 0.442 | 2 |
| store 120 | | | 1 | | | 1 | 1 | 1 |
| res 511 | 1 | 1 | 5 | | | 7 | - | 409 |
| 830 | | | 1 | | | 1 | 1 | 1 |
| Total (non-ag) | 1 | 33 | 132 | 0 | 1 | 167 | | 557 |
| nurseries 261 | | 2 | 5 | | | 7 | - | 116 |
| orchards 400 | | 4 | 6 | | | 10 | - | 193 |
| Ag Total | | 5 | 11 | | | 16 | | 309 |

[a]Excludes parcels and water systems southeast of Manresa Beach.

[b]Exclusive of parcels served by small water systems.

| **Summary** | ($mi^2$) | Total Use (ac-ft/yr) | Total Use (in/yr) | Consumptive Use (ac-ft/yr) | Consumptive Use (in/yr) | Return Flow (ac-ft/yr) | Return Flow (in/yr) |
|---|---|---|---|---|---|---|---|
| Approx. urban (mostly sewered) | 16 | 7,300 | 8.6 | 6,800 | 8.0 | 480 | 0.6 |
| Approx. rural (non-sewered) | 50 | 3,000 | 1.1 | 1,700 | 0.6 | 1,300 | 0.5 |
| SCWD Service Area | 14 | 6,000 | 8.0 | 5,600 | 7.5 | 360 | 0.5 |
| Purisima Area | 51.6 | 6,700 | 2.4 | 5,700 | 2.1 | 1,000 | 0.4 |
| Aromas Area | 14.4 | 3,600 | 4.7 | 2,800 | 3.7 | 780 | 1.0 |
| Total Study Area | 66.0 | 10,300 | 2.9 | 8,500 | 2.4 | 1,800 | 0.5 |

**Table 5-7**
**Summary of Water Use Analysis by Faler (1992), Pingree (1997), and Wolcott (1999)**

This table reflects information compiled by the three cited studies, but uses only the most recent water-use factors (Wolcott, 1999).
Split between indoor and outdoor use is as assumed by Wolcott (1999) for rural areas and as reported by ESA (2004) for urban areas.
The bottom two tables provide an original tally of information compiled by Faler (1992) for the Aromas area, although applying Wolcott's water use factors.
SCWD groundwater production values are maximums, 1997 for Purisima wells and 2002 for Aromas wells.
The value of Beltz wellfield production is for 2000, the year of greatest use since 1990.
The groundwater production value for CWD is for 1997, its maximum year; all return flows are over Aromas.

