Table 1. 1978 State permits for geothermal wells

Permit no.	Company	Well name	Location	Depth drilled (ft)	Status
11	Northwest Natural Gas	Mt. Hood Old Maid Flat No. 1	SW¼ sec. 15 T. 2 S., R. 8 E. Clackamas Co.	4,003	Deepened from 1,850 to 4,003 ft; completed August 1978
20	Sunoco	Austin Hot Springs No. 1	NE¼ sec. 29 T. 6 S., R. 7 E. Clackamas Co.	1,484	Spudded December 1977; completed February 1978
32	Chevron Resources	Bully Creek Hole No. 5-1-78	SW¼ sec. 5 T. 18 S., R. 43 E. Malheur Co.	2,000	Monitoring temperature Nov. 11, 1978
33	Chevron Resources	Bully Creek Hole No. 9-1-78	NW¼ sec. 9 T. 18 S., R. 43 E. Malheur Co.	--	Drilling postponed until 1979
34	Wy'East Exploration	Timberline Hole No. 71-7	NE¼ sec. 7 T. 3 S., R. 9 E. Clackamas Co.	1,380	Work suspended Nov. 6
35	Anadarko Production	Alvord Valley Hole No. A-5	SE¼ sec. 6 T. 33 S., R. 36 E. Harney Co.	1,750	Completed Sept. 1978
36	Anadarko Production	Alvord Valley Hole No. A-6	SW¼ sec. 7 T. 33 S., R. 36 E. Harney Co.	1,994	Completed Oct. 1978
37	Anadarko Production	Alvord Valley Hole No. A-7	SW¼ sec. 18 T. 33 S., R. 36 E. Harney Co.	--	Drilling postponed
38	Anadarko Production	Alvord Valley Hole No. A-8	SE¼ sec. 14 T. 33 S., R. 35 E. Harney Co.	--	Do.
39	Anadarko Production	Alvord Valley Hole No. A-26	NE¼ sec. 29 T. 34 S., R. 34 E. Harney Co.	--	Do.
40	Anadarko Production	Alvord Valley Hole No. A-31	SW¼ sec. 34 T. 34 S., R. 34 E. Harney Co.	--	Do.
41	Anadarko Production	Alvord Valley Hole No. A-34	NE¼ sec. 8 T. 35 S., R. 34 E. Harney Co.	--	Do.
42	Anadarko Production	Alvord Valley Hole No. B-56	SE¼ sec. 10 T. 37 S., R. 33 E. Harney Co.	--	Do.
43	Anadarko Production	Alvord Valley Hole No. B-61	SW¼ sec. 13 T. 37 S., R. 33 E. Harney Co.	--	Do.

Table 1. *Geothermal permits and drilling activity in Oregon, 1979*

Permit no.	Operator	Well name	Location	Total depth (ft)	Status
37	Anadarko Production	Alvord Valley Hole A-7	SW¼ sec. 18 T. 33 S., R. 36 E. Harney County	–	Location, proposed depth 2,000 ft.
38	Anadarko Production	Alvord Valley Hole A-8	SE¼ sec. 14 T. 33 S., R. 35 E. Harney County	–	Location, proposed depth 2,000 ft.
39	Anadarko Production	Alvord Valley Hole A-26	NE¼ sec. 29 T. 34 S., R. 34 E. Harney County	–	Location, proposed depth 2,000 ft.
40	Anadarko Production	Alvord Valley Hole A-31	SW¼ sec. 34 T. 34 S., R. 34 E. Harney County	–	Location, proposed depth 2,000 ft.
41	Anadarko Production	Alvord Valley Hole A-34	NE¼ sec. 8 T. 35 S., R. 34 E. Harney County	–	Location, proposed depth 2,000 ft.
42	Anadarko Production	Alvord Valley Hole B-56	SE¼ sec. 10 T. 37 S., R. 33 E. Harney County	–	Location, proposed depth 2,000 ft.
43	Anadarko Production	Alvord Valley Hole B-61	SW¼ sec. 13 T. 37 S., R. 33 E. Harney County	–	Location, proposed depth 2,000 ft.
44	Anadarko Production	Alvord Valley Hole B-64	NW¼ sec. 22 T. 37 S., R. 33 E. Harney County	–	Location, proposed depth 2,000 ft.
45	U.S. Geological Survey	Newberry Crater 2	SW¼ sec. 31 T. 21 S., R. 13 E. Deschutes County	2,076	Drilling suspended October 1979; will deepen to 3,000 ft in 1980.
46	Ore-Ida Foods, Inc.	Well 1	NE¼ sec. 3 T. 18 S., R. 47 E. Malheur County	10,050	Well suspended for monitoring.
47	Ore-Ida Foods, Inc.	Well 2	SE¼ sec. 3 T. 18 S., R. 47 E. Malheur County	–	Drilling postponed pending evaluation of Well No. 1.
48	Chevron Resources	Neals-Bully Creek 79-2	SE¼ sec. 32 T. 17 S., R. 43 E. Malheur County	–	Location, proposed depth 2,000 ft.
49	Chevron Resources	Neals-Bully Creek 79-4	SW¼ sec. 33 T. 17 S., R. 43 E. Malheur County	2,010	Temperature-gradient well.
50	Chevron Resources	Neals-Bully Creek 79-5	NE¼ sec. 4 T. 18 S., R. 43 E. Malheur County	–	Location, proposed depth 2,000 ft.
51	Chevron Resources	Neals-Bully Creek 79-6	SE¼ sec. 8 T. 18 S., R. 43 E. Malheur County	–	Location, proposed depth 2,000 ft.
52	Chevron Resources	Neals-Bully Creek 79-7	NW¼ sec. 3 T. 18 S., R. 43 E. Malheur County	–	Location, proposed depth 2,000 ft.
53	Chevron Resources	Neals-Bully Creek 79-8	NW¼ sec. 28 T. 17 S., R. 43 E. Malheur County	–	Location, proposed depth 2,000 ft.
54	Chevron Resources	Neals-Bully Creek 79-10	NE¼ sec. 15 T. 18 S., R. 43 E. Malheur County	1,868	Temperature-gradient well.
55	Chevron Resources	Neals-Bully Creek 79-11	NW¼ sec. 9 T. 18 S., R. 43 E. Malheur County	–	Location, proposed depth 2,000 ft.

