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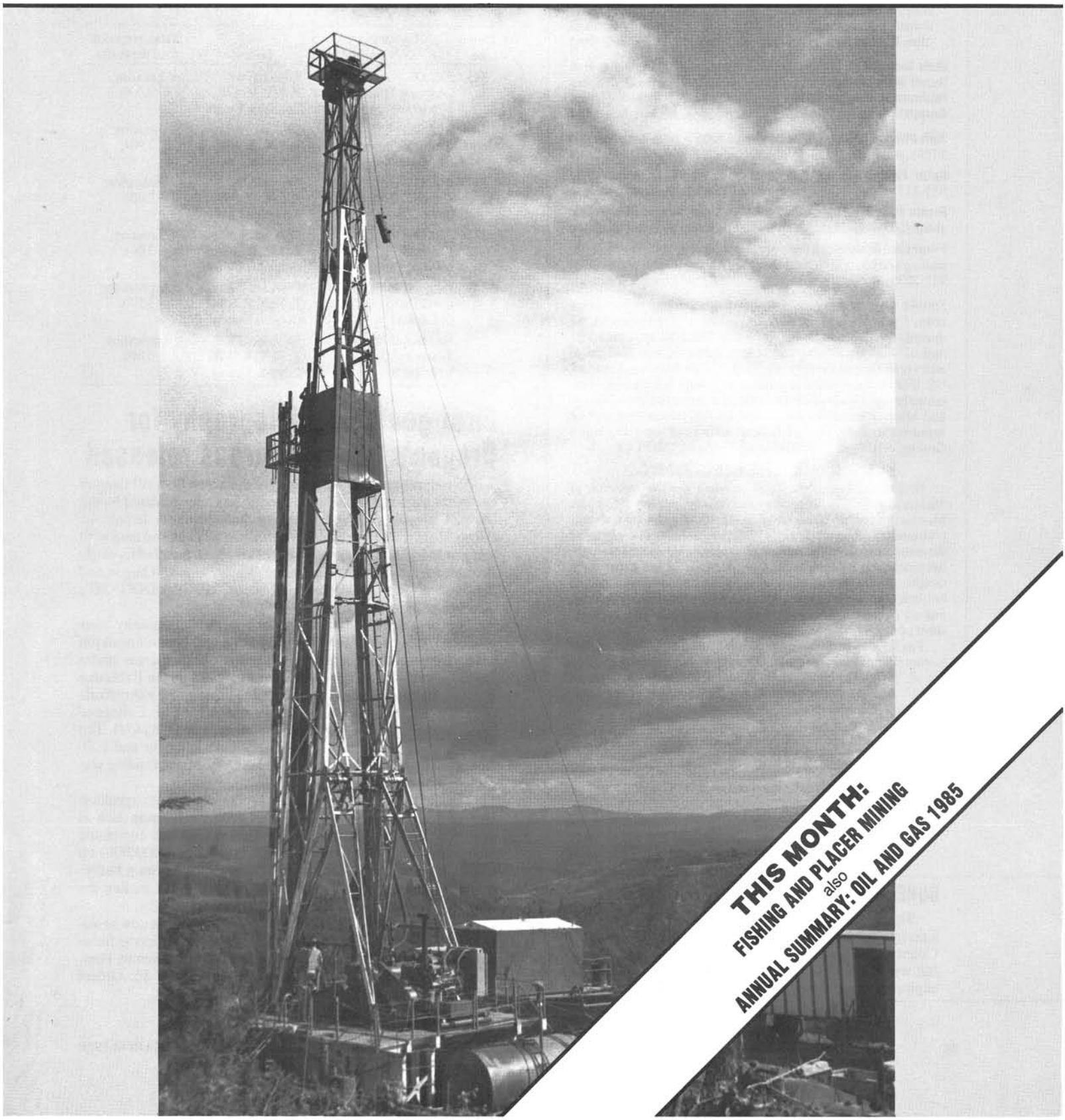

THIS MONTH:
FISHING AND PLACER MINING
also
ANNUAL SUMMARY: OIL AND GAS 1985

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

Taylor Drilling Company rig no. 5 on Reichhold Energy Corporation site at Mist Gas Field, Columbia County. The well was drilled to a total depth of 3,593 ft, but was a dry hole. See annual summary of oil and gas exploration and development beginning on page 29.