| WY | Soquel Creek: USGS Gages: Soquel Creek At Soquel | | Soquel Creek: USGS Gages: West Branch | Soquel Creek: USGS Gages: *At Soquel minus West Br* | Soquel Creek: USGS Gages: Near Soquel | Soquel Creek: USGS Gages: *At minus Near* | Soquel Creek: LKA Gages: West Branch | Soquel Creek: LKA Gages: "Upper" (East Branch) | Soquel Creek: LKA Gages: *West Br + Upper* | Soquel Creek: LKA Gages: *At Soq minus WBr+Up* | Aptos Creek: USGS Gages: At Aptos | Aptos Creek: USGS Gages: Near Aptos | Branciforte Ck: USGS at Santa Cruz | Santa Cruz Precipitation (NOAA) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (ac-ft/yr) | (% avg) | (ac-ft/yr) | | | | | | | | | | | (in/yr) | (% avg)* |
| 1952 | 67,707 | 216% | | | | | | | | | | | | 44.58 | 147% |
| 1953 | 27,175 | 87% | | | | | | | | | | | 11,763 | 24.41 | **80%** |
| 1954 | 18,664 | 60% | | | | | | | | | | | 6,019 | 23.84 | **79%** |
| 1955 | 15,045 | 48% | | | | | | | | | | | 7,499 | 23.88 | **79%** |
| 1956 | 71,574 | 229% | | | | | | | | | | | 26,380 | 39.67 | 131% |
| 1957 | 13,620 | 43% | | | | | | | | | | | 4,715 | 22.19 | **73%** |
| 1958 | 60,135 | 192% | | | | | | | | | | | 28,324 | 50.09 | 165% |
| 1959 | 19,698 | 63% | 6,999 | *12,699* | | | | | | | 3,733 | | 11,498 | 24.77 | **82%** |
| 1960 | 12,414 | 40% | 3,698 | *8,716* | | | | | | | 3,169 | | 8,111 | 21.43 | **71%** |
| 1961 | 3,279 | 10% | 1,649 | *1,630* | | | | | | | 991 | | 3,358 | 17.78 | **59%** |
| 1962 | 22,736 | 73% | 7,222 | *15,514* | | | | | | | 4,129 | | 12,120 | 27.47 | **91%** |
| 1963 | 62,787 | 200% | 22,941 | *39,846* | | | | | | | 14,537 | | 19,948 | 33.74 | 111% |
| 1964 | 10,049 | 32% | 3,604 | *6,445* | | | | | | | 2,637 | | 4,895 | 19.03 | **63%** |
| 1965 | 36,822 | 118% | 11,352 | *25,470* | | | | | | | 6,721 | | 13,823 | 30.64 | 101% |
| 1966 | 9,132 | 29% | 3,275 | *5,857* | | | | | | | 1,527 | | 5,312 | 20.48 | **67%** |
| 1967 | 54,243 | 173% | 17,889 | *36,354* | | | | | | | 10,301 | | 23,541 | 40.00 | 132% |
| 1968 | 12,035 | 38% | 5,183 | *6,852* | | | | | | | 2,613 | | 6,770 | 21.46 | **71%** |
| 1969 | 53,703 | 171% | 20,301 | *33,402* | 53,855 | *-152* | | | | | 12,603 | | | 44.94 | 148% |
| 1970 | 44,516 | 142% | 13,059 | *31,457* | 30,283 | *14,233* | | | | | 9,525 | | | 30.18 | 99% |
| 1971 | 22,665 | 72% | 6,601 | *16,064* | 15,749 | *6,916* | | | | | 3,526 | | | 27.24 | **90%** |
| 1972 | 6,162 | 20% | 1,928 | *4,234* | 4,675 | *1,487* | | | | | 1,249 | 1,168 | | 19.08 | **63%** |
| 1973 | 50,745 | 162% | | | | | | | | | | 10,839 | | 43.67 | 144% |
| 1974 | 46,846 | 150% | | | | | | | | | | 9,425 | | 41.96 | 138% |
| 1975 | 25,517 | 81% | | | | | | | | | | 4,958 | | 24.29 | **80%** |
| 1976 | 3,304 | 11% | | | | | | | | | | 1,129 | | 15.37 | **51%** |
| 1977 | 2,094 | 7% | | | | | | | | | | 696 | | 14.81 | **49%** |
| 1978 | 39,591 | 126% | | | | | | | | | | 8,408 | | 37.59 | 124% |
| 1979 | 16,411 | 52% | | | | | | | | | | 3,390 | | 29.15 | 96% |
| 1980 | 38,173 | 122% | | | | | | | | | | 9,718 | | 37.14 | 122% |
| 1981 | 9,786 | 31% | | | | | | | | | | 2,011 | | 21.74 | **72%** |
| 1982 | 66,193 | 211% | | | | | | | | | | 19,438 | | 48.14 | 159% |
| 1983 | 122,608 | 391% | | | | | | | | | | 22,858 | | 53.93 | 178% |
| 1984 | 24,785 | 79% | | | | | | | | | | 6,919 | | 24.01 | **79%** |
| 1985 | 12,900 | 41% | | | | | 4,637 | | | | | 2,755 | | 29.68 | 98% |
| 1986 | 64,481 | 206% | | | | | 17,608 | | | | | | | 40.99 | 135% |
| 1987 | 7,628 | 24% | | | | | 2,250 | | | | | | | 15.85 | **52%** |
| 1988 | 4,896 | 16% | | | | | 1,859 | 2,174 | *4,033* | *863* | | | | 18.73 | **62%** |
| 1989 | 12,972 | 41% | | | | | 2,526 | 6,101 | *8,627* | *4,345* | | | | 24.20 | **80%** |
| 1990 | 7,812 | 25% | | | | | 853 | 3,311 | *4,164* | *3,648* | | | | 16.76 | **55%** |
| 1991 | 9,604 | 31% | | | | | 3,415 | 4,229 | *7,644* | *1,960* | | | | 20.36 | **67%** |
| 1992 | 13,912 | 44% | | | | | 4,878 | 5,731 | *10,609* | *3,303* | | | | 27.51 | **91%** |
| 1993 | 39,726 | 127% | | | | | 12,746 | 11,069 | *23,815* | *15,911* | | | | 36.69 | 121% |
| 1994 | 6,936 | 22% | | | | | 2,278 | 1,406 | *3,684* | *3,252* | | | | 22.71 | **75%** |
| 1995 | 56,271 | 180% | | | | | 21,131 | 26,179 | *47,310* | *8,961* | | | | 43.01 | 142% |
| 1996 | 42,651 | 136% | | | | | 10,695 | 12,522 | *23,217* | *19,434* | | | | 31.49 | 104% |
| 1997 | 53,857 | 172% | | | | | 13,706 | 16,882 | *30,588* | *23,269* | | | | 36.60 | 121% |
| 1998 | 63,691 | 203% | | | | | 15,740 | 20,797 | *36,537* | *27,154* | | | | 59.82 | 197% |
| 1999 | 34,224 | 109% | | | | | 6,061 | 14,064 | *20,125* | *14,099* | | | | 33.65 | 111% |
| 2000 | 41,362 | 132% | | | | | 10,641 | 12,516 | *23,157* | *18,205* | | | | 36.39 | 120% |
| 2001 | 16,816 | 54% | | | | | 2,616 | 3,094 | *5,710* | *11,106* | | | | 25.45 | **84%** |
| 2002 | 17,508 | 56% | | | | | 2,475 | 4,044 | *6,519* | *10,989* | | | | 28.79 | 95% |
| Avg | 31,323 | 100% | 8,979 | *17,467* | 26,141 | *5,621* | 7,562 | 9,608 | *17,049* | *11,100* | 5,519 | 7,408 | 12,130 | 30.34 | 100% |
| Min | 2,094 | 7% | 1,649 | *1,630* | 4,675 | *-152* | 853 | 1,406 | *3,684* | *863* | 991 | 696 | 3,358 | 14.81 | 49% |
| Max | 122,608 | 391% | 22,941 | *39,846* | 53,855 | *14,233* | 21,131 | 26,179 | *47,310* | *27,154* | 14,537 | 22,858 | 28,324 | 59.82 | 197% |
| Period of Record % of Average* | | 100% | 84% | *84%* | 101% | *101%* | 93% | 90% | *90%* | *90%* | 84% | 106% | 90% | | |
| Adjusted Average | | | 10,634 | *20,688* | 25,779 | *5,543* | 8,145 | 10,691 | *18,971* | *12,351* | 6,536 | 6,984 | 13,527 | | |

*Based on Soquel Ck at Soquel record.

*Drought years in bold.

Heavy lines indicate boundaries between wet and dry periods.

