GEOTHERMAL OPERATIONS

GEOTHERMAL DISTRICT BOUNDARIES AND OFFICES
of the
Division of Oil, Gas, and Geothermal Resources

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SUMMARY OF GEOTHERMAL OPERATIONS

Richard P. Thomas, Geothermal Officer, Sacramento

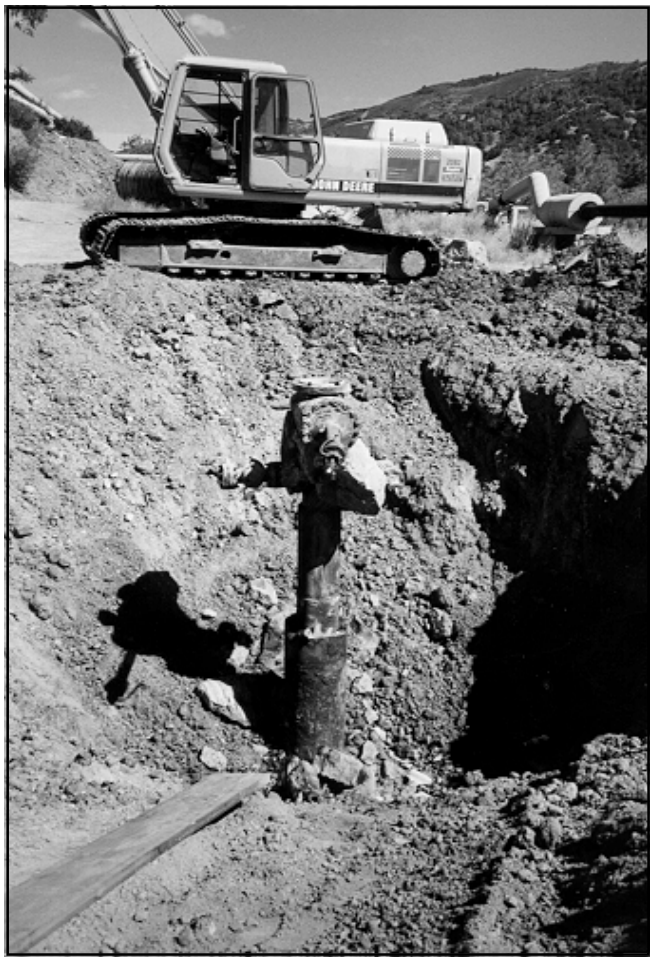
PROGRAM HIGHLIGHTS:

UNIT 15 WELLS In 1997, 22 geothermal wells were plugged and abandoned on the Unit 15 leasehold at The Geysers Geothermal field (*see* photos). The wells were operated by Geo Operator Corporation, which filed for bankruptcy in 1989. Neither Unit 15, a 62-megawatt power plant owned by Pacific Gas & Electric Company on the leasehold, nor the wells had been operated since 1989. However, the wells had been monitored through succeeding years by Department of Conservation engineers, who found some to be corroded and leaking hydrogen sulfide.

The U.S. Environmental Protection Agency (EPA), plugged and abandoned the seven most hazardous wells in Unit 15 when hydrogen sulfide gas was found to be leaking in potentially dangerous quantities. After repairing roadways, the EPA moved in a rig and the seven wells were plugged and abandoned by the end of July, at a cost of $1.4 million.

Meanwhile, the department, with the cooperation of the County of Sonoma, applied for and received $1.5 million from the California Energy Commission to complete work on the remaining wells. A contractor was hired in August 1997 and staff from the Santa Rosa geothermal office directed well-plugging operations. From the beginning of the project, the contractor faced a severe shortage of water for well mudding and cementing operations, and costs rose quickly as water was hauled from the Russian River. Fifteen wells were plugged and abandoned by the department, at a total cost of $1.5 million.

The EPA plugged and abandoned seven hazardous wells on Unit 15 at The Geysers Geothermal field. One was well "Rorabaugh" A-7, pictured here. *Photo by E. Johnson.*



Well "Rorabaugh" A-1, after it was plugged and abandoned on Unit 15. The wellhead was later cut off at the base, near the level of the plank, and buried. *Photo by E. Johnson.*

DISTRICT NO. G1

Elizabeth A. Johnson, District Engineer, Sacramento

LASSEN VOLCANIC NATIONAL PARK "WALKER O" WELL The Mining and Minerals Branch of the National Park Service, assisted by the Bureau of Land Management, plugged and abandoned geothermal well "Walker O" 1 in Lassen Volcanic National Park (*see* photos). In 1969, the well was drilled to a depth of 1,258 feet and deepened in 1978 to a depth of 4,008 feet. Terminal Geyser, a large fumarole and tourist attraction, is about 100 feet from the well. Department personnel worked closely with the Park Service on this project.

Originally, well "Walker 0" was drilled on privately held land. In the early 1980s, the National Park Service acquired both the land and the well in condemnation proceedings.