OIL AND GAS NEWS

Columbia County — Wildcat

ARCO Columbia County 41-6, located in NE¼ sec. 6, T. 5 N., R. 5 W., approximately 3 mi south of Birkenfeld in western Columbia County, was spudded January 15, drilled to a total depth of 2,750 ft, and plugged and abandoned January 23, 1986.

Recent permits

Permit no.	Operator, well, API number	Location	Status, proposed total depth (ft)
345	ARCO Longview Fibre 13-6 009-00186	SW¼ sec. 6 T. 5 N., R. 4 W. Columbia County	Location; 3,000
346	ARCO Crown Zellerbach 23-9 009-00187	SW¼ sec. 9 T. 5 N., R. 4 W. Columbia County	Location; 2,904.
347	ARCO Crown Zellerbach 32-9 009-00188	NE¼ sec. 9 T. 5 N., R. 4 W. Columbia County	Application; 2,800.
348	ARCO Crown Zellerbach 33-9 009-00189	SE¼ sec. 9 T. 5 N., R. 4 W. Columbia County	Location; 3,041.
349	Hutchins & Marrs Great Discovery #3 019-00033	SW¼ sec. 20 T. 30 S., R. 9 W. Douglas County	Application; 3,500.
350	Hutchins & Marrs Discovery #3 019-00034	NE¼ sec. 17 T. 30 S., R. 9 W. Douglas County	Application; 6,000. □

First geologic bibliography for Oregon's offshore areas released

A comprehensive bibliography of the ocean floor off Oregon and of the adjacent continental margin has been released by the Oregon Department of Geology and Mineral Industries (DOGAMI). The new release is published as a colored map with text printed on both front and back of the sheet. Entitled *Geologic Bibliography and Index Maps of the Ocean Floor off Oregon and the Adjacent Continental Margin,* it is map GMS-39 in DOGAMI's Geological Map Series.

The new publication is the first such bibliography ever produced. It is part of the efforts by State and Federal research teams investigating the newly expanded offshore areas under United States jurisdiction proclaimed in 1983 as the Exclusive Economic Zone (EEZ). It was produced through the joint efforts of the U.S. Minerals Management Service (MMS), the College of Oceanography of Oregon State University, and DOGAMI. The authors were OSU marine geologists C.P. Peterson and L.D. Kulm and DOGAMI staff geologist J.J. Gray. Major funding was provided by MMS.

The list of 361 citations of the bibliography is comprehensive, encompassing a wide variety of geologic subjects such as economic geology, geophysics, and tectonics. It is correlated with two index maps (scales 1:1,000,000 and 1:2,000,000) on which specific studies are outlined in seven colors on a bathymetric/topographic base. Finally, a subject index makes the references accessible under specific topics.

The new publication, DOGAMI map GMS-39, is now available at the Oregon Department of Geology and Mineral Industries, 910 State Office Building, 1400 SW Fifth Avenue, Portland, Oregon 97201-5530. The purchase price is $5. Orders under $50 require prepayment. □

Fishing and placer mining: Are they compatible?

by Allen H. Throop, Reclamationist, Oregon Department of Geology and Mineral Industries, Albany, and Allan K. Smith, Assistant Fisheries Biologist, Oregon Department of Fish and Wildlife, Grants Pass

INTRODUCTION

Placer miners and fishermen have often been at odds with each other over the years. On one hand, the fishermen claim that placer mining ruins the creek; on the other hand the miners maintain that their operations often enhance the fish values of a stream. Fish population surveys were recently conducted to look at the effects of mining on the fish in Sucker Creek in Josephine County. Preliminary results indicate that, in this case, anyway, the truth lies somewhere between the two extremes.