## Table 5-8
## Gaged Water-Year Flows of Soquel, Aptos, and Branciforte Creeks

| Station Name | Station | Drainag | | Gaged Flows | | | | | | | Estimated Baseflows | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Period of Record | | | | | | Soquel at | Adjusted | Adjusted | riod of Record | | Soq. at | Adjusted | Adjusted | Adj. by | |
| | | Re-ported (mi²) | This Study | Who le Wate | No. of Whole WYs | Average Dis-charge | Unit Dis-charge | | | | Estimated Average Baseflow[a] | Unit Base-flow | | | | Adjusted Average Baseflow | Adjusted Avg. Unit Baseflow |
| W Br Soquel Creek | LKA | 8.9 | 8.8 | 1985 - 2002 | 18 | 7,560 | 16.08 | 92.8% | 8,150 | 17.32 | 980 | 2.08 | 91.4% | 1,070 | 2.28 | 1,060 | 2.24 |
| W Br Soquel Ck near Soquel | 11159800 | 12.2 | 12.2 | 1959 - 1972 | 14 | 8,980 | 13.82 | 84.4% | 10,630 | 16.37 | 1,940 | 2.99 | 92.6% | 2,100 | 3.23 | 2,300 | 3.54 |
| Upper Soquel Creek | LKA | 13.9 | 13.6 | 1988 - 2002 | 15 | 9,610 | 13.24 | 89.9% | 10,690 | 14.73 | 890 | 1.22 | 91.7% | 970 | 1.33 | 980 | 1.36 |
| Soquel Ck near Soquel | 11159940 | 32.0 | 32.0 | 1969 - 1972 | 4 | 26,100 | 15.33 | 101.4% | 25,800 | 15.11 | 4,840 | 2.84 | 98.5% | 4,920 | 2.88 | 4,780 | 2.80 |
| Soquel Ck at Soquel | 11160000 | 40.2 | 40.2 | 1952 - 2002 | 51 | 31,300 | 14.62 | 100.0% | 31,300 | 14.62 | 5,620 | 2.62 | 100.0% | 5,620 | 2.62 | 5,620 | 2.62 |
| Branciforte Ck at Santa Cruz | 11161500 | 17.3 | - | 1953 - 1968 | 16 | 12,100 | 13.15 | 89.7% | 13,500 | 14.66 | 1,780 | 1.93 | 102.6% | 1,740 | 1.88 | 1,990 | 2.15 |
| Aptos Ck near Aptos | 11159690 | 10.2 | - | 1972 - 1985 | 14 | 7,410 | 13.62 | 106.1% | 6,980 | 12.84 | 1,470 | 2.70 | 100.4% | 1,460 | 2.69 | 1,380 | 2.55 |
| Aptos Ck at Aptos | 11159700 | 12.3 | 12.1 | 1959 - 1972 | 14 | 5,520 | 8.54 | 84.4% | 6,540 | 10.12 | 1,270 | 1.97 | 92.6% | 1,380 | 2.13 | 1,510 | 2.33 |
| | | | | | | Average | 13.55 | | | 14.47 | | 2.29 | | | 2.38 | | 2.45 |
| | | | | | | Minimum | 8.54 | | | 10.12 | | 1.22 | | | 1.33 | | 1.36 |
| | | | | | | Maximum | 16.08 | | | 17.32 | | 2.99 | | | 3.23 | | 3.54 |

*USGS station number or
or Linsley, Kraeger & Assoc. station.

[a]From Table 5-10.