Plugging and abandonment operations at well "Walker 0." Steam from Terminal Geyser is in the background. *Photo by R. Estabrook, Bureau of Land Management.*

The "Walker 0" well in Lassen Volcanic National Park, as it was plugged and abandoned. *Photo by R. Estabrook.*

GEOTHERMAL POWER PLANTS PROPOSED AT MEDICINE LAKE Two geothermal power plants have been proposed for the Medicine Lake area of eastern Siskiyou County near Glass Mountain. Both proposed plant sites are in the Modoc National Forest. A draft EIR/EIS is being prepared for California Energy General Corporation's Telephone Flat Power Plant. The second power plant, proposed by Calpine Corporation, is in the Fourmile Hill area. A final EIR/EIS for the Telephone Flat project will be released in 1998 and the department will comment on issues relating to geothermal wells.

DISTRICT NO. G2

Timothy S. Boardman, District Engineer, El Centro

MINERAL EXTRACTION PLANNED In 1997, after the Salton Sea Mineral Recovery Pilot Demonstration Plant proved successful, California Energy Operating Company proposed a full scale mineral-recovery project for its entire operation in the Salton Sea Geothermal field. Under the plan, after geothermal brines pass through a power plant, they are processed for minerals extraction before they are injected into the reservoir. Although brines in the Salton Sea Geothermal field contain mostly common salts, they also hold minute amounts of nearly every element on the periodic table, from arsenic to zinc.

The extraction process involves an ion-exchange unit with resin beads similar to those used to soften water. The exchange unit strips away zinc when the beads are washed with water, yielding an element that is 99.9 percent pure.

In addition, the company is proposing a 49 megawatt, net, geothermal power plant expansion in the Salton Sea Geothermal field. The expansion will provide energy for the mineral extraction process, and the excess power will be sold.

California Energy Operating Company is the sole operator of geothermal power plants in the Salton Sea Geothermal field, where the company has eight power plants with a capacity of 276 megawatts, net.

DISTRICT NO. G3

Kenneth F. Stelling, District Engineer, Santa Rosa

THE GEYSERS GEOTHERMAL FIELD October 16, 1997, saw the official start of the Southeast Geysers

Effluent Pipeline Project, where treated wastewater effluent and fresh makeup water from Clear Lake were injected into The Geysers Geothermal field. The effluent is from Lake County Sanitation District treatment plants at Clearlake and Middletown.

The water is injected into the steam reservoir at The Geysers in wells owned by Calpine Corporation, the Northern California Power Agency, and Unocal Corporation. Initial indications are that the water helps maintain field pressure in the injection area.

Production at The Geysers Geothermal field increased by 2 percent, rising from 65.1 billion kilograms in 1996 to 66.5 billion kilograms in 1997 (*see* photo).

View of power plant Units 5 and 6, the oldest active geothermal power plants in California, generating electricity at The Geysers Geothermal field. *Photo by E. Johnson.*

GEOTHERMAL STATISTICS

GEOTHERMAL OPERATIONS AND METERS DRILLED - 1997*

Field or county	API county code	Drilled					Completed					Redrilled or deepened					Plugged & abandoned					Suspended	Meters drilled	
		Explor.	Prod.	Serv.	Temp. grad.	Total	Explor.	Prod.	Serv.	Temp. grad.	Total	Explor.	Prod.	Serv.	Temp. grad.	Total	Explor.	Prod.	Serv.	Temp. grad.	Total		New wells	Reworks
DISTRICT G1																							
Casa Diablo	051	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lake City	049	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Litchfield	035	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Susanville	035	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wendel	035	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lassen County	035	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Modoc County	049	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mono County	051	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	4	6	0	0	0
Plumas County	063	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shasta County	089	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sierra County	091	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
District G1 Totals		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	4	6	0	0	0
DISTRICT G2																								
Brawley	025	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heber	025	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Mesa	025	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
Mesquite	025	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Salton Sea	025	0	2	1	0	3	0	2	1	0	3	0	3	5	0	8	0	1	0	0	1	0	6,381	3,955
Desert Hot Springs	065	0	2	0	0	2	0	2	0	0	2	0	1	0	0	1	0	0	0	0	0	0	233	41
Imperial County	025	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Inyo County	027	0	3	1	0	4	0	3	1	0	4	0	2	0	0	2	0	0	0	0	0	0	7,504	2,878
Kern County	029	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Riverside County	065	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Bernardino	071	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Luis Obispo	079	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
District G2 Totals		0	7	2	0	9	0	7	2	0	9	0	6	5	0	11	0	2	0	0	2	0	14,118	6,874
DISTRICT G3																								
Calistoga	055	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	145	0
The Geysers	033	0	1	1	0	2	0	1	1	0	2	0	0	0	0	0	0	1	0	0	1	0	7,913	0
	097	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	3	0	22	0	0	0
Lake County	033	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mendocino County	045	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sonoma County	097	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
District G3 Totals		0	3	1	0	4	0	1	1	0	4	0	0	0	0	0	0	20	3	0	23	0	8,058	0
STATE TOTALS		0	10	3	0	13	0	8	3	0	11	0	6	5	0	11	1	23	3	4	31	0	22,176	6,874

* Data for federal leases are not included.