Table 1. *Geothermal permits and drilling activity in Oregon, 1979 (continued)*

Permit no.	Operator	Well name	Location	Total depth (ft)	Status
75	Eugene Water and Electric Board	Poop Creek	SE¼ sec. 5 T. 7 S., R. 8 E. Clackamas County	870	Suspended, temperature-gradient well.
76	Eugene Water and Electric Board	Cinder Cone	NE¼ sec. 10 T. 7 S., R. 8 E. Clackamas County	1,160	Suspended, temperature-gradient well.
77	Eugene Water and Electric Board	Tarzan Spring	SE¼ sec. 4 T. 7 S., R. 7 E. Clackamas County	710	Suspended, temperature-gradient well.
78	Eugene Water and Electric Board	Pinhead	NE¼ sec. 35 T. 7 S., R. 8 E. Clackamas County	—	Location, temperature-gradient well.
79	Eugene Water and Electric Board	Crescent Creek	SE¼ sec. 13 T. 13 S., R. 6 E. Clackamas County	—	Location, temperature-gradient well.
80	Chevron Resources	Jordan 55	NW¼ sec. 9 T. 18 S., R. 43 E. Malheur County	—	Drilling at 2,600 ft, January 1980.

Table 2. *Geothermal prospect permits and drilling activity in Oregon, 1979*

Permit no.	Operator	Issue date	Locations	Comments and status
38	Phillips Petroleum Company	May 1978	Brothers Fault Zone, Lake and Harney Counties	Drilled 17 more 500-ft gradient holes in 1979, continuing the 1978 program.
47	Northwest Natural Gas	Nov. 1978	Mt. Hood Clackamas County	Summit Meadows well drilled to 1,115 ft. Lost Creek well drilled to 431 ft. Clear Fork well drilled to 495 ft.
48	Chevron Resources	April 1979	Bully Creek Malheur County	Drilled two 500-ft and two 2,000-ft gradient holes.
49	Technology International	April 1979	Vale Malheur County	Location, temperature-gradient well.
50	Phillips Petroleum Company	July 1979	Lakeview Harney County	Drilled 24 500-ft gradient holes in 1979.
51	Francana Resources	July 1979	Glass Buttes Lake County	Drilled one hole to 2,000 ft, suspended to monitor temperature.
52	Chevron Resources	July 1979	South Crump Lake Lake County	Drilled 14 500-ft gradient holes in 1979.
53	Chevron Resources	July 1979	Bully Creek Malheur County	Drilled four 500-ft gradient holes in 1979.
54	Oregon Department of Geology and Mineral Industries	Aug. 1979	Cascades Clackamas County	Drilled eight 500-ft gradient holes in 1979.
55	U.S. Geological Survey	Aug. 1979	Mt. Hood Clackamas County	Drilled two wells in 1979; deepest 1,002 ft.
56	Republic Geothermal	Aug. 1979	Vale Malheur County	Drilled four wells in 1979; three to depth of 500 ft and one to 1,500 ft.
57	Anadarko Production Company	Sept. 1979	Alvord Valley Harney County	Drilled six 500-ft and one 900-ft gradient holes in 1979.
58	Union Oil Company	Oct. 1979	Alvord Valley Harney County	Location, temperature-gradient well.
59	Eugene Water and Electric Board	Sept. 1979	Breitenbush Linn County	Location, temperature-gradient well.
60	Oregon Department of Geology and Mineral Industries	Nov. 1979	Lakeview Lake County	Drilled eight 500-ft gradient holes in 1979.
61	Oregon Department of Geology and Mineral Industries	Nov. 1979	La Grande Union County	Drilled two 500-ft gradient holes in 1979.