**Table 5-9**
**Unit Annual Flows and Estimated Unit Baseflows for Soquel, Aptos, and Branciforte Creeks**

| WY | Soquel Creek | | | | | | | | | | Aptos Creek | | Branciforte Ck | Santa Cruz Precipitation (NOAA) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | USGS Gages | | | | | | LKA Gages | | | | USGS Gages | | USGS at Santa Cruz | | |
| | Soquel Creek At Soquel | | West Branch | *At Soquel minus West Br* | Near Soquel | *At minus Near* | West Branch | "Upper" (East Branch) | *West Br + Upper* | *At Soq minus WBr+Up* | At Aptos | Near Aptos | | | |
| | (ac-ft/yr) | (% avg) | (ac-ft/yr) | | | | | | | | | | | (in/yr) | (% avg) |
| 1952 | 8,862 | 158% | | | | | | | | | | | | 44.58 | 147% |
| 1953 | 8,121 | 144% | | | | | | | | | | | 2,196 | 24.41 | **80%** |
| 1954 | 5,960 | 106% | | | | | | | | | | | 1,790 | 23.84 | **79%** |
| 1955 | 5,449 | 97% | | | | | | | | | | | 1,630 | 23.88 | **79%** |
| 1956 | 8,216 | 146% | | | | | | | | | | | 1,960 | 39.67 | 131% |
| 1957 | 5,456 | 97% | | | | | | | | | | | 1,629 | 22.19 | **73%** |
| 1958 | 8,346 | 148% | | | | | | | | | | | 2,073 | 50.09 | 165% |
| 1959 | 4,830 | 86% | 1,857 | *2,973* | | | | | | | 1,409 | | 1,571 | 24.77 | **82%** |
| 1960 | 4,678 | 83% | 1,646 | *3,033* | | | | | | | 1,164 | | 1,802 | 21.43 | **71%** |
| 1961 | 2,472 | 44% | 1,085 | *1,387* | | | | | | | 737 | | 1,379 | 17.78 | **59%** |
| 1962 | 3,822 | 68% | 1,252 | *2,569* | | | | | | | 915 | | 1,544 | 27.47 | **91%** |
| 1963 | 8,689 | 155% | 3,040 | *5,649* | | | | | | | 1,960 | | 2,136 | 33.74 | 111% |
| 1964 | 4,408 | 78% | 1,873 | *2,535* | | | | | | | 1,411 | | 1,680 | 19.03 | **63%** |
| 1965 | 6,309 | 112% | 2,251 | *4,058* | | | | | | | 1,455 | | 1,915 | 30.64 | 101% |
| 1966 | 4,197 | 75% | 1,473 | *2,724* | | | | | | | 843 | | 1,570 | 20.48 | **67%** |
| 1967 | 6,952 | 124% | 2,663 | *4,289* | | | | | | | 1,168 | | 1,848 | 40.00 | 132% |
| 1968 | 4,352 | 77% | 1,839 | *2,513* | | | | | | | 998 | | 1,796 | 21.46 | **71%** |
| 1969 | 7,684 | 137% | 2,493 | *5,191* | 6,624 | *1,060* | | | | | 1,541 | | | 44.94 | 148% |
| 1970 | 6,338 | 113% | 2,385 | *3,953* | 5,583 | *756* | | | | | 1,714 | | | 30.18 | 99% |
| 1971 | 5,179 | 92% | 2,202 | *2,977* | 4,798 | *382* | | | | | 1,636 | | | 27.24 | **90%** |
| 1972 | 2,938 | 52% | 1,132 | *1,806* | 2,362 | *576* | | | | | 874 | 740 | | 19.08 | **63%** |
| 1973 | 5,997 | 107% | | | | | | | | | | 1,217 | | 43.67 | 144% |
| 1974 | 7,516 | 134% | | | | | | | | | | 1,899 | | 41.96 | 138% |
| 1975 | 6,093 | 108% | | | | | | | | | | 1,741 | | 24.29 | **80%** |
| 1976 | 2,410 | 43% | | | | | | | | | | 926 | | 15.37 | **51%** |
| 1977 | 1,496 | 27% | | | | | | | | | | 566 | | 14.81 | **49%** |
| 1978 | 5,113 | 91% | | | | | | | | | | 1,177 | | 37.59 | 124% |
| 1979 | 4,003 | 71% | | | | | | | | | | 1,118 | | 29.15 | 96% |
| 1980 | 5,911 | 105% | | | | | | | | | | 1,631 | | 37.14 | 122% |
| 1981 | 3,151 | 56% | | | | | | | | | | 881 | | 21.74 | **72%** |
| 1982 | 8,036 | 143% | | | | | | | | | | 1,975 | | 48.14 | 159% |
| 1983 | 14,235 | 253% | | | | | | | | | | 2,918 | | 53.93 | 178% |
| 1984 | 7,424 | 132% | | | | | | | | | | 2,555 | | 24.01 | **79%** |
| 1985 | 4,666 | 83% | | | | | 1,559 | | | | | 1,221 | | 29.68 | 98% |
| 1986 | 6,933 | 123% | | | | | 1,553 | | | | | | | 40.99 | 135% |
| 1987 | 3,137 | 56% | | | | | 682 | 667 | *1,349* | *1,787* | | | | 15.85 | **52%** |
| 1988 | 1,955 | 35% | | | | | 747 | 602 | *1,350* | *606* | | | | 18.73 | **62%** |
| 1989 | 2,303 | 41% | | | | | 728 | 977 | *1,705* | *598* | | | | 24.20 | **80%** |
| 1990 | 3,842 | 68% | | | | | 431 | 1,474 | *1,905* | *1,937* | | | | 16.76 | **55%** |
| 1991 | 2,032 | 36% | | | | | 968 | 507 | *1,475* | *557* | | | | 20.36 | **67%** |
| 1992 | 2,538 | 45% | | | | | 762 | 598 | *1,360* | *1,178* | | | | 27.51 | **91%** |
| 1993 | 4,448 | 79% | | | | | 1,255 | 728 | *1,984* | *2,465* | | | | 36.69 | 121% |
| 1994 | 2,290 | 41% | | | | | 846 | 660 | *1,505* | *785* | | | | 22.71 | **75%** |
| 1995 | 8,192 | 146% | | | | | 1,874 | 1,218 | *3,093* | *5,100* | | | | 43.01 | 142% |
| 1996 | 6,748 | 120% | | | | | 1,192 | 876 | *2,069* | *4,679* | | | | 31.49 | 104% |
| 1997 | 7,168 | 128% | | | | | 735 | 743 | *1,478* | *5,691* | | | | 36.60 | 121% |
| 1998 | 10,433 | 186% | | | | | 1,721 | 1,993 | *3,714* | *6,719* | | | | 59.82 | 197% |
| 1999 | 8,201 | 146% | | | | | 871 | 876 | *1,747* | *6,454* | | | | 33.65 | 111% |
| 2000 | 6,845 | 122% | | | | | 782 | 923 | *1,705* | *5,140* | | | | 36.39 | 120% |
| 2001 | 5,113 | 91% | | | | | 413 | 430 | *843* | *4,270* | | | | 25.45 | **84%** |
| 2002 | 5,177 | 92% | | | | | 526 | | | | | | | 28.79 | 95% |
| Avg | 5,621 | 100% | 1,942 | *3,261* | 4,842 | *693* | 980 | 885 | *1,819* | *3,198* | 1,273 | 1,469 | 1,782 | 30.34 | 100% |
| Min | 1,496 | 27% | 1,085 | *1,387* | 2,362 | *382* | 413 | 430 | *843* | *557* | 737 | 566 | 1,379 | 14.81 | 49% |
| Max | 14,235 | 253% | 3,040 | *5,649* | 6,624 | *1,060* | 1,874 | 1,993 | *3,714* | *6,719* | 1,960 | 2,918 | 2,196 | 59.82 | 197% |
| Period of Record % of Average* | | 100% | 93% | *93%* | 98% | *98%* | 91% | 92% | *92%* | *92%* | 93% | 100% | 103% | | |
| Adjusted Average | | | 2,098 | *3,523* | 4,917 | *704* | 1,072 | 965 | *1,984* | *3,488* | 1,375 | 1,463 | 1,738 | | |

*Based on Soquel Ck at Soquel record.

