

## Thermoelectric Power

190,000 million gallons per day

The total quantity of water used for thermoelectric power generation during 1995 was an estimated 190,000 Mgal/d, or about 3 percent less than during 1990. This use included 57,900 Mgal/d of saline water, or 10 percent less than during 1990). (See tables 23, 24.) Withdrawals for thermoelectric power generation account for 39 percent of freshwater use for all off-stream categories and represent 47 percent of combined fresh and saline withdrawals. Public suppliers only delivered about 100 Mgal/d of water to thermoelectric plants during 1995; this accounted for less than 1 percent of total public-supply withdrawals. Fossil-fuel thermoelectric plants account for about 71 percent of total thermoelectric withdrawals; nuclear plants, 29 percent; and geothermal plants, less than 1 percent.

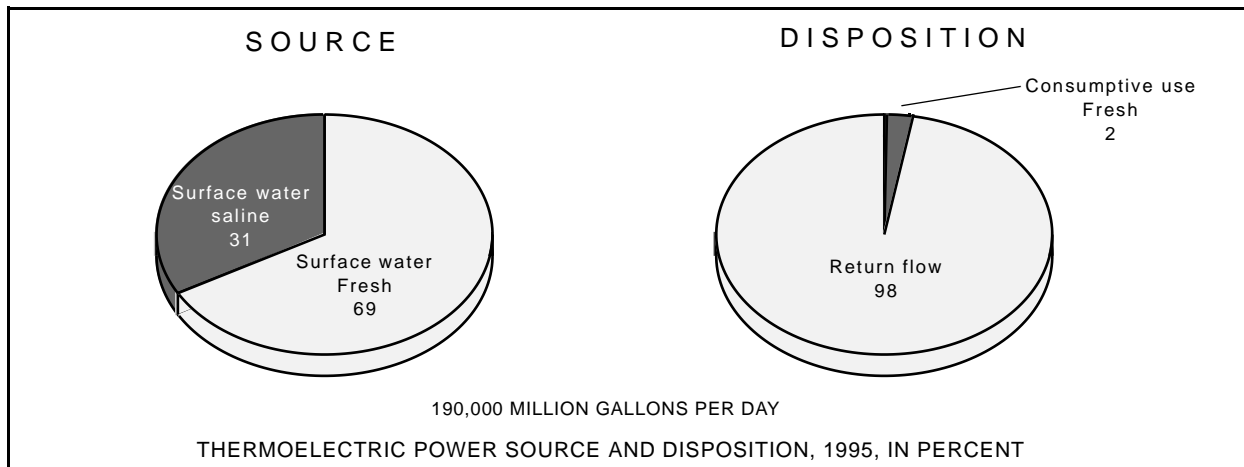
The source and disposition of water for thermoelectric power are shown in the chart below. Surface water was the source for more than 99 percent of total thermoelectric withdrawals, and about 31 percent of the surface-water withdrawal was saline. About 2 percent of the water withdrawn for thermoelectric power during 1995 was consumptively used as a result of once-through, cooling-tower, or pond cooling.

The thermoelectric power category includes water used in the generation of electric power with fossil-fuel, nuclear, or geothermal energy. The estimates of water withdrawals for thermoelectric power estimates should be reliable because relatively complete files on power generation are maintained by Federal and State agencies. The Electric Power Annual is prepared by the U.S.

Department of Energy, Energy Information Administration, and contains information about electric power net generation. Most of the water withdrawn by thermoelectric plants is used for condenser and reactor cooling. Plants vary widely as to the techniques used in the disposal of the cooling water after it is passed through the condensers. Less water is required when cooling water is recycled through cooling towers or ponds, but a higher percentage of the cooling water is evaporated (consumptive use), usually more than 60 percent. When the water withdrawn for cooling is used only once before it is returned to a surface water body, significantly more water is required, but evaporation is low (less than 3 percent). Withdrawal estimates generally are based on power generation. Consumptive use is based on coefficients ranging from 1 to 100 percent of withdrawals.

Thermoelectric power is by far the largest water use in the East. The eight eastern water-resources regions, led by the Mid-Atlantic region, account for 75 percent of the total water withdrawn for thermoelectric power cooling (figure 26; table 23). The highly populated States of Illinois, Texas, New York, Florida, and California use the most water for thermoelectric power. Illinois leads the Nation, nearly double Texas, in the use of freshwater for thermoelectric power.

