

OREGON GEOLOGY

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VOLUME 49, NUMBER 3

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THIS MONTH:
Annual oil and gas summary
and
The great fireball of September 15, 1986

OREGON GEOLOGY

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Information for contributors

Oregon Geology is designed to reach a wide spectrum of readers interested in the geology and mineral industry of Oregon. Manuscript contributions are invited on both technical and general-interest subjects relating to Oregon geology. Two copies of the manuscript should be submitted, typed double-spaced throughout (including references) and on one side of the paper only. Graphic illustrations should be camera-ready; photographs should be black-and-white glossies. All figures should be clearly marked, and all figure captions should be typed together on a separate sheet of paper.

The style to be followed is generally that of U.S. Geological Survey publications (see the USGS manual *Suggestions to Authors*, 6th ed., 1978). The bibliography should be limited to "References Cited." Authors are responsible for the accuracy of the bibliographic references. Names of reviewers should be included in the "Acknowledgments."

Authors will receive 20 complimentary copies of the issue containing their contribution. Manuscripts, news, notices, and meeting announcements should be sent to Beverly F. Vogt, Publications Manager, at the Portland office of DOGAMI.

COVER PHOTO

Production facilities at the ARCO Columbia County 23-22 well site. During 1986, this well produced over one billion cubic feet of gas from a depth of 1,329 feet. Article beginning on next page summarizes oil and gas exploration and development activity in Oregon during 1986.

OIL AND GAS NEWS

Mist gas storage project

Oregon Natural Gas Development has completed drilling wells for the gas storage project in which gas will be injected and stored in the depleted Flora and Bruer Pools. Three observation-monitor wells were completed in January, bringing to six the total number of observation-monitor wells at the project. These are the OM 12c-3 in NW ¼ sec. 3, T. 6 N., R. 5 W., the OM 14a-3 in SW ¼ sec. 3, T. 6 N., R. 5 W., and the OM 32b-11 in NE ¼ sec. 11, T. 6 N., R. 5 W. These had total depths of 3,156 ft, 3,200 ft, and 3,205 ft, respectively.

Observation-monitor wells are used to monitor pressures and gas levels in the storage reservoirs. The injection well IW 34d-3 in SE ¼ sec. 3, T. 6 N., R. 5 W., was completed at a total depth of 2,272 ft. There are two injection wells at the project, and they are used to inject gas into and withdraw gas from the storage reservoirs. Injection was scheduled to begin during February.

Recent permits

Permit no.	Operator, well API number	Location	Status, proposed total depth (ft)
378	ARCO Longv. Fibre 23-33-65 36-009-00215	SW ¼ sec. 33 T. 6 N., R. 5 W. Columbia County	Application; 2,400.
379	ARCO Col. Co. 11-7-65 36-009-00216	NW ¼ sec. 7 T. 6 N., R. 5 W. Columbia County	Application; 3,800.
380	ARCO Col. Co. 11-34-65 36-009-00217	NW ¼ sec. 34 T. 6 N., R. 5 W. Columbia County	Application; 2,400.
381	ARCO Col. Co. 23-18-65 36-009-00218	SW ¼ sec. 18 T. 6 N., R. 5 W. Columbia County	Application; 3,600.
382	ARCO Col. Co. 32-26-65 36-009-00219	NE ¼ sec. 26 T. 6 N., R. 5 W. Columbia County	Application; 2,200.
383	ARCO Col. Co. 32-9-65 36-009-00220	NE ¼ sec. 9 T. 6 N., R. 5 W. Columbia County	Application; 2,900.
384	ARCO Col. Co. 24-26-65 36-009-00221	SW ¼ sec. 26 T. 6 N., R. 5 W. Columbia County	Application; 2,000.
385	ARCO Col. Co. 22-27-65 36-009-00222	NW ¼ sec. 27 T. 6 N., R. 5 W. Columbia County	Application; 2,300.
386	ARCO Col. Co. 41-34-65 36-009-00223	NE ¼ sec. 34 T. 6 N., R. 5 W. Columbia County	Application; 2,400.
387	ARCO Col. Co. 31-27-65 36-009-00224	NE ¼ sec. 27 T. 6 N., R. 5 W. Columbia County	Application; 2,300. □

Oil and gas exploration and development in Oregon, 1986

by Dan E. Wermiel, Petroleum Geologist, and Dennis Olmstead, Petroleum Engineer, Oregon Department of Geology and Mineral Industries

ABSTRACT

Oil and gas leasing in Oregon during 1986 decreased greatly from the previous year. Leases on 2.8 million acres of land were withdrawn or terminated during 1986. Columbia County remains the region of the State with the greatest concentration of leases.

The number of applications for permits to drill was down from 1985, as was drilling activity. Eleven exploratory wells, three gas storage wells, and two redrills were drilled during the year. Of these, all but one were in the Mist Gas Field in Columbia County. Four operators were active in the State, producing two new completions, both drilled by ARCO Oil and Gas Company.

Production in 1986 totaled 4.6 billion cubic feet of gas, for a value of approximately \$9.2 million.

Oregon Natural Gas Development Corporation, a subsidiary of Northwest Natural Gas Company, began drilling at the natural gas storage project at Mist Gas Field, where the depleted Bruer and Flora Pools will be used for gas storage purposes.