CALIFORNIA'S STEAM-DOMINATED GEOTHERMAL FIELDS *

Year	Average number of producing wells	Gross steam produced kilograms (thousands)	Average number of active injection wells	Water injected kilograms (thousands)	Percent injected
The Geysers Geothermal field:					
1960	3	306,180	0	0	0
1961	3	857,431	0	0	0
1962	3	913,804	0	0	0
1963	7	1,530,900	0	0	0
1964	7	1,838,314	0	0	0
1965	7	1,727,581	0	0	0
1966	7	1,709,872	0	0	0
1967	13	2,862,470	0	0	0
1968	13	3,515,849	0	0	0
1969	26	6,812,616	1	410,788	6.0
1970	27	6,457,453	1	847,490	13.1
1971	30	7,813,799	2	1,224,598	15.7
1972	45	15,777,373	3	2,904,923	18.4
1973	60	21,464,314	4	4,064,929	18.9
1974	72	26,329,259	5	5,364,196	20.4
1975	84	30,514,607	5	7,473,397	24.5
1976	92	31,995,187	6	7,717,116	24.1
1977	95	32,527,275	6	7,496,076	23.0
1978	95	27,622,596	6	6,522,400	23.6
1979	123	36,138,118	9	8,723,633	24.1
1980	150	46,966,791	10	10,866,000	23.1
1981	165	52,864,353	12	13,595,090	25.7
1982	174	48,174,347	11	13,549,916	28.1
1983	225	65,893,108	15	19,081,541	29.0
1984	253	80,067,099	17	23,312,221	29.1
1985	309	95,232,214	22	26,517,067	27.8
1986	354	106,561,865	23	30,771,676	28.9
1987	390	111,821,897	23	31,495,280	28.2
1988	429	108,523,641	23	28,325,113	26.1
1989	439	100,205,378	23	28,348,657	28.3
1990	442	95,646,626	25	27,318,499	28.6
1991	436	89,660,288	26	25,747,804	28.7
1992	444	88,513,172	29	27,344,280	30.9
1993	450	84,379,560	29	30,183,128	35.8
1994	447	78,427,345	28	24,524,066	31.3
1995	428	+61,104,078	26	26,826,230	43.9
1996	439	+65,110,919	25	30,601,721	47.0
1997	430	66,515,579	29	26,701,703	40.1

* Data for federal leases included.
\+ Contains corrected data.

CALIFORNIA'S WATER - DOMINATED GEOTHERMAL FIELDS*

Geothermal field	Year	Average number of producing wells	Gross water produced kilograms (thousands)	Average number of injection wells	Water injected kilograms (thousands)
Amedee	1988**	2	1,283,871	NO INJECTION	
	1989	2	4,778,856		
	1990	2	5,443,317		
	1991	2	5,778,129		
	1992	2	5,946,618		
	1993	2	5,535,367		
	1994	2	4,970,443		
	1995	2	5,357,734		
	1996	2	5,670,982		
	1997	2	5,374,700		
Brawley	1982**	2	1,833,217	2	1,578,510
	1983	2	2,397,722	4	2,342,862
	1984	1	1,122,414	3	994,175
	1985	1	555,731	1	529,041
	1986		PROJECT TERMINATED		
Casa Diablo	1984**	1	1,317,788	1	1,317,788
	1985	3	3,840,401	3	3,840,401
	1986	3	6,076,840	3	6,076,840
	1987	4	6,754,790	3	6,754,790
	1988	4	6,723,808	3	6,723,808
	1989	3	6,871,002	3	6,871,002
	1990	4	6,971,231	3	6,971,231
	1991	10	24,538,220	5	24,538,220
	1992	10	24,604,335	4	24,604,335
	1993	10	23,544,466	4	23,544,466
	1994	10	23,637,236	5	23,637,236
	1995	9	22,498,589	5	22,498,589
	1996	9	22,500,565	5	22,500,565
	1997	9	22,229,408	5	22,229,408
Coso	1987**	5	4,125,630	3	3,547,813
	1988	15	13,965,143	6	9,233,591
	1989	32	44,187,631	12	34,841,883
	1990	47	55,936,765	14	40,390,044
	1991	57	46,624,874	14	28,479,346
	1992	63	41,198,639	16	27,342,886
	1993	68	+47,726,990	18	26,693,236
	1994	+72	+43,261,502	19	24,412,831
	1995	+75	+40,317,057	20	24,483,807
	1996	+79	+39,732,984	20	22,416,692
	1997	82	36,611,570	20	19,485,632
East Mesa	1983**	5	3,196,215	3	3,190,219
	1984	6	4,050,175	2	3,963,468
	1985	6	3,659,938	2	3,385,793
	1986	6	4,725,162	3	4,399,114
	1987	15	14,187,024	6	13,734,959
	1988	25	40,952,496	12	35,950,366
	1989	32	67,990,914	23	57,796,766
	1990	39	79,221,063	33	75,465,209
	1991	42	91,984,758	36	89,406,945
	1992	42	97,750,781	39	94,370,772
	1993	43	97,849,346	40	96,029,637
	1994	43	90,589,304	40	87,198,495
	1995	43	90,488,703	41	86,970,705
	1996	43	92,604,479	42	89,674,536
	1997	42	92,797,342	43	89,231,453
Heber	1985**	9	13,584,658	8	13,214,051
	1986	13	32,263,682	12	29,716,492
	1987	16	34,472,259	13	31,300,084
	1988	12	29,769,219	10	26,031,068
	1989	11	29,384,658	10	24,976,751
	1990	10	29,487,574	9	25,085,848
	1991	10	29,215,287	9	25,252,223
	1992	10	29,478,685	9	26,816,804
	1993	17	41,674,826	17	38,101,717
	1994	22	53,988,169	22	+49,640,276
	1995	22	56,645,248	23	52,587,798
	1996	22	58,358,658	23	54,637,130
	1997	22	60,145,589	20	56,449,799