Saline ground water was only reported for geothermal plants in California (22 Mgal/d), Nevada (30 Mgal/d), and Utah (6.7 Mgal/d), and is not listed in the tables or included in the totals.



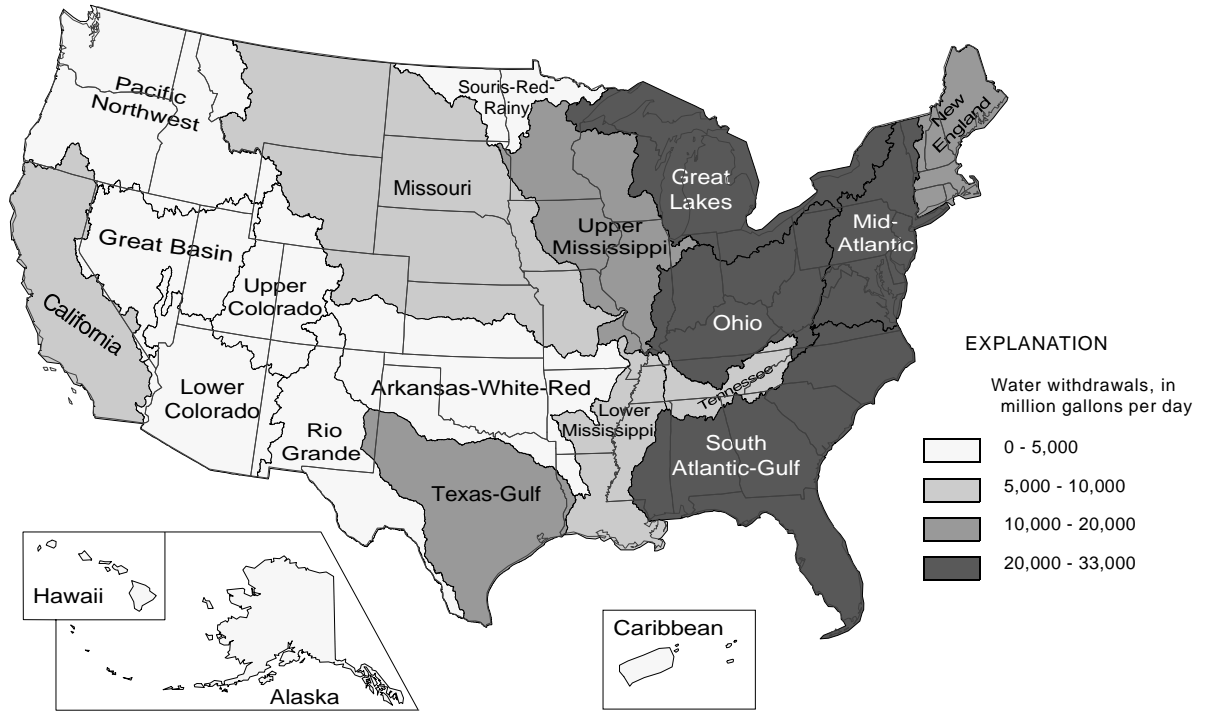
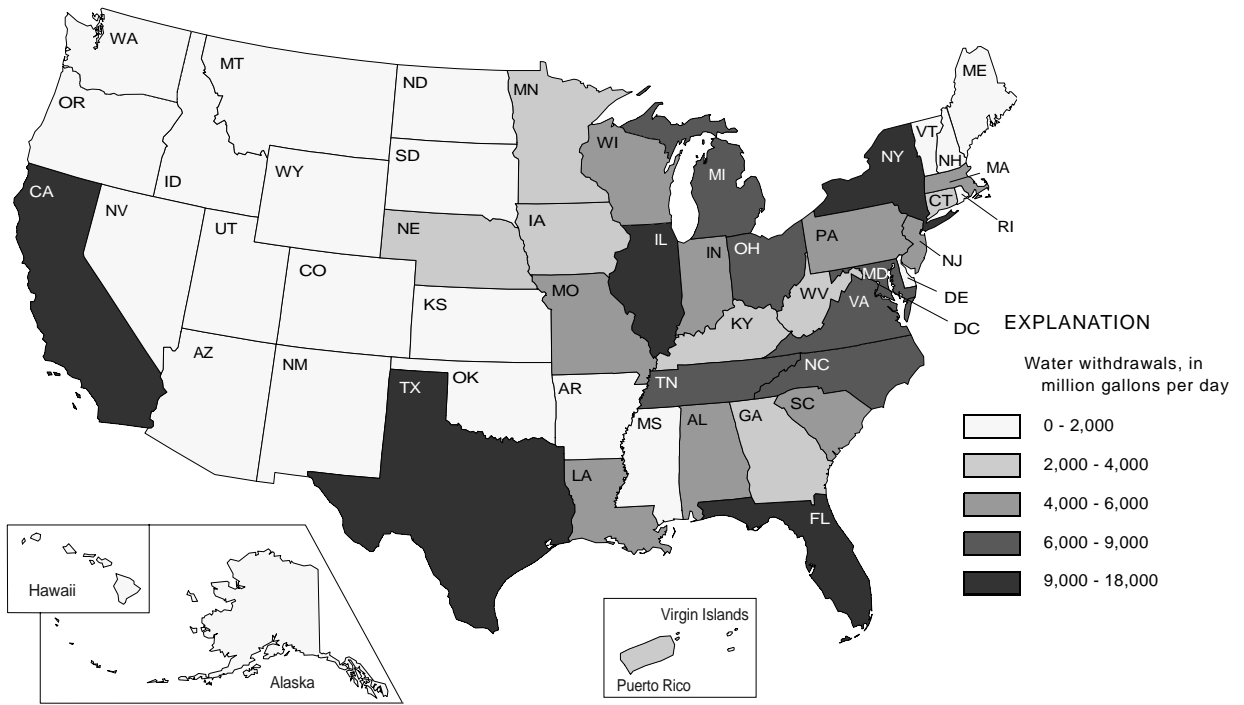