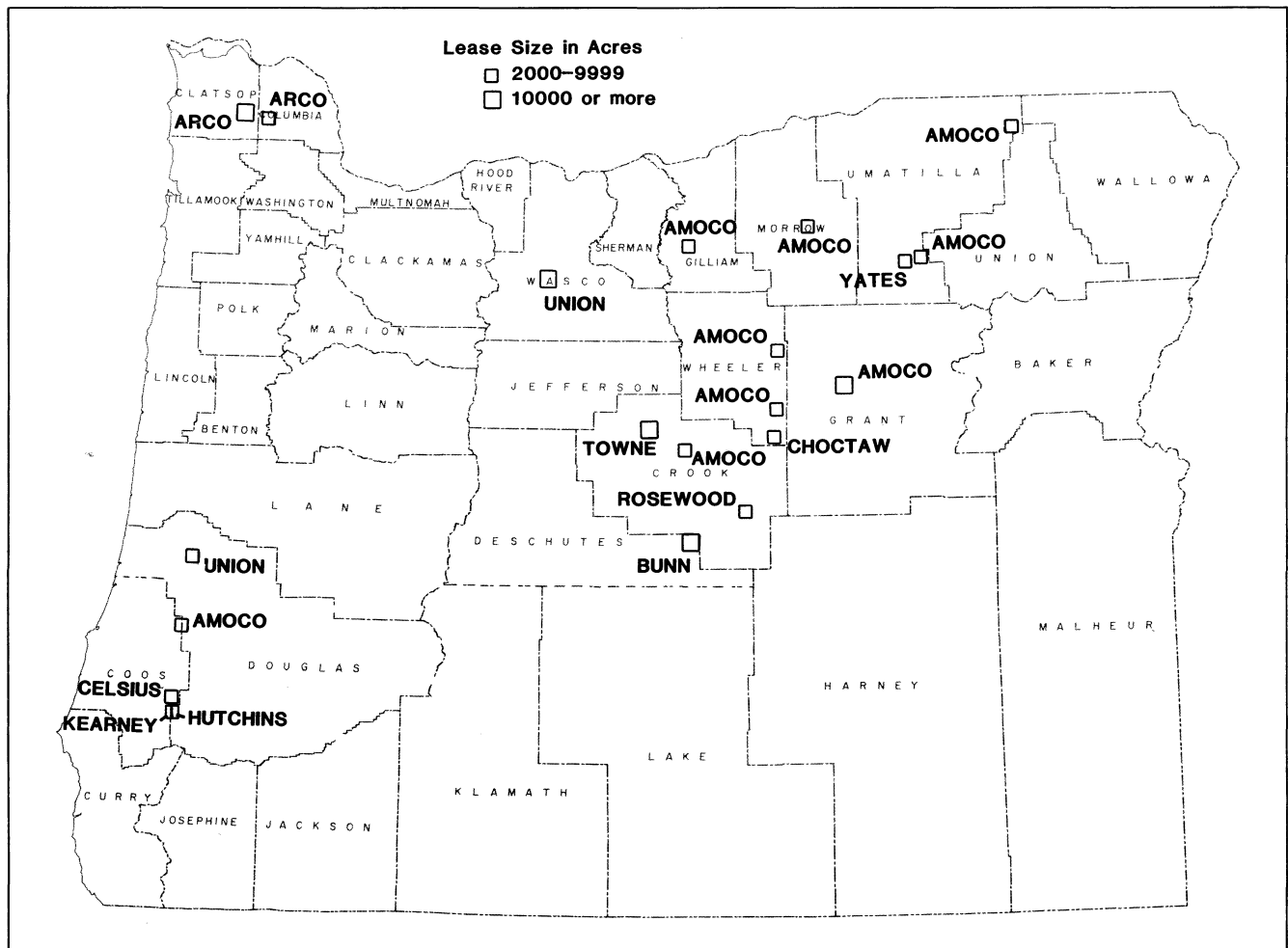
The Division of State Lands passed rules relating to permitting for offshore geological and geophysical surveys. The Oregon Department of Geology and Mineral Industries held public hearings on requests for extension of confidentiality periods on two wells.

LEASING ACTIVITY

Oil and gas leasing in Oregon followed the national trend in that more leases were relinquished and terminated than new leases were issued. On Federal lands in the State, 21 new applications were filed for a total of 101,983 acres. Some of these were for parcels for which application had been made in 1985. The most active counties were Wheeler (45,627 acres), Crook (41,179 acres), and Umatilla (31,276 acres). During the year, leases on 949 tracts expired, were terminated, or were relinquished, a total of 2.6 million acres. At year's end, Oregon had 842 Federal tracts under lease, comprising 1,557,626 acres. Rental income for the year was \$1.6 million.

No lease sales of State lands were held during the year, but 34,248 acres of existing leases expired or were dropped. This left 266,832 acres of State land under lease at year's end. Counties with the most State land held under lease last year were Malheur, Harney, and Clatsop. Early in 1987, however, Malheur and Harney Counties lost much of their leased acreage.