A section of Sucker Creek was completely relocated during mining. Three years after the relocation, coho salmon and steelhead have returned, but their numbers are not equal to those in unmined sections of the stream. The purpose of this article is to relate the findings of the population surveys for this site. Comparing the value of the mining against the damage done to the fish and to the fish habitat is beyond the scope of this article.

Sucker Creek is a tributary of the Illinois River between Cave Junction and the Oregon Caves (Figure 1). The area surveyed lies at the bottom of steep-sided, fir-covered mountains. Precipitation ranges up to 70 in. per year.

The climate and topography combine to make excellent anadromous fish spawning habitat with cool, free-flowing streams protected from the sun by the mountains, large fir trees,

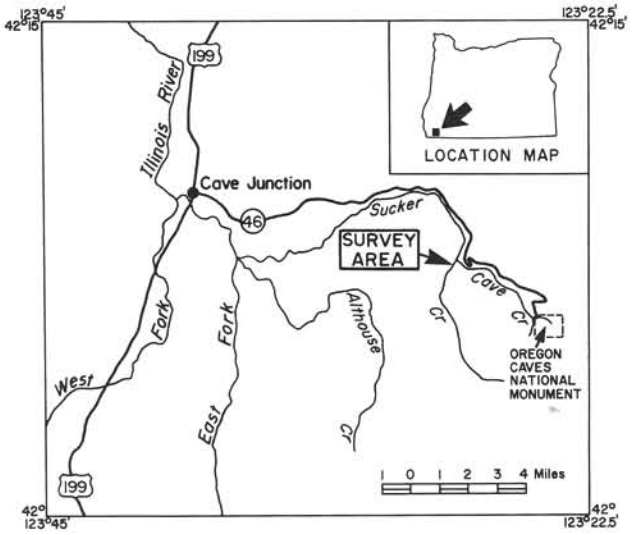


Figure 1. Location map of the fish-survey area on Sucker Creek.

Figure 2. The electrofisher in the background stuns the fish so the netter can catch them.

and a thick understory of alders and willows. The same natural topography and abundant water combined with a favorable geology led to the formation of significant placer gold deposits along Sucker and Althouse Creeks, the major drainages of the area.

Gold mining began in the area in the 1850's. Almost certainly the entire stream bed and most of the valley gravels were mined prior to 1950. Surface mining was the most common method, but evidence turned up during recent mining indicates that the original miners also used underground mining techniques to recover gold from the top of the bed rock without moving all the gravels.

In 1979, large-scale mining was revived near the junction of Sucker and Cave Creeks. For three years the miners processed all available gravel along a ½-mi stretch of the valley. During the operation, the creek was relocated along the west edge of the valley floor. This mine was one of four then operating along a 1-mi stretch of Sucker Creek's 25-mi length.

Although no fish population information was collected prior to stream relocation, the Oregon Department of Fish and Wildlife and the Oregon Department of Geology and Mineral Industries decided in the spring of 1985 to compare the fish populations of Sucker Creek upstream from the mine with a portion of relocated stream. The techniques used in this study and the results are given below.

METHODS AND MATERIALS

On July 3 and September 12, 1985, two areas on Sucker Creek were sampled using standard Fish and Wildlife sampling procedures. The Smith-Root Model V-A backpack electrofisher used (Figure 2) consists of a 12-volt motorcycle battery, a transformer, and positive and negative electrodes. Output was approximately 325 volts of pulsed DC current at 60 cycles per second. The backpack was carried by one individual who guided the positive electrode (a 12-in. copper hoop on the end of a 6½-ft-long rod). The negative electrode, a chain with copper straps attached at the end, was dragged behind. Fish were attracted to the positive electrode, stunned by the shock, netted by other party members, and held in a bucket. The fish recovered from the electric shock in a matter of seconds and were subsequently identified, counted, and released (Figure 3). A sample of up to 30 individuals of each age and species was measured for length.