Figure 26. Thermoelectric power water withdrawals (fresh, saline) by water-resources region, 1995.

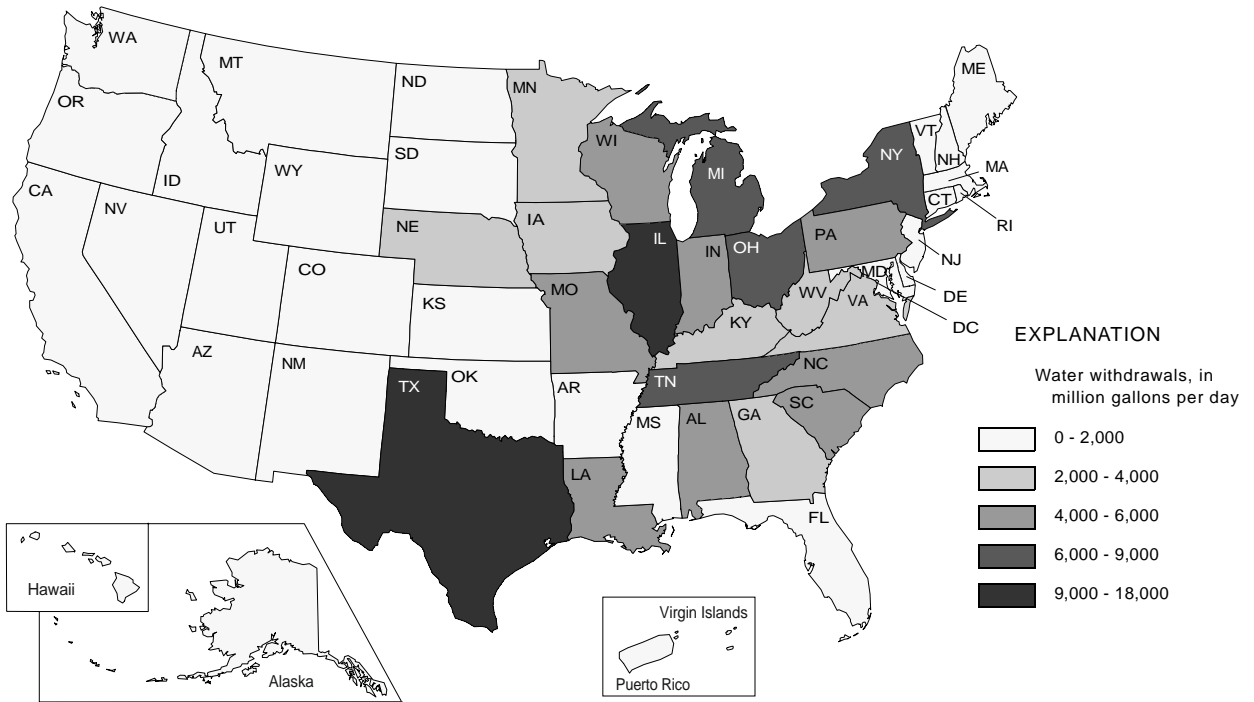
Table 23. Thermoelectric power water use by water-resources region, 1995