Columbia County was the only county to hold a lease sale during the year. A total of 292 tracts was offered, and 76 received bids. The acreage involved was 19,070, earning \$134,000 in bonus bids for the County. The high bid was \$70 per acre by ARCO Oil and



Major oil and gas leasing in Oregon, 1986. Map shows acreage applied for, issued, and assigned. Withdrawals and terminations are not shown. Data courtesy Greater Columbia LANDATA.

Table 1. Oil and gas permits and drilling activity in Oregon, 1986

Permit no.	Operator, well, API number	Location	Status, depth (ft) TD=total depth PTD=proposed TD RD=redrill
299	Tenneco Oil Co. Columbia County 24-28 36-009-00145	SW¼ sec. 28 T. 6 N., R. 5 W. Columbia County	Abandoned, dry hole; TD: 1,928.
318	ARCO Oil and Gas Co. Columbia County 14-23 36-009-00161	SW¼ sec. 23 T. 6 N., R. 5 W. Columbia County	Completed, gas; TD: 2,180.
325	ARCO Oil and Gas Co. Columbia County 41-6 36-009-00167	NE¼ sec. 6 T. 5 N., R. 5 W. Columbia County	Abandoned, dry hole; TD: 2,750.
341	ARCO Oil and Gas Co. Longview Fibre 41-35 36-009-00182	NE¼ sec. 35 T. 6 N., R. 5 W. Columbia County	Completed, gas; TD: 1,585.
345	ARCO Oil and Gas Co. Longview Fibre 13-6 36-009-00186	SW¼ sec. 6 T. 5 N., R. 4 W. Columbia County	Abandoned, dry hole; TD: 1,473.
346	ARCO Oil and Gas Co. CFI* 23-9 36-009-00187	SW¼ sec. 9 T. 5 N., R. 4 W. Columbia County	Permit issued; PTD: 2,904.
347	ARCO Oil and Gas Co. CFI* 41-9 & Redrill 1 36-009-00188 36-009-00188-01	NE¼ sec. 9 T. 5 N., R. 4 W. Columbia County	Abandoned, dry hole; TD: 2,500, RD: 2,501
348	ARCO Oil and Gas Co. CFI* 33-9 36-009-00189	SE¼ sec. 9 T. 5 N., R. 4 W. Columbia County	Abandoned, dry hole; TD: 3,242.
352	ARCO Oil and Gas Co. Columbia County 44-27 36-009-00191	SE¼ sec. 27 T. 6 N., R. 5 W. Columbia County	Permit issued; PTD: 2,360.
353	ARCO Oil and Gas Co. Longview Fibre 43-4 36-009-00192	NE¼ sec. 4 T. 5 N., R. 5 W. Columbia County	Permit issued; PTD: 3,000.
354	ARCO Oil and Gas Co. Columbia County 44-6 36-009-00193	SE¼ sec. 6 T. 6 N., R. 5 W. Columbia County	Permit issued; PTD: 3,000.
355	ARCO Oil and Gas Co. Columbia County 31-7 36-009-00194	NE¼ sec. 7 T. 6 N., R. 5 W. Columbia County	Permit issued; PTD: 3,000.
356	ARCO Oil and Gas Co. Columbia County 13-21 36-009-00195	SW¼ sec. 21 T. 6 N., R. 5 W. Columbia County	Permit issued; PTD: 3,000.
358	Damon Petroleum Corp. Stauffer Farms 35-1 36-047-00020	NW¼ sec. 35 T. 4 S., R. 1 W. Marion County	Evaluating; TD: 2,752.
359	ARCO Oil and Gas Co. CFI* 21-22 36-009-00196	NW¼ sec. 22 T. 5 N., R. 4 W. Columbia County	Permit issued; PTD: 3,315.
363	Oregon Nat. Gas Dev. OM 44d-3 36-009-00200	SE¼ sec. 3 T. 6 N., R. 5 W. Columbia County	Permit issued; PTD: 3,400.
364	Oregon Nat. Gas Dev. OM 12c-3 36-009-00201	NW¼ sec. 3 T. 6 N., R. 5 W. Columbia County	Permit issued; PTD: 3,400.
365	Oregon Nat. Gas Dev. OM 12d-10 36-009-00202	NW¼ sec. 10 T. 6 N., R. 5 W. Columbia County	Completed, service well; TD: 2,805.
366	Oregon Nat. Gas Dev. OM 41a-10 36-009-00203	NE¼ sec. 10 T. 6 N., R. 5 W. Columbia County	Completed, service well; TD: 3,067.