*Drought years in bold.

Heavy lines indicate boundaries between wet and dry periods.

**Table 5-10**

**Estimated Water-Year Baseflows of Soquel, Aptos, and Branciforte Creeks**

| Watershed | Tp or Qa[a] | Drainage Area (mi$^2$) | Water-shed Precip.[b] Ppt | Total Stream Discharge: Gaged[c] Qt | Total Stream Discharge: Rainfall-Runoff Relation[b] Qt | Stream Base-flow[c] Qb | Storm Flow Qs=Qt-Qb | Evapo-trans-piration (in/yr)[d] ET | Estimated Deep Recharge from Precip. dRch=Ppt-Qt-ET | Estimated Precip. Recharge Rch=Qb+dRch | Stream Baseflow (ac-ft/yr) | Estimated Deep Recharge from Precip. (ac-ft/yr) | Estimated Precip. Recharge (ac-ft/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Estimated Average Unit Rates (in/yr) | | | | | | | | Estimated Volumetric Rates | | |
| Gaged Watersheds | | | | | | | | | | | | | |
| W Br Soquel Creek (LKA) | | 8.8 | *44.5* | 17.2 | *15.9* | 2.20 | 15.0 | *27.0* | 0.34 | 2.54 | 1,035 | 160 | 1,195 |
| W Br Soquel Ck near Soquel | | 12.2 | 44.1 | 16.3 | *15.6* | 3.20 | 13.1 | *27.0* | 0.76 | 3.96 | 2,079 | 491 | 2,570 |
| Upper Soquel Creek (LKA) | | 13.6 | *43.5* | 14.4 | *15.2* | 1.40 | 13.0 | *27.5* | 1.58 | 2.98 | 1,016 | 1,146 | 2,162 |
| Soquel Ck near Soquel | | 32.0 | 43.3 | 15.1 | *15.1* | 2.80 | 12.3 | *26.0* | 2.15 | 4.95 | 4,776 | 3,675 | 8,451 |
| Soquel Ck at Soquel | | 40.2 | 41.4 | 14.6 | *13.9* | 2.62 | 12.0 | *25.5* | 1.33 | 3.95 | 5,621 | 2,851 | 8,472 |
| Branciforte Ck at Santa Cruz | | 17.3 | 40.9 | 14.7 | *13.5* | 2.10 | 12.6 | *24.7* | 1.52 | 3.62 | 1,938 | 1,402 | 3,339 |
| Aptos Ck near Aptos | | 10.2 | 38.6 | 12.8 | *12.0* | 2.60 | 10.2 | *24.3* | 1.49 | 4.09 | 1,414 | 811 | 2,226 |
| Aptos Ck at Aptos | | 12.1 | 37.5 | 10.0 | *11.2* | 2.30 | 7.66 | *24.1* | 2.12 | 4.42 | 1,485 | 1,369 | 2,854 |
| Portions of Gaged Watershed not in Study Area | | | | | | | | | | | | | |
| W Br not in study area | | *10.5* | *44.2* | *16.5* | *15.7* | *2.70* | *13.8* | 27.0 | *0.70* | *3.40* | 1,512 | 392 | 1,904 |
| Upper Soq. Ck not in study area | | *16.1* | *43.5* | *15.0* | *15.2* | *2.20* | *12.8* | 27.5 | *1.00* | *3.20* | 1,889 | 859 | 2,748 |
| Aptos Ck not in study area | | *3.4* | *44.0* | *16.0* | *15.6* | *2.00* | *14.0* | 27.2 | *0.80* | *2.80* | 363 | 145 | 508 |
| Portions of Gaged Watershed in Study Area | | | | | | | | | | | | | |
| Soquel Ck in study area[e] | Tp | 13.6 | - | - | - | *3.07* | - | - | *2.21* | *5.27* | *2,220* | *1,600* | *3,820* |
| Branc. Ck in study area | Tp | *3.6* | *38.0* | 12.5 | 11.6 | 2.00 | 10.5 | 24.6 | *1.80* | *3.80* | *384* | *346* | *730* |
| Aptos Ck in study area[f] | Tp | *8.7* | - | - | - | *2.42* | - | - | *2.63* | *5.05* | *1,123* | *1,223* | *2,346* |
| Estimates for Ungaged Watersheds in Study Area | | | | | | | | | | | | | |
| Valencia Creek at Aptos[g] | Tp/Qa | 9.1 | *34* | - | *7.95* | *2.00* | *5.95* | *23.7* | *2.35* | *4.35* | *966* | *1,134* | *2,100* |
| Between Branciforte and Soquel gaged watersheds, upstream of Hwy 1 (includes Arana and Rodeo gulches) | Tp | 5.9 | *33* | - | *8.29* | *1.77* | *6.52* | *22.5* | *2.21* | *3.98* | *562* | *699* | *1,261* |
| Between Soquel and Aptos gaged watersheds, upstream of Hwy 1 (includes Porter Gulch) | Tp | 3.5 | *31* | - | *6.97* | *1.57* | *5.40* | *22.0* | *2.03* | *3.60* | *295* | *382* | *677* |
| Harkins Slough and south to Hwy 1 | Qa | 7.6 | *26* | - | *1.80* | *1.00* | *0.80* | *19.1* | *5.10* | *6.10* | *406* | *2,070* | *2,476* |
| Hwy 1 to coast - West (Purisima) | Tp | *7.9* | *29* | - | *5.65* | *1.36* | *4.29* | *21.3* | *2.05* | *3.41* | *573* | *864* | *1,437* |
| Hwy 1 to coast - East (Aromas) | Qa | *5.2* | *24* | - | *2.34* | *0.84* | *1.50* | *19.1* | *2.56* | *3.40* | *233* | *709* | *942* |
| Study Area Totals and Weighted Averages | | | | | | | | | | | | | |
| Purisima study area | | *51* | | | | *2.2* | | | *2.2* | *4.4* | 6,100 | 6,100 | 12,200 |
| Aromas study area | | *14* | | | | *0.9* | | | *3.8* | *4.7* | 700 | 2,900 | 3,600 |
| Study area | | *65* | | | | *1.9* | | | *2.6* | *4.5* | 6,800 | 9,000 | 15,800 |