[Figures may not add to totals because of independent rounding. Mgal/d = million gallons per day; kWh = kilowatt-hour]

REGION	ALL THERMOELECTRIC POWER WATER USE, in Mgal/d									
	Self-supplied withdrawals, by source and type					Total use				
	Ground water	Surface water			Public-supply deliveries	Withdrawals and deliveries	Consumptive use			POWER GENERATED, in million kWh
		Fresh	Fresh	Saline			Total	Fresh	Fresh	
New England	48	1,620	8,800	10,400	2.3	1,670	17	88	105	84,600
Mid-Atlantic	11	12,600	19,700	32,400	27	12,700	188	213	401	259,000
South Atlantic-Gulf	79	17,500	12,700	30,200	5.6	17,600	344	20	365	478,000
Great Lakes	7.6	22,800	0	22,800	.1	22,800	429	0	429	219,000
Ohio	70	22,600	0	22,600	.3	22,600	838	0	838	451,000
Tennessee	0	6,990	0	6,990	0	6,990	13	0	13	76,600
Upper Mississippi	24	19,000	0	19,000	7.4	19,100	388	0	388	211,000
Lower Mississippi	69	6,670	0	6,670	1.1	6,740	253	0	253	78,100
Souris-Red-Rainy	0	38	0	38	0	38	0	0	0	396
Missouri Basin	30	8,770	0	8,770	4.7	8,810	172	0	172	167,000
Arkansas-White-Red	37	4,140	0	4,140	28	4,200	163	0	163	143,000
Texas-Gulf	50	7,630	3,870	11,500	13	7,700	252	12	264	224,000
Rio Grande	16	2.2	0	2.2	0	18	14	0	14	7,780
Upper Colorado	0	146	0	146	0	146	130	0	130	94,000
Lower Colorado	45	17	0	17	1.5	64	57	0	57	62,400
Great Basin	2.6	21	0	21	0	24	23	8.6	32	16,300
Pacific Northwest	.5	384	0	384	0	385	18	0	18	17,000
California	3.6	202	9,430	9,630	5.3	211	9.7	19	29	76,000
Alaska	4.2	26	0	26	.6	31	3.1	0	3.1	3,770
Hawaii	67	0	903	903	.3	67	.7	9.0	9.7	6,370
Caribbean	2.2	0	2,440	2,440	2.2	4.3	.9	0	.9	16,500
Total	565	131,000	57,900	189,000	100	132,000	3,310	369	3,680	2,690,000



**Figure 27.** Thermoelectric power water withdrawals (fresh, saline) by State, 1995.



**Figure 28.** Thermoelectric power freshwater withdrawals by State, 1995.

**Table 24.** Thermoelectric power water use by State, 1995

[Figures may not add to totals because of independent rounding. Mgal/d = million gallons per day; kWh = kilowatthour]