Table 1. Oil and gas permits and drilling activity in Oregon, 1986
—continued

Permit no.	Operator, well, API number	Location	Status, depth (ft) TD=total depth PTD=proposed TD RD=redrill
367	Oregon Nat. Gas Dev. OM 14a-3 36-009-00204	SW¼ sec. 3 T. 6 N., R. 5 W. Columbia County	Permit issued; PTD: 3,400.
368	ARCO Oil and Gas Co. CFI* 41-4 & Redrill 1 36-009-00205 36-009-00205-01	NE¼ sec. 4 T. 5 N., R. 4 W. Columbia County	Abandoned, dry hole; TD: 2,584, RD: 1,935.
369	ARCO Oil and Gas Co. CFI* 31-22 36-009-00206	NE¼ sec. 22 T. 6 N., R. 5 W. Columbia County	Permit issued; PTD: 2,400.
370	ARCO Oil and Gas Co. CFI* 12-5 36-009-00207	NW¼ sec. 5 T. 5 N., R. 4 W. Columbia County	Permit issued; PTD: 4,850.
371	ARCO Oil and Gas Co. CFI* 12-12 36-009-00208	NW¼ sec. 12 T. 5 N., R. 5 W. Columbia County	Abandoned, dry hole; TD: 1,862.
372	Oregon Nat. Gas Dev. OM 32b-11 36-009-00209	NE¼ sec. 11 T. 6 N., R. 5 W. Columbia County	Permit issued; PTD: 3,000.
373	Oregon Nat. Gas Dev. IW 34d-3 36-009-00210	SE¼ sec. 3 T. 6 N., R. 5 W. Columbia County	Permit issued; PTD: 2,800.
374	Oregon Nat. Gas Dev. OM 44a-3 36-009-00211	SE¼ sec. 3 T. 6 N., R. 5 W. Columbia County	Completed, service well; TD: 3,655.
375	ARCO Oil and Gas Co. Columbia County 31-8 36-009-00212	NE¼ sec. 8 T. 6 N., R. 5 W. Columbia County	Abandoned, dry hole; TD: 4,054.
376	ARCO Oil and Gas Co. Columbia County 42-8-54 36-009-00213	NE¼ sec. 8 T. 5 N., R. 4 W. Columbia County	Permit issued; PTD: 2,750.
377	ARCO Oil and Gas Co. Longview Fibre 11-31 36-009-00214	NW¼ sec. 31 T. 6 N., R. 4 W. Columbia County	Permit issued; PTD: 2,300.

*CFI = Cavenham Forest Industries



Drilling operations at ARCO Columbia County 14-23, which was successfully completed as a gas producer in 1986.

Table 2. *Canceled and denied permits, 1986*

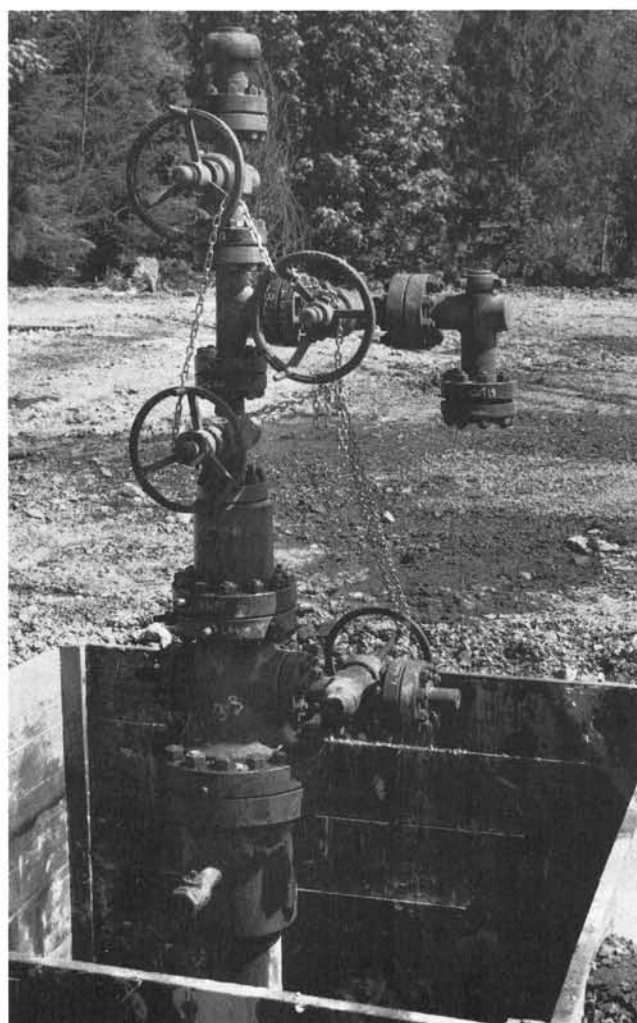
Permit no.	Operator, well, API number	Location	Issue date	Cancellation date	Reason
255	ARCO Oil and Gas Co. Columbia County 13-34A 36-009-00123	SW ¼ sec. 34 T. 7 N., R. 5 W. Columbia County	1-13-84	4-7-86	Permit canceled; expired.
260	AMOCO Production Co. Weyerhaeuser 1-26 36-019-00024	SW ¼ sec. 26 T. 25 S., R. 9 W. Douglas County	5-25-84	5-25-86	Permit canceled; expired.
261	AMOCO Production Co. Weyerhaeuser 1-34 36-019-00025	NW ¼ sec. 34 T. 25 S., R. 9 W. Douglas County	5-25-84	5-25-86	Permit canceled; expired
267	AMOCO Production Co. Weyerhaeuser 1-6 36-019-00026	SW ¼ sec. 6 T. 25 S., R. 8 W. Douglas County	--	--	Permit denied; failure to post drilling bond.
281	Leavitts Exploration Jackson 1 36-039-00006	NW ¼ sec. 14 T. 19 S., R. 4 W. Lane County	1-10-85	1-10-86	Permit canceled; expired.
282	Leavitts Exploration Jackson 2 36-039-00007	SW ¼ sec. 11 T. 19 S., R. 4 W. Lane County	1-10-85	1-10-86	Permit canceled; expired.
286	Ty Settles Cindy 2 36-039-00009	SW ¼ sec. 23 T. 16 S., R. 5 W. Lane County	--	--	Permit denied; failure to post drilling bond.
291	Hutchins and Marrs Discovery 1 36-019-00031	NW ¼ sec. 17 T. 30 S., R. 9 W. Douglas County	4-12-85	4-12-86	Permit canceled; expired.
294	Oregon Nat. Gas Dev. Tesch 44-21 36-047-00019	SE ¼ sec. 21 T. 5 S., R. 2 W. Marion County	5-13-85	5-13-86	Permit canceled; expired.
303	ARCO Oil and Gas Co. Columbia County 11-31 36-009-00149	NW ¼ sec. 31 T. 6 N., R. 3 W. Columbia County	5-28-85	6-13-86	Permit canceled; expired.
304	ARCO Oil and Gas Co. Columbia County 33-28 36-009-00150	SE ¼ sec. 28 T. 5 N., R. 5 W. Columbia County	5-28-85	1-3-86	Permit canceled; lease expiration.
305	ARCO Oil and Gas Co. Columbia County 41-14 36-009-00151	NE ¼ sec. 14 T. 4 N., R. 3 W. Columbia County	5-28-85	1-3-86	Permit canceled; lease expiration.
308	EXXON Corp. Columbia County 1 36-009-00154	NE ¼ sec. 29 T. 5 N., R. 3 W. Columbia County	7-17-85	7-17-86	Permit canceled; expired
311	EXXON Corp. Crown Zellerbach 1 39-009-00157	NE ¼ sec. 28 T. 5 N., R. 3 W. Columbia County	7-17-85	7-17-86	Permit canceled; expired.
312	EXXON Corp. GPE Federal 3 36-009-00158	SW ¼ sec. 35 T. 5 N., R. 3 W. Columbia County	7-17-85	7-17-86	Permit canceled; expired.
313	ARCO Oil and Gas Co. Columbia County 22-19 36-009-00159	NW ¼ sec. 19 T. 6 N., R. 5 W. Columbia County	6-20-85	6-20-86	Permit canceled; expired.
315	Leavitt Exploration Falk 3 36-039-00010	NE ¼ sec. 13 T. 16 S., R. 5 W. Lane County	--	--	Permit denied; failure to post drilling bond.