Each survey area was about 150 yd long. In the undisturbed area, the stream banks were covered with stands of alders, willows, and annual plants. Woody debris was abundant in the stream. This section also had undercut banks and side channels. Overall, the channel was narrower and deeper than the disturbed section. In contrast, the banks of the relocated channel had very small alders and willows as stream-side vegetation and only one large piece of woody debris; there were no side channels in the relocated section.

Figure 3. A juvenile steelhead is measured before being released. A typical-size cottid is visible in the bucket.

RESULTS AND DISCUSSION

A summary of the sampling results appears in Table 1. Steelhead fry (young of the year) were abundant in both survey areas in July and September. Steelhead fry were more abundant in the relocated area in both months because they prefer shallow water in a riffle; there was much more of this type of habitat in the rechanneled area. Steelhead juveniles (older than one year) were found in greater numbers in the undisturbed area, because they were much larger than the fry and required deeper water and cover. Deep water and cover were absent in the relocated area. The presence of multiple ages in a steelhead population is an indicator of a healthy, balanced population.

Table 1. *Fish captured in Sucker Creek in 1985.*

Undisturbed area species	No. counted July 3	No. counted Sept. 12	Total
Steelhead fry	30	33	63
Steelhead juvenile	9	13	22
Coho fry	4	46	50
Cottid (all ages)	43	20	63
Pacific giant salamander	2	2	4
Lamprey ammocete	0	1	1
Disturbed area species	**No. counted July 3**	**No. counted Sept. 12**	**Total**
Steelhead fry	66	52	118
Steelhead juvenile	5	3	8
Coho fry	2	19	21
Cottid (all ages)	163	66	229
Pacific giant salamander	0	1	1
Lamprey ammocete	0	0	0

Coho fry in the undisturbed area outnumbered those in the rechanneled area, because they prefer habitat with pools and cover much more strongly than do steelhead fry. Many of the 19 coho captured in the rechanneled area in September were under one root wad.

Cottids, small, bottom-dwelling nongame fish popularly known as sculpins, were found in far greater numbers in the disturbed area. They were so abundant in September that many escaped capture by the netters. These fish live in areas of large gravel and small rubble where they can hide under rocks. They usually are not found in pools, on sandy or silt bottoms, or on bed rock. The large expanses of gravel in the rechanneled area provide ideal habitat for cottids; such habitat is not ideal for coho.

The actual moving of the streambed during mining destroyed spawning habitat, eggs, and fry in the gravel during the year it was moved. The production of insects, the primary food of young steelhead and salmon, was also temporarily eliminated.

Removal of vegetation deprives the fish of cooling shade, removes the primary source of terrestrial insects for food, and allows for increased stream-bank erosion, which in turn adds more silt to the stream. Revegetation of the mining site after the gold is extracted is very important. This may involve putting stored topsoil and overburden back onto recontoured gravels and planting the area with grass, alders, willows, or other plants. Each mining operation is unique and requires individual planning so that fish and fish habitat can be protected or restored. Close cooperation between the miners and the natural-resource agen-

*(Continued on page 34, **Fish**)*

Oil and gas exploration and development in Oregon, 1985

by Dennis L. Olmstead, Petroleum Engineer, Oregon Department of Geology and Mineral Industries

ABSTRACT

Oil and gas leasing in Oregon during 1985 decreased from the previous year, but the acreage under lease at year's end remained nearly unchanged. Crook County was the site of the most new federal leasing.

Applications for permits to drill were up sharply, while drilling also showed an increase. Twenty-six wells and one redrill were drilled during the year. Of these wells, 63 percent were in the Mist Gas Field in Columbia County. Two wells exceeded 11,000 ft in total depth. Eleven companies carried out exploration resulting in eight new completions. These producers were drilled by ARCO and Tenneco.

Production in 1985 totaled 4.08 billion cubic feet, for a value of $9.8 million.