STATE	ALL THERMOELECTRIC POWER WATER USE, in Mgal/d									POWER GENERATED, in million kWh	
	Self-supplied withdrawals, by source and type				Public- supply deliveries	Withdrawals and deliveries		Total use			
	Ground water	Surface water				Fresh	Fresh	Consumptive use			
		Fresh	Fresh	Saline	Total			Fresh	Saline		Total
Alabama	6.0	5,190	0	5,190	0	5,200	32	0	32	85,300	
Alaska	4.2	26	0	26	.6	31	3.1	0	3.1	3,770	
Arizona	42	20	0	20	0	62	54	0	54	65,300	
Arkansas	5.2	1,770	0	1,770	0	1,770	28	0	28	37,400	
California	3.6	202	9,430	9,630	5.3	211	9.7	19	29	76,000	
Colorado	22	93	0	93	14	128	41	0	41	30,600	
Connecticut	.2	760	3,180	3,940	1.0	761	5.9	74	80	27,500	
Delaware	.2	534	740	1,270	.5	535	.2	2.9	3.1	6,060	
D.C.	0	9.7	0	9.7	0	9.7	.8	0	.8	189	
Florida	21	615	11,000	11,600	3.6	640	56	0	56	149,000	
Georgia	4.8	3,040	33	3,070	0	3,040	145	0	145	92,700	
Hawaii	67	0	903	903	.3	67	.7	9.0	9.7	6,370	
Idaho	0	0	0	0	0	0	0	0	0	0	
Illinois	11	17,100	0	17,100	5.2	17,100	407	0	407	147,000	
Indiana	11	5,680	0	5,680	0	5,690	114	0	114	105,000	
Iowa	15	2,110	0	2,110	3.0	2,130	10	0	10	32,600	
Kansas	14	1,250	0	1,250	.8	1,270	58	0	58	38,100	
Kentucky	38	3,410	0	3,410	0	3,440	203	0	203	70,600	
Louisiana	31	5,450	0	5,450	0	5,480	222	0	222	54,200	
Maine	.7	30	105	135	.9	31	3.5	1.7	5.2	4,600	
Maryland	1.8	358	6,000	6,360	0	360	3.7	48	52	43,200	
Massachusetts	46	150	4,370	4,520	0	196	0	6.0	6.0	34,000	
Michigan	3.0	8,370	0	8,370	0	8,370	126	0	126	96,700	
Minnesota	1.9	2,090	0	2,090	.1	2,090	48	0	48	41,300	
Mississippi	42	220	112	333	2.2	265	27	3.6	31	26,100	
Missouri	9.5	5,540	0	5,540	.2	5,550	51	0	51	63,600	
Montana	0	22	0	22	0	22	22	0	22	8,770	
Nebraska	4.4	2,350	0	2,350	0	2,350	12	0	12	23,800	
Nevada	6.3	21	0	21	1.5	28	28	8.3	37	18,900	
New Hampshire	.8	228	877	1,110	.3	229	4.3	0	4.3	14,000	
New Jersey	1.9	578	3,780	4,360	25	605	4.4	32	36	23,600	
New Mexico	9.3	46	0	46	.1	56	48	0	48	29,100	
New York	0	6,570	6,490	13,100	0	6,570	170	130	300	76,100	
North Carolina	.1	5,860	1,550	7,420	.4	5,860	57	17	74	93,400	
North Dakota	.3	879	0	879	0	880	25	0	25	26,300	
Ohio	19	8,170	0	8,170	0	8,190	336	0	336	135,000	
Oklahoma	3.5	121	0	121	1.2	126	60	0	60	44,700	
Oregon	0	9.0	0	9.0	0	9.0	7.8	0	7.8	3,620	
Pennsylvania	6.2	5,920	0	5,920	1.6	5,930	239	0	239	168,000	
Rhode Island	0	0	275	275	0	0	0	5.5	5.5	278	
South Carolina	39	4,770	0	4,770	0	4,810	51	0	51	74,200	
South Dakota	3.4	1.9	0	1.9	0	5.4	.1	0	.1	2,800	
Tennessee	0	8,300	0	8,300	.5	8,300	.5	0	.5	73,800	
Texas	59	9,530	3,870	13,400	29	9,620	297	12	309	259,000	
Utah	0	48	0	48	0	48	47	.3	47	31,600	
Vermont	.4	452	0	452	0	453	4.0	0	4.0	4,400	
Virginia	.4	3,890	2,730	6,620	.5	3,890	8.8	0	8.8	50,900	
Washington	.5	375	0	375	0	376	10	0	10	13,300	
West Virginia	.5	3,010	0	3,010	.2	3,010	122	0	122	79,100	
Wisconsin	5.8	5,820	0	5,820	.1	5,830	58	0	58	44,700	
Wyoming	1.0	219	0	219	0	220	50	0	50	38,600	
Puerto Rico	2.2	0	2,260	2,260	2.2	4.4	.7	0	.7	15,800	
Virgin Islands	0	0	173	173	.8	.8	.2	0	.2	771	
Total	565	131,000	57,900	189,000	100	132,000	3,310	369	3,680	2,690,000	