Table 2. *Canceled and denied permits, 1986* — continued

Permit no.	Operator, well, API number	Location	Issue date	Cancellation date	Reason
316	Leavitt Exploration Jessie 1 36-039-00011	SW¼ sec. 13 T. 16 S., R. 5 W. Lane County	--	--	Permit denied; failure to post drilling bond.
319	ARCO Oil and Gas Co. Columbia County 14-18 36-009-00162	SW¼ sec. 18 T. 4 N., R. 3 W. Columbia County	--	--	Permit denied; irregular location waiver denied by County.
321	Tenneco Oil Co. Columbia County 12-15 36-009-00164	NW¼ sec. 15 T. 5 N., R. 5 W. Columbia County	9-3-85	1-6-86	Permit canceled; lease expiration.
322	Tenneco Oil Co. Columbia County 24-10 36-009-00165	SW¼ sec. 10 T. 5 N., R. 5 W. Columbia County	8-7-85	1-6-86	Permit canceled; lease expiration
326	ARCO Oil and Gas Co. Columbia County 33-6 36-009-00168	SE¼ sec. 6 T. 5 N., R. 5 W. Columbia County	8-20-85	8-20-86	Permit canceled; expired.
328	EXXON Corp. Columbia County "B" 1 36-009-00169	SW¼ sec. 2 T. 4 N., R. 3 W. Columbia County	9-3-85	9-3-86	Permit canceled; expired.
329	EXXON Corp. Columbia County "C" 1 36-009-00170	NW¼ sec. 14 T. 4 N., R. 3 W. Columbia County	9-3-85	9-3-86	Permit canceled; expired.
330	ARCO Oil and Gas Co. Columbia County 33-35 36-009-00171	SE¼ sec. 35 T. 7 N., R. 5 W. Columbia County	9-25-85	9-25-86	Permit canceled; expired.
331	ARCO Oil and Gas Co. Columbia County 43-32 36-009-00172	SE¼ sec. 32 T. 6 N., R. 5 W. Columbia County	9-25-85	9-25-86	Permit canceled; expired.
332	ARCO Oil and Gas Co. Columbia County 11-34 36-009-00173	NW¼ sec. 34 T. 6 N., R. 5 W. Columbia County	9-25-85	1-3-86	Permit canceled; lease expiration.
334	ARCO Oil and Gas Co. Columbia County 13-3 36-009-00172	SW¼ sec. 3 T. 5 N., R. 5 W. Columbia County	9-25-85	9-25-86	Permit canceled; expired.
335	ARCO Oil and Gas Co. Columbia County 41-24 36-009-00176	NE¼ sec. 24 T. 4 N., R. 4 W. Columbia County	9-30-85	1-3-86	Permit canceled; lease expiration.
336	ARCO Oil and Gas Co. Columbia County 22-7 36-009-00177	NW¼ sec. 7 T. 6 N., R. 5 W. Columbia County	9-30-85	9-30-86	Permit canceled; expired.
340	ARCO Oil and Gas Co. Columbia County 14-30 36-009-00181	SW¼ sec. 30 T. 6 N., R. 3 W. Columbia County	10-2-85	10-2-86	Permit canceled; expired.
342	ARCO Oil and Gas Co. Columbia County 31-27 36-009-00183	NE¼ sec. 27 T. 6 N., R. 5 W. Columbia County	12-2-85	12-2-86	Permit canceled; expired.
343	ARCO Oil and Gas Co. Longview Fibre 34-25 36-009-00184	SE¼ sec. 25 T. 6 N., R. 5 W. Columbia County	12-2-85	12-2-86	Permit canceled; expired.
349	Hutchins & Marrs Great Discovery 3 36-019-00033	SW¼ sec. 20 T. 30 S., R. 9 W. Douglas County	--	--	Permit denied; failure to post drilling bond.