*(Note: small roundoff errors)*

Note: *Italics* indicate values with relatively more associated assumptions.

This table represents a worksheet combining data, estimates, assumptions, and professional judgement for the purpose of arriving at the generalized estimates presented in Table 5-12.

[a]Indicates values that contribute to the estimated recharge of either the Purisima study area (Tp; i.e., contributes groundwater to District Service Areas I & II) or the Aromas study area (Qa; i.e., contributes to District Service Areas III & IV).

[b]Estimated from Figure 5-5, except for watersheds overlying the Aromas Formation, for which lower values are assumed due to the soil's high percolation capacity.

[c]See Table 5-9. Baseflows of ungaged streams (italics) estimated from a regression between Qb and Ppt for gaged streams: Qb = (0.07 x Ppt) -0.58.

[d]Evapotranspiration estimated by: ET = (0.37 x Ppt)+10.4; slightly higher values assumed for fully forested areas, slightly lower values for Aromas areas. Phreatophyte ET is not explicitly accounted for. Regression equations for ET and Qb are assumed for the purpose of completing this table.

[e]"Soquel Ck in study area" (mi$^2$) = Soquel Ck at Soquel - ("West Branch Soquel Ck not in study area" + "Upper Soquel Ck not in study area")

[f]"Aptos Ck in study area" (mi$^2$) = Aptos Ck at Aptos - "Aptos Ck not in study area"

[g]Assumes 10% of Valencia Ck recharge contributes to Aromas area.

Table does not account for return-flow recharge from "imported" water use in Live Oak area.

**Table 5-11**
**Estimated Soquel-Aptos Baseflow and Recharge by Watershed**

| Study Subarea | Area ($mi^2$) | Estimated Average Unit Rates (in/yr) | | | Estimated Volumetric Rates | | |
|---|---|---|---|---|---|---|---|
| | | Stream Baseflow | Deep Recharge from Precip. | Precipitation Recharge | Stream Baseflow | Deep Recharge from Precip. | Precipitation Recharge |
| | | (in/yr) | | | (ac-ft/yr) | | |
| Purisima North | 7.4 | 2.4 | 2.3 | 4.7 | 950 | 910 | 1,850 |
| Purisima Central | 34.0 | 2.4 | 2.3 | 4.7 | 4,350 | 4,170 | 8,520 |
| Coastal Terrace West | 10.2 | 1.4 | 2.0 | 3.4 | 760 | 1,090 | 1,850 |
| **Purisima Average/Total** | 51.6 | 2.2 | 2.2 | 4.4 | **6,100** | **6,100** | **12,200** |
| Aromas Sands | 12.0 | 1.0 | 4.0 | 5.0 | 640 | 2,560 | 3,200 |
| Coastal Terrace East | 2.4 | 0.6 | 2.4 | 3.0 | 80 | 310 | 380 |
| **Aromas Average/Total** | 14.4 | 0.9 | 3.8 | 4.7 | **700** | **2,900** | **3,600** |
| **Average/Total** | 66.0 | 1.9 | 2.6 | 4.5 | **6,800** | **9,000** | **15,800** |

Based on unit rates estimated in Table 5-11.

**Table 5-12**

**Estimated Soquel-Aptos Baseflow and Precipitation Recharge by Subarea**

**Table 7-1**
**Summary of Past Interpretations of Stream-Aquifer Interactions Along Soquel Creek**

| | General Approach | Concept and Method | Inherent Limitations | Investigators |
|---|---|---|---|---|
| 1 | Hydrogeology of creek alluvium and Purisima Formation. | The layering and texture of the alluvium and underlying Purisima Formation along Soquel Creek may include fine-grained layers capable of greatly impeding flow between the creek and the alluvium, or between the alluvium and the Purisima Formation. Borehole geologic and geophysical logs are used to investigate layering. | Borehole geology is not a direct measure of pumping effects on baseflow. At best, it can only be used to infer vertical permeability at a point. Vertical flow is governed by permeability over a wide area and also by the hydraulic gradient. | Todd Engineers, 2001; Balance Hydrologics, 2003. |
| 2 | Aquifer test of a well near the creek. | Look for break in slope (recharge boundary) or gradual deflection (leakiness) in a plot of drawdown versus time at an observation well near the pumping well. Also, measure streamflow upstream and downstream of the well before and during the test. | The short duration of typical aquifer tests (1 to 3 days) is not likely to detect gradual leakage at steady rates over years to decades. | Luhdorff & Scalmanini Consulting Engineers, 1991; Todd Engineers, 2001. |
| 3 | Comparison of stream and ground-water elevations along the length of the creek. | Water-level differences between the creek and nearby wells indicate the direction of seepage between the stream and aquifer. | The hydraulic gradient between the creek and adjacent shallow aquifer indicates only the direction of flow, not the rate of flow. If permeability is very low, seepage rates may be negligible. | Luhdorff & Scalmanini Consulting Engineers, 1985, 1998; and with Linsley, Kraeger Associates, 2003. |
| 4 | Mapping small streamflow gains and losses along the length of the creek. | If pumping induces stream infiltration, this seepage should be detectable as a decrease in surface flow near the well during low-flow periods. Flow is measured at numerous points along the creek while a well is operating. The flow gains or losses between measurement points are compared with the location and pumping rate of the well. | The accuracy of streamflow measurements is at best plus-or-minus about 5 percent. The expected range of potential streamflow depletion by District wells is 0 to 2 cfs, which means that their impact could not be reliably measured at flows greater than 40 cfs, or possibly less. Fortunately, all of the previous investigations focused their analysis on periods when flows were typically less than 10 cfs. | Linsley, Kraeger Associates, 1986; Balance Hydrologics, 2003. |
| 5 | Well versus stream water quality. | If the major-ion composition of well water is different from that of the stream, it may be from a different source. | Water quality changes as water percolates from the creek or land surface through the groundwater system. Dissolution and precipitation of minerals, cation exchange, adsorption and commingling with older water in the basin deposits can cause the relative and absolute concentrations of individual ions to change. These processes must be considered when drawing conclusions regarding differences in water quality. | Luhdorff & Scalmanini Consulting Engineers, 1991. |