Table 2. *Geothermal prospect permits and drilling activity in Oregon, 1980*

Permit no.	Operator	Issue date	Location(s)	Comments and status
35	Sunoco Energy Development Co.	July 1979	Breitenbush and Belknap Hot Springs, Marion, Linn, Lane Counties	Drilled twenty-three 500-ft gradient holes.
50	Phillips Petroleum Co.	July 1979	Cox Flat Lake County	Drilled four gradient holes to 260 ft.
54	Oregon Dept. of Geology and Mineral Industries	Aug. 1979	Western Cascades Lane, Linn, Jefferson Counties	Drilled sixteen gradient holes to 500 ft.
55	U.S. Geological Survey	Aug. 1979	Mt. Hood area Clackamas County	Deepened one hole, drilled four holes, deepest to 1,163 ft.
58	Union Oil Co. of California	Sept. 1979	Alvord Desert Harney County	Drilled one hole to 2,000 ft.
62	Chevron Resources Co.	Feb. 1980	Alvord Desert Harney County	Program canceled.
63	Robert Dollar Co.	Mar. 1980	Klamath Lake Klamath County	Location, one gradient hole.
64	AMAX Exploration, Inc.	Mar. 1980	Bully Creek Malheur County	Program canceled.
65	Anadarko Production Co.	April 1980	Alvord Desert Harney County	Drilled eleven holes, deepest to 1,810 ft.
66	Phillips Petroleum Co.	May 1980	Glass Buttes Lake County	Drilled five holes, deepest to 1,945 ft.
67	Hunt Energy Corp.	June 1980	Lake Owyhee Malheur County	Drilled seven holes to 500 ft.
68	Oregon Dept. of Geology and Mineral Industries	June 1980	Parkdale Hood River County	Location, three gradient holes.
69	Chevron Resources Co.	June 1980	Warner Valley Lake County	Drilled twenty-one holes to 500 ft.
70	Chevron Resources Co.	June 1980	Warner Valley Lake County	Drilled nine holes to 500 ft, one to 2,000 ft.
71	Oregon Dept. of Geology and Mineral Industries	Aug. 1980	Oakridge Lane County	Deepened one hole to 1,130 ft, drilled one to 500 ft.
72	Phillips Petroleum Co.	Sept. 1980	Cox Flat Lake County	Drilled three holes, deepest to 1,555 ft.
73	Oregon Dept. of Geology and Mineral Industries	Nov. 1980	Hood River Valley Hood River County	Location, four gradient holes.
74	Oregon Dept. of Geology and Mineral Industries	Nov. 1980	Powell Buttes Crook County	Drilled eight holes to 500 ft.
75	Oregon Dept. of Geology and Mineral Industries	Nov. 1980	Burns area Harney County	Drilled four holes, deepest to 615 ft.

Industrial deep drilling

Chevron Resources Company was the only company involved in significant deep drilling (below 2,000 ft). They lost a 2,820-ft well near Vale and completed a 2,979-ft well at Crump Lake, near Lakeview (Figure 1). Both wells were drilled for high-temperature fluid to generate electricity.

LEASING

The level of geothermal leasing increased dramatically in 1980. There was a 73 percent increase in leased Federal acreage, most of which was non-KGRA land (Table 3). No accurate data are available for private leases, but a similar increase probably occurred in that sector as well. This dramatic increase in leasing may herald a major increase in exploration efforts for the next few years.

Three U.S. Bureau of Land Management (USBLM) lease sales were held in 1980. Anadarko Production Company, Union Oil Company, Intercontinental Energy Corporation, Hunt Oil Company, Getty Oil Company, Chevron Resources, and Al-Aquitaine Exploration bid a total of $1,530,692.34 on 32,641 acres of land in KGRA's (Table 4). No further lease sales are planned for 1981.