Table 2. *Canceled and denied permits, 1986* — continued

Permit no.	Operator, well, API number	Location	Issue date	Cancellation date	Reason
350	Hutchins & Marrs Discovery 3 36-019-00034	NE¼ sec. 17 T. 30 S., R. 9 W. Douglas County	--	--	Permit denied; failure to post drilling bond.
351	ARCO Oil and Gas Co. Longview Fibre 14-25 36-009-00190	SW¼ sec. 25 T. 6 N., R. 5 W. Columbia County	--	--	Permit denied; spacing unit exception not granted.
357	Hutchins & Marrs GP 2 36-011-00023	NE¼ sec. 14 T. 30 S., R. 10 W. Coos County	--	--	Permit denied; failure to post drilling bond.
360	ARCO Oil and Gas Co. Columbia County 42-8 36-009-00197	NE¼ sec. 8 T. 5 N., R. 5 W. Columbia County	5-20-86	9-9-86	Permit canceled; lease expiration.
361	ARCO Oil and Gas Co. Columbia County 12-6 36-009-00198	NW¼ sec. 6 T. 5 N., R. 5 W. Columbia County	5-20-86	11-3-86	Permit canceled; lease expiration.
362	ARCO Oil and Gas Co. Columbia County 21-11 36-009-00199	NW¼ sec. 11 T. 5 N., R. 3 W. Columbia County	6-11-86	11-3-86	Permit canceled; lease expiration.



Wellhead at ARCO Columbia County 14-23.

propose legislation in 1987. Details can be obtained from DOGAMI. The Department contributed input to the rulemaking by the Division of State Lands regarding permitting for offshore geological and geophysical activity and surveys to be conducted in State waters.

DOGAMI converted a deserted well in Wheeler County, Steel Energy Keys No. 1, to a water well, using drilling bond money posted for the well. ARCO Oil and Gas Company requested a one-year extension of the standard two-year confidentiality period for well records on Werner 34-21 in Marion County and Paul 34-32 Redrills 1 and 2 in Columbia County. DOGAMI held public hearings on the matter, and the extension of confidentiality was denied on the Werner 34-21 but granted on the Paul 34-32 redrills, a decision which was on appeal at year's end. The Mist Gas Field map has been updated through October 1986 and is available from DOGAMI, as are publications in the Oil and Gas Investigation Series and others relating to the Mist Gas Field.

Columbia County, in which the Mist Gas Field is located, has adopted a new lease form that affects the acreage offered for sale by the County in the future. The annual rental is \$10 per acre with a term of 10 years. There is also a five-year drilling commitment, with a \$5 annual penalty per acre after the five-year period. Information can be obtained from Columbia County, St. Helens, Oregon, phone (503) 397-4322. □

Bureau of Mines names new Spokane chief

The U.S. Bureau of Mines recently appointed Richard B. Grabowski as Chief of its Western Field Operations Center in Spokane. Grabowski spent most of his career in the western United States managing mineral exploration and development for several industrial firms. His most recent position was as chief geologist for Cabot Mineral Resources, a multinational firm based in New York.

In his new position, Grabowski will be responsible for a variety of programs that assess the nation's mineral resource potential and the adequacy of its mineral supply. The Center's work includes examination of individual mines and mineral deposits, evaluation of the mineral potential of public lands, and engineering and economic studies of mineral commodities and the industries that produce them.

—BLM News

The great fireball of September 15, 1986

by Richard N. Pugh, Science Teacher, Cleveland High School, Portland, Oregon

A great bolide (large fireball) occurred over the Cascade Mountains of Oregon on September 15, 1986, at 9:51 p.m., Pacific Daylight Time. It moved from the north-northeast to the south-southwest, entering the atmosphere north of Hood River and disappearing near the village of Vida, east of Eugene. It is the largest fireball reported over Oregon since the December 3, 1981, fireball over Silverton (Pugh, 1982).