**Table 25.** Thermoelectric power water use by energy source and water-resources region, 1995

[Figures may not add to totals because of independent rounding. All values in million gallons per day]

REGION	FOSSIL FUEL						NUCLEAR					
	Withdrawals, by source and type				Consumptive use		Withdrawals, by source and type				Consumptive use	
	Ground water	Surface water					Ground water	Surface water				
		Fresh	Fresh	Saline	Total	Fresh		Saline	Fresh	Fresh	Saline	Total
New England . . . . .	48	684	5,460	6,150	14	82	0.1	936	3,340	4,270	3.2	6.0
Mid-Atlantic . . . . .	9.6	8,490	10,900	19,400	95	155	1.2	4,140	8,790	12,900	93	58
South Atlantic-Gulf . . . . .	39	11,200	9,290	20,500	220	3.6	40	6,340	3,360	9,700	124	17
Great Lakes . . . . .	7.4	15,300	0	15,300	180	0	.2	7,520	0	7,520	249	0
Ohio . . . . .	70	22,500	0	22,500	810	0	0	65	0	65	29	0
Tennessee . . . . .	0	4,750	0	4,750	11	0	0	2,240	0	2,240	1.5	0
Upper Mississippi . . . . .	20	12,300	0	12,300	163	0	3.4	6,690	0	6,690	225	0
Lower Mississippi . . . . .	37	5,650	0	5,650	223	0	32	1,020	0	1,020	30	0
Souris-Red-Rainy . . . . .	0	38	0	38	0	0	0	0	0	0	0	0
Missouri Basin . . . . .	28	7,700	0	7,700	161	0	.4	1,080	0	1,080	11	0
Arkansas-White-Red . . . . .	37	3,150	0	3,150	149	0	0	989	0	989	14	0
Texas-Gulf . . . . .	49	4,820	3,870	8,680	226	12	.8	2,820	0	2,820	26	0
Rio Grande . . . . .	16	2.2	0	2.2	14	0	0	0	0	0	0	0
Upper Colorado . . . . .	0	146	0	146	130	0	0	0	0	0	0	0
Lower Colorado . . . . .	45	17	0	17	57	0	0	0	0	0	0	0
Great Basin . . . . .	2.5	21	0	21	23	0	0	0	0	0	0	0
Pacific Northwest . . . . .	.4	26	0	26	8.2	0	.1	358	0	358	9.8	0
California . . . . .	3.5	190	4,730	4,920	9.4	2.8	.1	12	4,690	4,710	.3	1.3
Alaska . . . . .	4.2	26	0	26	3.1	0	0	0	0	0	0	0
Hawaii . . . . .	67	0	903	903	.7	9.0	0	0	0	0	0	0
Caribbean . . . . .	2.2	0	2,440	2,440	.9	0	0	0	0	0	0	0
Total . . . . .	486	97,000	37,600	135,000	2,500	263	78	34,300	20,200	54,500	815	82

**Table 26.** Thermoelectric power water use by energy source and State, 1995

[Figures may not add to totals because of independent rounding. All values in million gallons per day]