Most geothermal leases continue to be located in either the Basin and Range province of southeastern Oregon or the Western Cascades of northwestern Oregon. The most extensive holdings are at the following areas: Vale-Owyhee, Alvord Desert, Crump Geyser, Lakeview, Paisley, Klamath Falls, Newberry Caldera, Belknap-Foley Hot Springs, Breitenbush

Table 3. *Geothermal leases, 1980*

Type of leases	Net gain since 1979 Numbers		Net gain since 1979 Acres		Relinquished since 1979 Numbers	Relinquished since 1979 Acres
Federal leases						
Noncompetitive, USBLM	76	(+67%)*	41,709.81	(+74%)*	2	2,566.58
Noncompetitive, USFS	2	(+12%)*	1,282.36	(+ 3%)*	0	0
KGRA, USBLM	16	(+76%)*	30,280.75	(+70%)*	3	6,322.56
KGRA, USFS	0		0.00		0	0
Total	94	(+58%)*	73,272.92	(+73%)*	5	8,889.14
Federal leases pending						
Noncompetitive, USBLM	36	(+29)*	72,955.50			
Noncompetitive, USFS	73	(+20)*	156,069.81			
KGRA, USBLM	1		2,360.00			
KGRA, USFS	0		0.00			
Total	110	(+23%)*	231,385.31			
State						
Total leases active in 1980	13		9,687			
Total applications pending	3		2,010			
Private						
Total leases active (est.)	No data		~250,000			

* Based on total of all leases as of 1-2-80.

Table 4. *1980 U.S. Bureau of Land Management KGRA sales*

Tract no.	Date (1980)	Company	Area	Acreage	Amount ($)
13	Jan. 8	Anadarko Pro. Co.	Alvord	2,280	$ 236,367.60
14	Jan. 8	Anadarko Pro. Co.	Alvord	2,463	90,605.33
33	Jan. 8	Union Oil	Breitenbush	1,040	10,341.45
39	Jan. 8	Intercontinental	Klamath Falls	119	917.53
50	Jan. 8	Hunt Oil	Crump Geyser	2,371	4,833.35
51	Jan. 8	Hunt Oil	Crump Geyser	2,344	4,828.58
4	April 29	Getty Oil	Alvord	2,563	30,117.37
28	April 29	Getty Oil	Alvord	1,830	61,751.70
29	April 29	Getty Oil	Alvord	2,542	44,478.35
33	April 29	Anadarko	Alvord	2,400	149,664.00
34	April 29	Anadarko	Alvord	2,560	397,516.80
35	April 29	Getty Oil	Alvord	40	630.00
36	April 29	Anadarko	Alvord	2,520	227,379.60
37	April 29	Getty Oil	Alvord	2,560	44,802.28
59	April 29	Chevron	Crump Geyser	2,568	5,785.00
60	April 29	Chevron	Crump Geyser	81	1,057.00
1	Oct. 23	Al-Aquitaine Explor.	Alvord	2,360	249,617.20
			Total	32,641	$1,530,692.34

Hot Springs, Austin (Carey) Hot Springs, and Mount Hood.

Atlantic Richfield (ARCO) has acquired a significant land position around the Kitson-McCredie Hot Springs area. This is the first time ARCO has shown interest in the Cascades, and they plan to do preliminary geophysical and geological studies and water sampling in this area during the upcoming field season.

Northeastern Oregon and the Ashland-Medford area continue to be largely ignored by industry, although both areas have low- to moderate-temperature geothermal resources. This may be blamed on the general tendency for most larger companies to concentrate on high-temperature resources for electrical power production.

RESEARCH

Low-temperature geothermal resources

The Department is continuing its USDOE-funded low-temperature geothermal-resource assessment program. The second year of this study has culminated in preparation of resource assessment open-file reports on the following areas (Figure 1):

Belknap-Foley—Open-File Report 0-80-2*
Willamette Pass—Open-File Report 0-80-3*
Craig Mountain-Cove (La Grande)—Open-File Report 0-80-4
Western Snake River Plain (Vale)—Open-File Report 0-80-5
Northern Harney Basin (Burns)—Open-File Report 0-80-6*
Southern Harney Basin—Open-File Report 0-80-7*
Powell Buttes—Open-File Report 0-80-8
Lakeview—Open-File Report 0-80-9
Alvord Desert—Open-File Report 0-80-10

* Already available for sale from the Portland office of the Oregon Department of Geology and Mineral Industries.