This report is based on the observations of 37 people. The fireball was seen as far north as Timberline Lodge on the south side of Mount Hood, as far east as Baker in eastern Oregon, as far west as Coos Bay on the coast, and as far south as Central Point in Jackson County. Estimates of the size of the bolide ranged from one to ten times the diameter of the full moon. In almost all cases, the brightness was reported to be greater than that of a full moon. Two observers reported that the object was too bright to look at directly. In almost all cases, the fireball lit up the land, casting shadows.

The color of the fireball varied from white to red, yellow-white being the most commonly reported color. However, there were many reports of blue or green edges around the yellow-white center. Most observers saw a tail coming off of the fireball. The length of the tail ranged from 5° to 60°, and its color was most commonly reported to be yellow-orange. There were numerous reports of sparks, streamers, smoke, and vapor trails associated with the fireball. As many as 12 large fragments were reported.

Sonic booms were reported near Tygh Valley, Madras, Prineville, Albany, and McKenzie Bridge. There were also reports of anomalous sounds associated with the fireball. The anomalous sounds are not the same as sonic booms. They are sounds heard the same time the fireball is seen, although the fireball may be many miles away from the observer. As sound travels slower than the speed of light, the occurrence of these sounds with the visual observations is not yet understood.

One observer saw the fireball split into two pieces east of Mulino, Oregon. One piece appeared to be spinning, the other not. The fireball again broke up or exploded just before termination.

The presence of sonic booms during this event indicated that meteorites were produced from this fireball. Plotting of fireball sightings indicated that the area of impact was probably east of Eugene/Springfield, near the town of Vida on the McKenzie River. As this is a rugged and heavily timbered part of the western Cascades, unless one of the meteorites struck a building, it is unlikely that specimens will be recovered (Pugh, 1986).

At present, Oregon has produced five meteorites. Four were finds, that is, they were found after having been on the ground for hundreds of years. The only meteorite that was actually recovered right after falling was the Salem stony meteorite, which fell May 13, 1981 (Pugh, 1983). Even though several meteorites undoubtedly



Picture painted by artist Nancy Jo Farry, who saw the September 15 fireball from Coos Bay, Oregon. Photo by Memo Jasso.

ly fall every year in Oregon, their recovery is difficult due to the geography, geology, frequently cloudy weather, and population distribution.

It is hoped that readers will be on the lookout for these space rocks. Anyone who thinks that he might have a meteorite should contact the author at Cleveland High School, 3400 S.E. 26th Ave., Portland, OR 97202, phone (503) 280-5120.

REFERENCES CITED

- Pugh, R.N., 1982, December 3, 1981, fireball: *Oregon Geology*, v. 44, no. 6, p. 69-70.
———1983, The Salem meteorite: *Oregon Geology*, v. 45, no. 6, p. 63-64.
———1986, Report to SEAN: *Scientific Event Alert Network Bulletin*, v. II, no. 9, p. 21. □

New list of field trip guides available

The Geoscience Information Society (GIS) has published the fourth edition of its *Union List of Geologic Field Trip Guidebooks of North America*. The 200-page publication is available from Customer Services, American Geological Institute (AGI), 4220 King Street, Alexandria, VA 22302, for the price of \$47.50.

The new edition lists guidebooks for field trips held from 1891 through the end of 1979, including the holdings of 134 libraries in Canada and the United States with strong geoscience collections. Useful as both a bibliography and a finding tool, it helps the user to determine quickly which libraries own a copy of any guidebook

cited and what the lending policies of those libraries are.

It is often difficult to obtain guidebooks for the field trips held at geology meetings every year. Few are available for purchase after the field trips have taken place. That is why GIS has over the years given high priority to production of the Union List. This fourth edition has listings of 566 guidebook series, compared to 354 in the previous edition, and a greatly expanded geographic index. The publication is a cooperative effort of the 134 libraries, the GIS Guidebooks Committee, and the AGI library staff. The compilation and editing were directed by Beatrice Lukens of the AGI, who chaired the GIS Guidebooks Committee. □

Glimpses of DOGAMI history — the beginnings

Fifty years ago, on March 1, 1937, Chapter 179 of the Oregon Laws was signed by the Governor and filed in the office of the Secretary of State. It began: "There hereby is created and established a State Department of Geology and Mineral Industries." That start of the Department is reflected in the following glimpses of DOGAMI history.

From The Way it Was, a brief history of the Department by Ralph S. Mason, former State Geologist. The paper will soon be released by DOGAMI.

"In the spring of 1937, the Legislature created the present Department of Geology and Mineral Industries and for the first biennium appropriated \$60,000 for the Department, along with an additional \$40,000 that was earmarked for grubstakes for prospectors and for administering the "Grubstake Act" during the biennium. The first meeting of the Department's Governing Board, which had been appointed by the Governor, took place on April 7, 1937, about a month after the Department had been created. The Board members had been chosen partly because of their interest in mining and geology and partly by reasons of regional representation. They were Senator W.H. Strayer from Baker County, who had long campaigned for the formation of a Department; Albert Burch from Jackson County, who was a consulting mining engineer; and E.B. MacNaughton from Multnomah County, who was a banker and civic leader. Senator Strayer was appointed Chairman. . .