STATE	FOSSIL FUEL						NUCLEAR					
	Withdrawals, by source and type				Consumptive use		Withdrawals, by source and type				Consumptive use	
	Ground water	Surface water			Fresh	Saline	Ground water	Surface water			Fresh	Saline
		Fresh	Fresh	Saline				Total	Fresh	Fresh		
Alabama	6.0	4,330	0	4,330	30	0	0	862	0	862	1.7	0
Alaska	4.2	26	0	26	3.1	0	0	0	0	0	0	0
Arizona	42	20	0	20	54	0	0	0	0	0	0	0
Arkansas	5.2	798	0	798	27	0	0	967	0	967	1.2	0
California	3.5	190	4,730	4,920	9.4	2.8	.1	12	4,690	4,710	.3	1.3
Colorado	22	93	0	93	41	0	0	0	0	0	0	0
Connecticut	.1	276	882	1,160	5.9	74	.1	484	2,300	2,780	0	0
Delaware	.2	534	740	1,270	.2	2.9	0	0	0	0	0	0
D.C.	0	9.7	0	9.7	.8	0	0	0	0	0	0	0
Florida	21	615	9,140	9,760	54	0	.3	0	1,810	1,810	1.2	0
Georgia	3.9	2,910	33	2,950	52	0	1.0	122	0	122	93	0
Hawaii	67	0	903	903	.7	9.0	0	0	0	0	0	0
Idaho	0	0	0	0	0	0	0	0	0	0	0	0
Illinois	9.5	9,570	0	9,570	144	0	1.3	7,520	0	7,520	263	0
Indiana	11	5,680	0	5,680	114	0	0	0	0	0	0	0
Iowa	13	2,100	0	2,100	7.8	0	2.0	8.1	0	8.1	2.6	0
Kansas	14	1,230	0	1,230	45	0	0	22	0	22	13	0
Kentucky	38	3,410	0	3,410	203	0	0	0	0	0	0	0
Louisiana	31	4,430	0	4,430	212	0	.1	1,020	0	1,020	10	0
Maine	.7	30	105	135	3.5	1.7	0	0	0	0	0	0
Maryland	1.6	358	2,780	3,140	3.7	32	.2	0	3,220	3,220	0	16
Massachusetts	46	150	3,910	4,060	0	0	0	0	454	454	0	6.0
Michigan	3.0	6,030	0	6,030	50	0	.1	2,340	0	2,340	76	0
Minnesota	1.8	1,210	0	1,210	28	0	.1	886	0	886	20	0
Mississippi	10	220	112	333	8.0	3.6	32	0	0	0	19	0
Missouri	9.1	5,520	0	5,520	40	0	.4	21	0	21	11	0
Montana	0	22	0	22	22	0	0	0	0	0	0	0
Nebraska	4.4	1,290	0	1,290	12	0	0	1,060	0	1,060	0	0
Nevada	6.2	21	0	21	28	0	0	0	0	0	0	0
New Hampshire	.8	228	292	521	4.3	0	0	0	585	585	0	0
New Jersey	1.2	578	980	1,560	3.7	9.9	.7	0	2,800	2,800	.7	22
New Mexico	9.3	46	0	46	48	0	0	0	0	0	0	0
New York	0	5,140	5,470	10,600	103	109	0	1,420	1,010	2,440	68	20
North Carolina	.1	3,210	0	3,210	56	0	0	2,660	1,550	4,210	1.5	17
North Dakota	0	879	0	879	25	0	0	0	0	0	0	0
Ohio	19	8,040	0	8,040	309	0	0	137	0	137	27	0
Oklahoma	3.5	121	0	121	60	0	0	0	0	0	0	0
Oregon	0	9.0	0	9.0	7.8	0	0	0	0	0	0	0
Pennsylvania	6.2	3,870	0	3,870	120	0	0	2,050	0	2,050	119	0
Rhode Island	0	0	275	275	0	5.5	0	0	0	0	0	0
South Carolina	.4	1,290	0	1,290	23	0	39	3,470	0	3,470	28	0
South Dakota	2.6	1.9	0	1.9	.1	0	0	0	0	0	0	0
Tennessee	0	6,830	0	6,830	.5	0	0	1,470	0	1,470	0	0
Texas	58	6,710	3,870	10,600	271	12	.8	2,820	0	2,820	26	0
Utah	0	48	0	48	47	0	0	0	0	0	0	0
Vermont	.4	.5	0	.5	.7	0	0	452	0	452	3.2	0
Virginia	.1	1,820	973	2,790	8.8	0	.3	2,080	1,760	3,830	0	0
Washington	.4	17	0	17	.4	0	.1	358	0	358	9.8	0
West Virginia	.5	3,010	0	3,010	122	0	0	0	0	0	0	0
Wisconsin	5.6	3,860	0	3,860	39	0	.1	1,970	0	1,970	20	0
Wyoming	1.0	219	0	219	50	0	0	0	0	0	0	0
Puerto Rico	2.2	0	2,260	2,260	.7	0	0	0	0	0	0	0
Virgin Islands	0	0	173	173	.2	0	0	0	0	0	0	0
Total	486	97,000	37,600	135,000	2,500	263	78	34,300	20,200	54,500	815	82