Geothermal field	Year	Average number of producing wells	Gross water produced kilograms (thousands)	Average number of injection wells	Water injected kilograms (thousands)
Litchfield	1984**	1	945,419	NO INJECTION	
	1985	1	987,427		
	1986	1	852,801		
	1987	1	712,709		
	1988	1	765,384		
	1989	1	1,061,360		
	1990	1	891,708		
	1991	1	760,304		
	1992	1	621,690		
	1993	1	885,045		
	1994	1	701,006		
	1995	1	822,790		
	1996	1	729,777		
	1997	1	988,284		
Salton Sea	1982**	2	2,383,365	2	2,071,770
	1983	3	3,735,455	2	3,260,076
	1984	2	4,208,900	2	3,211,456
	1985	2	4,167,497	2	3,193,912
	1986	9	13,433,795	7	10,851,579
	1987	9	14,272,783	8	11,911,933
	1988	11	19,572,266	10	17,087,924
	1989	23	56,570,756	18	47,581,465
	1990	32	75,745,346	23	62,991,977
	1991	33	77,687,699	23	68,884,579
	1992	35	78,034,671	22	69,247,157
	1993	34	77,792,273	25	+66,406,019
	1994	31	77,764,065	24	69,917,900
	1995	32	80,974,333	24	71,139,969
	1996	32	96,779,351	26	+83,152,296
	1997	30	102,380,076	29	104,693,078
Susanville***	1982**	1	21,228	1	21,228
	1983	1	174,352	1	174,352
	1984	1	134,832	1	134,832
	1985	1	339,792	1	171,360
	1986	1	345,600	1	199,104
	1987	1	436,751	1	276,196
	1988	1	262,878	1	230,307
	1989	1	448,792	1	300,972
	1990	1	518,471	1	297,840
	1991	1	525,490	1	297,840
	1992	1	482,574	1	298,656
	1993	1	589,658	1	297,840
	1994	1	551,406	1	297,840
	1995	1	565,345	1	297,024
	1996	1	489,327	1	297,840
	1997	1	415,313	1	297,840
Wendel	1985**	1	833,989		0
	1986	1	1,808,949		0
	1987	1	1,773,907		0
	1988	1	1,763,722		0
	1989	2	2,542,910	1	428,745
	1990	2	2,618,618	1	978,066
	1991	2	2,440,737	1	1,717,291
	1992	2	2,503,719	1	1,017,408
	1993	2	2,370,861	1	1,043,371
	1994	2	2,309,924	1	1,145,622
	1995	2	2,153,224	1	956,770
	1996	2	+2,032,435	1	749,124
	1997	2	1,772,335	1	605,987

* Data for federal leases included.

** The first year that production data were reported to the Division of Oil, Gas, and Geothermal Resources.

*** Data are only available for the city's space-heating project.

\+ Contains corrected data.

GEOTHERMAL NOTICES FILED AND INSPECTIONS - 1997*

Field or county	Notices to drill					Notices to rework					Notices to plug & abandon					Total inspections by district
	Explor.	Prod.	Serv.	Temp. grad.	Total	Explor.	Prod.	Serv.	Temp. grad.	Total	Explor.	Prod.	Serv.	Temp. grad.	Total	
DISTRICT G1																
Casa Diablo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Lake City	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Litchfield	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Wendel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Susanville	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Lassen County	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Modoc County	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Mono County	0	0	0	0	0	0	0	0	0	0	1	1	0	4	6	
Plumas County	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Shasta County	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Sierra County	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
District G1 Totals	0	0	0	0	0	0	0	0	0	0	1	1	0	4	6	272
DISTRICT G2																
Brawley	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Heber	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	
East Mesa	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	
Mesquite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Salton Sea	0	2	1	0	3	0	12	9	2	23	0	1	0	0	1	
Desert Hot Springs	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	
Imperial County	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	
Inyo County	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Los Angeles County	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Riverside County	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
San Bernardino	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
San Luis Obispo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
District G2 Totals	2	4	1	0	7	0	12	10	2	24	0	1	0	0	1	320
DISTRICT G3																
Calistoga	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	
The Geysers	0	2	2	0	4	0	5	2	0	7	0	22	2	0	24	
Lake County	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Mendocino County	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	
Napa County	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Sonoma County	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
District G3 Totals	0	4	2	0	6	0	5	2	0	7	1	22	2	0	25	1,496
STATE TOTALS	2	8	3	0	13	0	17	12	2	31	2	24	2	4	32	2,088

*Data for federal leases not included. The number of drilling permits issued by the Bureau of Land Management (BLM) for geothermal development on federal lands in California stayed the same in 1997. According to the BLM, 1 well was permitted during federal fiscal year 1997 (October 1996-September 1997) and 1 well was permitted the year before.