**Table 7.1**
**Summary of Past Interpretations of Stream-Aquifer Interactions Along Soquel Creek (continued)**

| | General Approach | Concept and Method | Inherent Limitations | Investigators |
|---|---|---|---|---|
| 6 | Correlate normal streamflow fluctuations to possible causative factors. | Evaluating the magnitude and timing of short-term fluctuations in baseflow may suggest the relative importance of factors that affect it. | The magnitude of the flow fluctuations is within the plausible range of ET-related streamflow depletion along a 1 to 2 mile reach upstream of each gaging location. The flow fluctuations are too large to be attributable to private well pumping along the creek because most of that pumping is for domestic use, which is not strongly diurnal, and because pumping at wells more than a few hundred feet from the creek or more than a few miles upstream would cause flow depletions out of phase with the depletion from closer wells, which would diminish their combined effect to a magnitude smaller than the observed fluctuations. | Balance Hydrologics, 2003. |
| | | If there is a strong correlation between annual groundwater pumping and summer baseflow, pumping is likely a significant factor affecting baseflow. | This method would fail to detect pumping effects if they are much smaller than effects caused by other factors. | Luhdorff & Scalmanini Consulting Engineers, Linsley, Kraeger Associates, 1998. |
| 7 | Correlate normal groundwater fluctuations with possible causative factors. | Comparing the timing and magnitude of observed fluctuations in groundwater levels with possible causes of those fluctuations (for example, pumping cycles, fluctuations in creek stage, or ET) can reveal which cause is dominant. | See detailed discussion in Appendix _. | Luhdorff & Scalmanini Consulting Engineers, Linsley, Kraeger Associates, 1998; 2003. |
| 8 | Comparison of baseflow trends with other streams unaffected by pumping. | The large effects of climate (wet and dry years) on baseflow can be filtered out of the flow dataset by comparing relative changes in baseflow trends between two nearby watersheds. Specifically, if baseflow in one stream changes from one period of years to a more recent period of years, while the average remained unchanged in a nearby stream, then the change at the first station must have been caused by something other than climatic conditions. | Watershed comparisons introduce new variables into the trend analysis, including: 1) differences in geology and storage response during long droughts, 2) differences in logging, grazing, fire and/or development history, and 3) differences in private well pumping upstream of the respective gages. Also, low flows are intrinsically difficult to gage accurately over extended periods because the stage-discharge relation can be significantly altered by in-channel vegetation growth, debris jams, or minor changes in bed topography. | Luhdorff & Scalmanini Consulting Engineers, Linsley, Kraeger Associates, 1998; Johnson, 2001. |

**Table 7.1**
**Summary of Past Interpretations of Stream-Aquifer Interactions Along Soquel Creek (continued)**

| | General Approach | Concept and Method | Inherent Limitations | Investigators |
|---|---|---|---|---|
| 9 | Comparison of average Soquel Creek baseflow and average rainfall for different periods. | By comparing average baseflow during hydrologically similar periods of years, changes in baseflow over time may be detectable. | Low flows are difficult to gage accurately. Apparent changes could reflect rating curve errors, or minor changes in vegetation or channel shape at the gage. | Luhdorff & Scalmanini Consulting Engineers, Linsley, Kraeger Associates, 1998; Todd Engineers, 2001. |
| 10 | Changes in the frequency distribution of low flows over time. | Evaluating the frequency distribution of low flows for different periods of time provides a more complete picture of the baseflow regime than average flows during those periods. The years selected for analysis can be stratified by climatic conditions (e.g. wet, normal, and dry years) to partially control for variability related to rainfall. Two methods can be used to evaluate frequency distributions. The first is to plot complete flow-duration curves, which involves ranking all the daily flows in each analysis period and plotting them against their percentile. The second is to select a small number of specific flow magnitudes (e.g. 0, 1, 2, 3 and 4 cfs) and plot the number of days in each analysis period that flows are less than or equal to those values. | As with all evaluations of low-flow records at gaging stations, those data are vulnerable to significant errors in the stage-discharge rating curve caused by minor changes over time in channel vegetation and bed form. | Jackson, 2001; Balance Hydrologics, 2003; this report (see Section 7.3). |
| 11 | Baseflow recession patterns. | The rate of dry-season baseflow recession could be a fairly sensitive indicator of pumping-related streamflow depletion. Comparing recession rates among various periods of years would reveal whether recession rates have changed over time. | Baseflow magnitude is strongly influence by annual rainfall, and a comparison among different years could lead to incorrect conclusions unless those years were climatically similar. Also, baseflow recession is affected by numerous factors including factors that also affect rainfall recharge. Thus, correctly identifying the cause of a change in recession rate may be difficult. | Johnson, 2001. |