"By June 8, 1937 . . . the Board had selected Earl K. Nixon to be the first Director of the Department. Earl Nixon was a mining engineer with wide experience in many parts of the world. At the time of his appointment, Nixon was operating a placer mine in Josephine County . . . From his first moment in the driver's seat, the new Director, with the full cooperation of the Board (which met ten times during the first year), launched a blizzard of programs and projects. To accomplish as many tasks as possible in the shortest time, Nixon established a 44-hour work week for the Department and kept the office open during noon hours to accommodate both local and out-of-town patrons and also to receive phone calls originating in other time zones. For many years, thanks to flexible work schedules, the Portland office was open from shortly after 7:00 a.m. until 5:30 p.m. Professional staffers working on rush projects in the evening reported calls coming in as late as 9:00 p.m. and later.

"The title of State Geologist, which had been originally conferred on Dr. [Thomas] Condon [in 1872], was not given to the new Director of the Department. It was not until 1963 that the position of State Geologist was restored."

From the first issue of the Department's Press Bulletins (which in 1939 were changed into the monthly magazine The Ore. Bin), Press Bulletin No. 1, November 1, 1937.

"Mining Bureau Created. The last session of the State Legislature authorized a State Department of Geology and Mineral Industries which is to stimulate mining activity in the State and to locate markets where Oregon products may be sold . . .

"The head office is located in Portland, with Earl K. Nixon as Director of the Department, Mr. A.M. Swartley as Consulting Mining Engineer, and Mr. Ray C. Treasher as Geologist. Offices are maintained in the Lewis Building at the corner of Southwest Fourth and Oak. Mr. Donald K. Mackay is Mining Geologist at Baker, where the State Assay Laboratory is conducted by Mr. Leslie L. Motz. Mr. J.E. Morrison, Mining Geologist, is at Grants Pass, where the State Assay Laboratory is conducted by Mr. Albert A. Lewis." □

Oregon earthquakes recorded on new map

A new map published by the Oregon Department of Geology and Mineral Industries (DOGAMI) depicts the locations and magnitudes of all earthquakes that are known to have occurred in Oregon and southern Washington between 1841 and 1986. It is map GMS-49 in DOGAMI's Geological Map Series.

The black-and-white *Map of Oregon Seismicity, 1841-1986*, produced by R.S. Jacobson during his tenure at the College of Oceanography, Oregon State University, measures approximately 2 by 3 ft and depicts the earthquake epicenters on a background showing the state, its counties, and selected cities. It includes all earthquakes recorded in the unpublished Seismic Catalog of Oregon State University. A total of 1,286 earthquake events are recorded, of which approximately 440 were associated with the eruption of Mount St. Helens in 1980. Approximately 250 of the listed events occurred before 1962, when modern recording instrumentation became available. The map also contains a brief discussion by the author, a table listing the seven largest earthquakes in Oregon, and a bibliography with suggestions for further reading.

The author advises caution in using this map alone to define earthquake hazards within Oregon. The historical record is not sufficiently extensive and not exact enough for that. Also, areas outside the State, such as Puget Sound, Mount St. Helens, or the Blanco Fracture Zone off the coast, could create earthquake hazards within Oregon. He finally describes the different attempts by scientists to explain the phenomenon that Oregon has had relatively few and only moderate earthquakes in the past and to solve the question whether one may expect only moderate earthquake activity or greater earthquake activity in the future.

The new map, GMS-49, is now available at the Oregon Department of Geology and Mineral Industries, 910 State Office Building, Portland, OR 97201. The purchase price is \$3. Orders under \$50 require prepayment. □

Volcano News devotes one issue to Mount St. Helens

The July 1986 issue of *Volcano News* (no. 24), entitled "Mount St. Helens: The First Six Years," contains short summary articles on Mount St. Helens activity, prediction of eruptions, rockslide/debris avalanches, lahars, the blast eruption, erosion of sediments, and petrology and chemical composition of the St. Helens magma by scientists who have studied the volcano for the last six years.

Volcano News, a sort of underground newspaper for volcanologists, appears at varying intervals. The publication is described by its editor Charles Wood in the following way: "Approximately 450 volcanologists and volcano enthusiasts from 30 nations subscribe, including many professional geologists in the U.S. Geological Survey. *VN* tries to be sprightly, interspersing its "serious" articles with reviews of volcano disaster books, volcano art, whimsy, crossword puzzles, and poetry/doggerel. Forthcoming issues include articles on the Aleutians, Central America, remote sensing, and societal effects of volcanic eruptions. Also, I hope to establish the world's first volcano bulletin board on computer in time to have daily reports from the January 1987 symposium in Hawaii on 'How Volcanoes Work'."

Single copies of the eight-page *Volcano News* sell for \$2, but Editor Wood assures *Oregon Geology* readers that if anyone wants to subscribe for the next four issues (*VN* 25-28) at \$7, he'll include a free copy of the Mount St. Helens issue, if the subscriber asks and also mentions this notice in *Oregon Geology*. Address of *Volcano News* is 320 East Shore Drive, Kemah, TX 77565, phone (713) 538-2135. □

AVAILABLE DEPARTMENT PUBLICATIONS

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	Price	No. copies	Amount
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