GEOTHERMAL EXPLORATORY WELLS DRILLED TO TOTAL DEPTH IN 1997

County	T.	R.	Sec.	B. & M.	Operator	Well designation and API number	Elev. (meters)	Month drilling completed	Total depth (meters)	Stratigraphic units penetrated and/or time-stratigraphic units at total depth (depth in meters)
NONE TO REPORT										

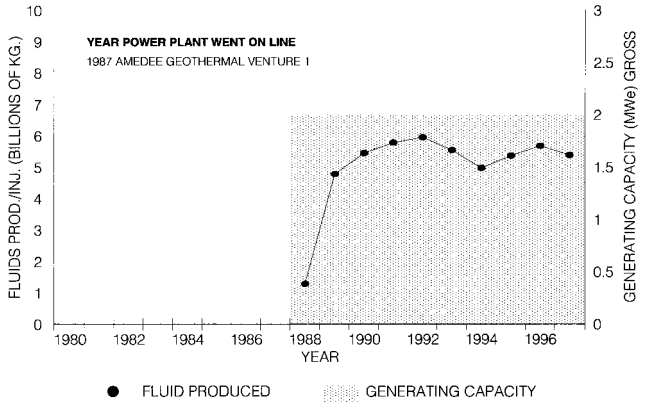
GEOTHERMAL CEQA APPLICATIONS AND SITE VISITS

Year	Projects filed				Notices issued				Reports				Site inspections		
	Temperature gradient	Exploratory	Other	Total	Preparation	Exemption	Determination	Total	Negative declaration	Draft EIR	Final EIR	Total	General	Specific	Total
1980	24	6	0	30	9	20	6	35	3	4	4	11	2	9	11
1981	12	7	0	19	15	15	6	36	3	3	2	8	0	11	11
1982	2	6	0	8	5	3	5	13	2	1	2	5	0	2	2
1983	4	7	0	11	4	6	2	12	1	2	2	5	0	5	5
1984	5	3	0	8	1	7	5	13	0	5	4	9	0	4	4
1985	5	3	0	8	2	5	3	10	1	2	2	5	0	0	0
1986	0	3	0	3	0	2	1	3	1	0	0	1	1	0	1
1987	0	5	0	5	0	3	1	4	1	0	0	1	1	4	5
1988	0	1	0	1	0	1	1	2	0	0	0	0	1	0	1
1989	0	2	0	2	0	1	1	2	1	0	0	1	3	0	3
1990	0	2	0	2	0	2	2	4	0	0	0	0	0	2	2
1991	0	3	0	3	0	3	0	3	0	0	0	0	0	3	3
1992	0	2	1	3	0	0	2	2	2	0	0	2	2	6	8
1993	2	2	0	4	2	2	2	6	2	0	0	2	4	4	8
1994	0	1	0	1	0	0	0	0	0	0	0	0	1	1	2
1995	0	1	0	1	0	1	0	1	1	0	0	1	1	1	2
1996	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

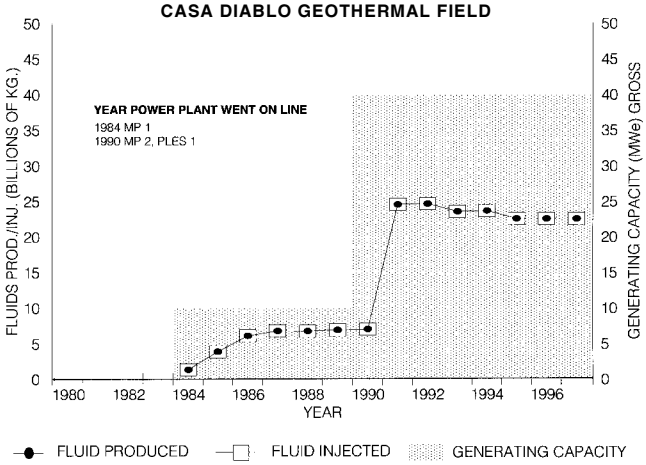
FLUID PRODUCED AND INJECTED, AND POWER PLANT CAPACITY FOR CALIFORNIA GEOTHERMAL FIELDS