**Table 7.1**
**Summary of Past Interpretations of Stream-Aquifer Interactions Along Soquel Creek (continued)**

| | General Approach | Concept and Method | Inherent Limitations | Investigators |
|---|---|---|---|---|
| 12 | Rainfall-runoff modeling. | Streamflow is strongly affected by rainfall. One of the ways to detect the effects of other factors is to evaluate changes in the relationship between rainfall and runoff. Methods of analysis include scatterplots and regression lines relating annual or seasonal streamflow to annual rainfall; multivariate regression models that relate current-month streamflow to weighted values of rainfall in a series of prior months (also known as the "antecedent precipitation index" method); and distributed-parameter computer models that simulate hydrologic processes such as interception, infiltration, depression storage, direct runoff, soil moisture storage, and interflow over short time intervals at a sub-watershed scale. | The fact that rainfall has a large effect on baseflow is an insufficient basis to conclude that other factors have little or no effect. | Luhdorff & Scalmanini Consulting Engineers, Linsley, Kraeger Associates, 1998; Jackson, 2001; Balance Hydrologics, 2003. |
| 13 | Groundwater modeling. | Creeks and rivers are often included in groundwater flow models as head-dependent boundary cells. Seepage to or from the creek is calculated during simulations as part of the overall groundwater flow system. During calibration, streambed permeability (conductance) is commonly calibrated so that simulated groundwater levels near the creek match measured water levels and the volume of seepage is consistent with the overall groundwater budget and flow patterns. Thus, groundwater modeling can be a useful tool for identifying gaining and losing reaches, estimating seepage rates, and investigating the effects of pumping on streamflow. | The modeling solution may not be unique. That is, equally good calibration results may be obtainable for various combinations of streambed conductance, aquifer transmissivity, and seepage flux. | Essaid, 1991; Montgomery Watson, Ali Taghavi & Associates, Luhdorff & Scalmanini Consulting Engineers, 1998. |

| | Water Year | Rainfall at Santa Cruz (inches) | Water Year | Soquel Creek Mean Annual Flow (cfs) |
|---|---|---|---|---|
| WET YEARS | 1998 | 59.82 | 1983 | 169.4 |
| | 1983 | 53.93 | 1956 | 98.6 |
| | 1958 | 50.09 | 1952 | 93.3 |
| | 1982 | 48.14 | 1982 | 91.4 |
| | 1969 | 44.94 | 1986 | 89.1 |
| | 1952 | 44.58 | 1998 | 88.0 |
| | 1973 | 43.67 | 1963 | 86.7 |
| | 1995 | 43.01 | 1958 | 83.1 |
| | 1974 | 41.96 | 1995 | 77.7 |
| | 1986 | 40.99 | 1967 | 74.9 |
| | 1967 | 40.00 | 1997 | 74.4 |
| | 1956 | 39.67 | 1969 | 74.2 |
| | 1978 | 37.59 | 1973 | 70.1 |
| NORMAL YEARS | 1980 | 37.14 | 1974 | 64.7 |
| | 1993 | 36.69 | 1970 | 61.5 |
| | 1997 | 36.60 | 1996 | 58.8 |
| | 2000 | 36.39 | 2000 | 57.0 |
| | 1963 | 33.74 | 1993 | 54.9 |
| | 1999 | 33.65 | 1978 | 54.7 |
| | 1996 | 31.49 | 1980 | 52.6 |
| | 1965 | 30.64 | 1965 | 50.9 |
| | 1970 | 30.18 | 1999 | 47.3 |
| | 1985 | 29.68 | 1953 | 37.5 |
| | 1979 | 29.15 | 1975 | 35.2 |
| | 2002 | 28.79 | 1984 | 34.1 |
| | 1992 | 27.51 | 1962 | 31.4 |
| | 1962 | 27.47 | 1971 | 31.3 |
| | 1971 | 27.24 | 1959 | 27.2 |
| | 2001 | 25.45 | 1954 | 25.8 |
| | 1959 | 24.77 | 2002 | 24.2 |
| | 1953 | 24.41 | 2001 | 23.2 |
| | 1975 | 24.29 | 1979 | 22.7 |
| | 1989 | 24.20 | 1955 | 20.8 |
| | 1984 | 24.01 | 1992 | 19.2 |
| | 1955 | 23.88 | 1957 | 18.8 |
| | 1954 | 23.84 | 1989 | 17.9 |
| DRY YEARS | 1994 | 22.71 | 1985 | 17.8 |
| | 1957 | 22.19 | 1960 | 17.1 |
| | 1981 | 21.74 | 1968 | 16.6 |
| | 1968 | 21.46 | 1964 | 13.8 |
| | 1960 | 21.43 | 1981 | 13.5 |
| | 1966 | 20.48 | 1991 | 13.3 |
| | 1991 | 20.36 | 1966 | 12.6 |
| | 1972 | 19.08 | 1990 | 10.8 |
| | 1964 | 19.03 | 1987 | 10.5 |
| | 1988 | 18.73 | 1994 | 9.6 |
| | 1961 | 17.78 | 1972 | 8.5 |
| | 1990 | 16.76 | 1988 | 6.7 |
| | 1987 | 15.85 | 1976 | 4.6 |
| | 1976 | 15.37 | 1961 | 4.5 |
| | 1977 | 14.81 | 1977 | 2.9 |

**Table 7-2**
**Classification of Water-Year Hydrologic Conditions**