DISTRICT NO. G1

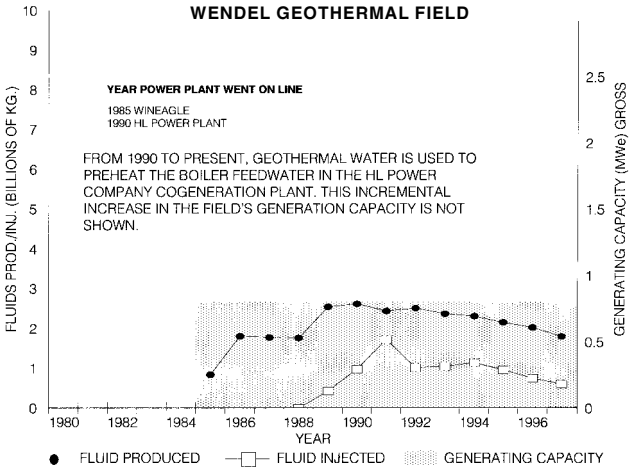
AMEDEE GEOTHERMAL FIELD



CASA DIABLO GEOTHERMAL FIELD

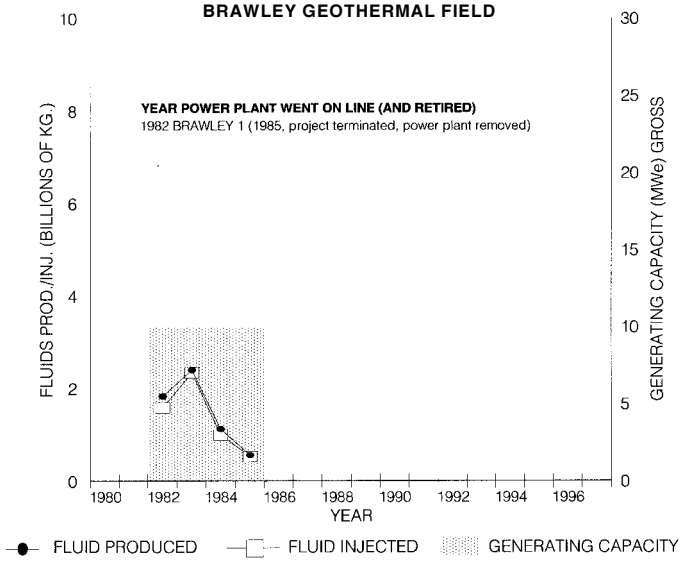


WENDEL GEOTHERMAL FIELD

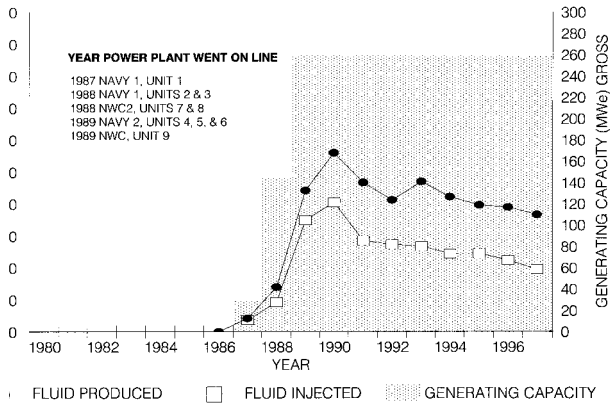


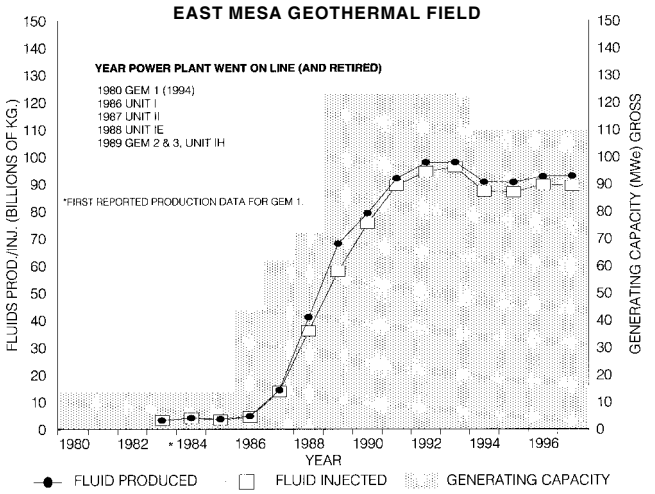
DISTRICT NO. G2

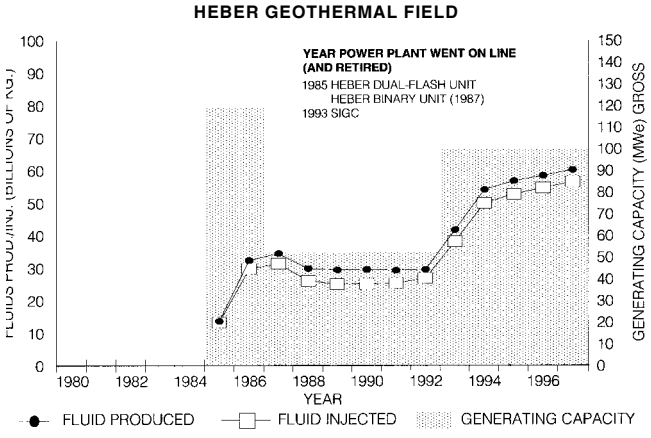
BRAWLEY GEOTHERMAL FIELD

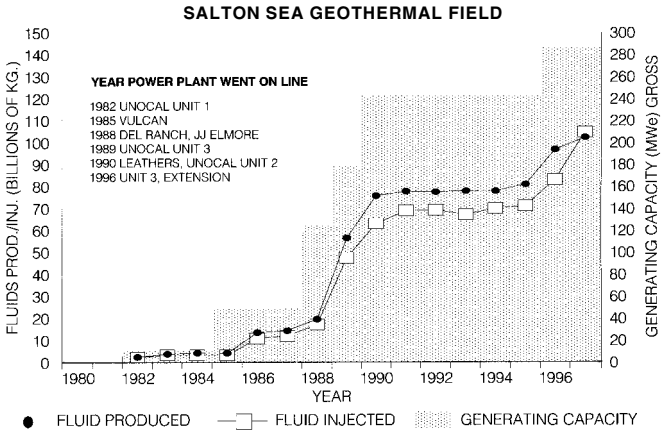


COSO GEOTHERMAL FIELD

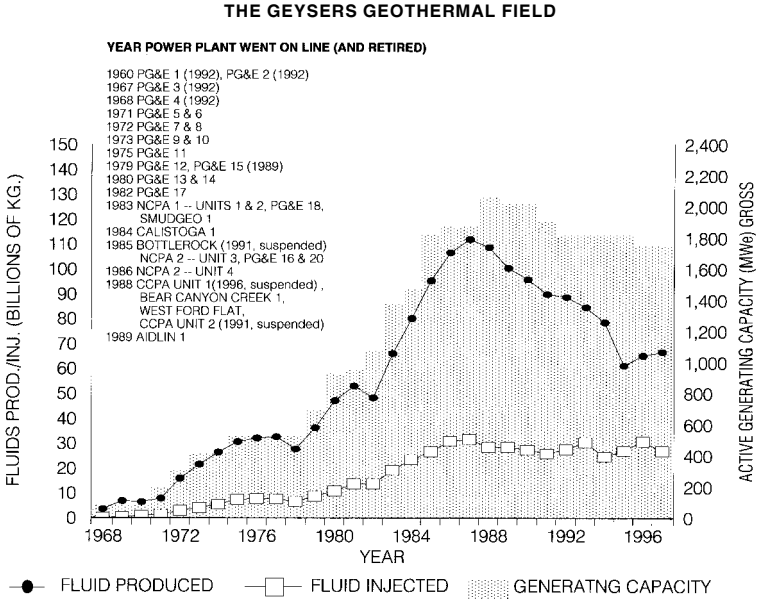








DISTRICT NO. G3



FINANCIAL REPORT

FINANCIAL REPORT

The following report is made in accordance with Section 3108, Division 3, Public Resources Code, which reads as follows: "On or before the first day of October of each year the supervisor shall make public for the benefit of all interested persons, a report in writing showing:

(a) The total amounts of oil and gas produced in each county in the state during the previous calendar year. (Figures for 1996 are published in the *82nd Annual Report of the State Oil and Gas Supervisor.)*

(b) The total cost of the division for the previous fiscal year.

(c) The total amount delinquent and uncollected from any assessments or charges levied pursuant to the chapter.

The report shall also include such other information as the supervisor deems advisable."

Collection of Funds by Assessment

Funds for the support of the Department of Conservation's Division of Oil, Gas, and Geothermal Resources are raised by an assessment on oil and gas production as provided for in Article 7 of Division 3, Public Resources Code.

The assessment is based on the projected expenditures of the division, taking into account any previous surpluses or deficiencies, and the prior year's production. For the 1997-98 fiscal year, the rate of assessment was established at $0.0355296 per barrel of oil or ten thousand cubic feet of gas.

As provided for in Chapter 4, Division 3, Section 3724.5 of the Public Resources Code, the division is also partly funded by an annual assessment levied on operators of high-temperature geothermal resource wells and by drilling fees charged to geothermal operators for drilling new wells or redrilling abandoned wells.

For the 1997-98 fiscal year, the fee-assessment was established at $1,680.00 per high-temperature geothermal well.

Financial Statement

1996-97 Fiscal Year

Beginning Resource	$	352,000.00
Balance Available from Prior Year	$	26,000.00
Revenue Applicable to Oil, Gas, and Geothermal Operations	$	10,117,000.00
Total Resources	$	10,495,000.00
Total Expenditures	$	10,288,000.00
Ending Resources	$	207,000.00

Hazardous and Idle – deserted Well Abandonment Expenditures

1996-97 Fiscal Year

No. of Wells			
46	Hazardous and Idle-deserted Wells Plugged and Abandoned	$	660,711.93
0	Section 3237 PRC Wells Plugged and Abandoned	$	0
7	Orphaned Wells Plugged and Abandoned (HIDWAF)	$	51,307.22
53	Total Wells Plugged and Abandoned	$	712,019.15
	Remedial Action Taken	$	27,614.88
	Gross Expenditure	$	739,634.03
	Reimbursement	$	-419,580.95
	Net Expenditure	$	320,053.08
	Geothermal		
	Remedial Action Taken	$	21,654.98
	Reimbursement	$	-22,879.98
	Net Expenditure	$	- 1,225.00

Underground Injection Control Program Expenditures

(Oct. 1, 1996 – Sept. 30, 1997 Federal Fiscal Year)

Beginning Resource	$	427,500.00
Balance Available from Prior Year	$	2,197.00
Total Resources	$	429,697.00
Total Expenditures	$	380,810.00
Ending Resources	$	48,887.00

List of Delinquent Assessments and Penalties: Oil, Gas, and Geothermal Operations as of June 30, 1998

OPERATOR	YEAR	ASSESSMENT
OIL AND GAS OPERATORS		
Alanmar Energy	1997	$1,270.29
Allied Energy Corp.	1996	$91.50
	1997	$34.48
Amerada Hess Corp.	1997	$2,488.47
American Barter Petro., Inc.	1993	$4,454.98
	1994	$3,487.97
American Titan Oil Co.	1996	$266.34
Baker Oil and Gas Co.	1990	$1,036.74
Blackhawk Oil Co.	1994	$7,266.45
	1995	$2,509.94
Brea Oil Co. Inc.	1997	$587.19
Brindle/Thomas	1996	$793.85
	1997	$165.95
E. H. Brogdon	1996	$70.53
Weldon Bruce	1989	$634.65
Calif. Oil Independents, Inc.	1995	$364.60
	1996	$311.16
Cemco-Edison #1 Fr Prtnrshp	1997	$64.03
Central Lease Inc.	1991	$1,580.38
	1992	$1,115.79
	1993	$819.57
	1995	$82.64
Deuel Petroleum Co., Inc.	1987	$123.76
	1988	$210.01
Dynametrics	1996	$192.46
	1997	$97.57
Eastern Pacific Oil Co.	1996	$65.43
Henry & Jane Fong	1997	$137.45
Fortune Petroleum Corp.	1996	$236.50
	1997	$696.71
GENY Operations	1995	$1,446.17
GEO Petroleum, Inc.	1996	$1,424.22
	1997	$1,837.88
Graham Royalty, LTD.	1994	$8,028.70
Grayson Service, Inc.	1996	$107.41
	1997	$137.42
Hillcrest Beverly Oil Corp.	1997	$373.91
Hilliard Oil & Gas Inc.	1986	$550.54
Joro Inc.	1996	$96.83
Kalco Development Corp.	1988	$3,053.66
	1989	$2,342.64
	1990	$480.92
	1991	$326.83
Killingsworth Oil Co.	1994	$173.71
Ted Koble, Opr.	1994	$222.82
Lobodo Inc.	1994	$202.59
	1995	$64.52
	1996	$67.09
	1997	$50.49
Marlin Pacific Oil & Gas	1996	$370.05
	1997	$89.46
Mitchell Oil Co.	1989	$279.61
	1990	$339.53
	1991	$262.33
	1992	$136.47
	1994	$266.28
Nahama & Weagant Energy Co.	1994	$1,650.28
	1996	$5,364.00
Nahama & Weagant 1984 LP	1997	$3,524.58
The National Oil Co.	1987	$67.91
	1990	$202.76
	1991	$104.79
Nugget Oil Co.	1996	$383.72
	1997	$603.21
Oilfield Pet. & Energy Co.	1995	$125.35
	1996	$208.27
Oro Negro, Inc.	1997	$868.25
Pacific Inland Oper. Corp.	1996	$2,972.46
Pan American Energy Corp.	1993	$145.76
	1994	$41.15
	1994	$128.60
Pangea Inc.	1997	$691.65
Petro Nova	1989	$520.95
	1990	$208.10
Pine Meadows Ranch Inc.	1996	$1,073.37
	1997	$643.80
Polaris Prod. Co.	1997	$69.50
Prado Petroleum	1988	$1,261.86
	1989	$697.96
	1990	$1,291.45
	1991	$908.08
	1992	$486.85
	1993	$491.36
Pueblo Oil & Gas	1992	$437.46
	1993	$394.56
Razar Resources	1996	$413.48
	1997	$108.60
Saba Petroleum Inc.	1997	$1,527.50
Sam Enterprises, Inc.	1996	$127.32
South Coast Oil Corp.	1996	$470.64
St. Regis Resources Corp.	1995	$380.52
Sunwest Petroleum Inc.	1996	$915.23
	1997	$526.41
Supreme Oil & Gas Corp.	1994	$109.77
TRV Minerals Corp.	1987	$396.39
Target Drilling	1997	$374.46
Zachary T. Tatum	1995	$95.48
	1996	$207.84
	1997	$183.16
Temblor Petroleum Co., LLC	1997	$92.20
Terra Expl. & Prod. Co. Inc.	1997	$900.17
Terra Oil Co.	1997	$302.10
John A. Thomas	1996	$184.29
Thomas Oil Co.	1987	$341.98
	1988	$455.02
	1989	$277.31
	1990	$247.85
	1993	$360.95
	1994	$418.95
Tri Kern Resources	1988	$562.30
	1989	$265.43
Troy Resources Corp.	1988	$213.48
	1989	$447.62
Turco Products Division	1994	$134.74
United Energy, Inc.	1996	$548.25
	1997	$1,441.14
XL Operating Co.	1997	$2,005.07
TOTALS	1986	$550.54
	1987	$930.04
	1988	$5,756.33
	1989	$5,466.17
	1990	$3,807.35
	1991	$3,182.41
	1992	$2,176.57
	1993	$6,667.19
	1994	$22,132.01
	1995	$5,069.22
	1996	$16,962.24
	1997	$21,893.10
		$94,593.17
GEOTHERMAL OPERATORS		
GEO Operator Corp.	1988	$21,197.44
	1989	$159,872.80
	1990	$92,791.50
	1991	$83,282.82
	1992	$7,516.80
	1996	$6,605.22
	1997	$5,770.80
Geysers Power, Inc.	1992	$48,488.00
	1993	$55,702.20
	1994	$58,575.00
	1995	$46,195.50
	1996	$46,236.54
	1997	$40,395.60
Imperial Energy Corp.	1985	$2,956.93
MSR Power Agency	1994	$5,857.50
TOTALS	1985	$2,956.93
	1986	$0.00
	1987	$0.00
	1988	$21,197.44
	1989	$159,872.80
	1990	$92,791.50
	1991	$83,282.82
	1992	$56,004.80
	1993	$55,702.20
	1994	$64,432.50
	1995	$46,195.50
	1996	$52,841.76
	1997	$46,166.40
		$681,444.65
GRAND TOTAL		$776,037.82

PR06 (8/98/OSP/2M)