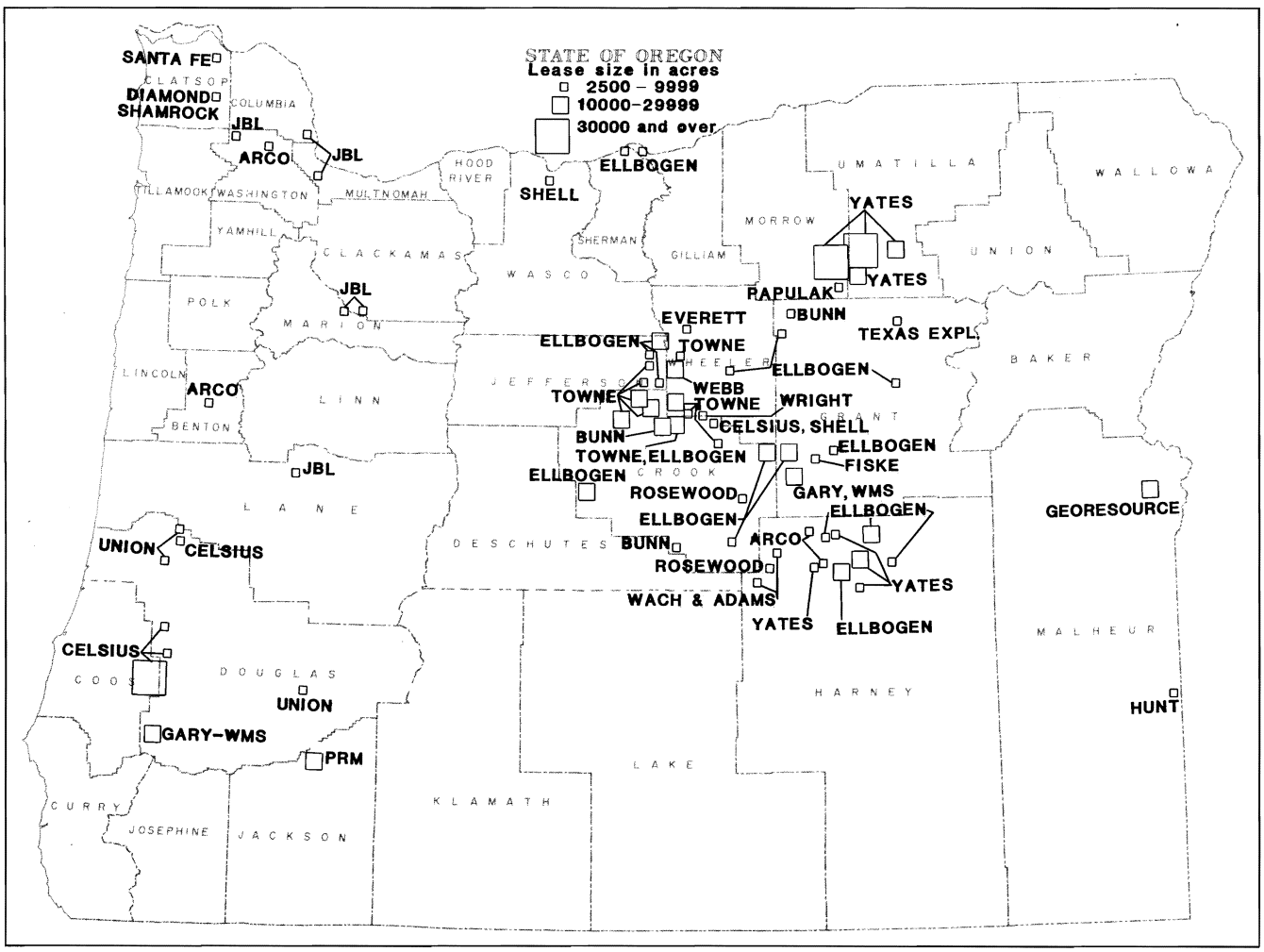
ARCO Oil and Gas Company purchased Reichhold Energy Corporation to become the predominant operator in the Mist Gas Field. The company also took over the interests of Diamond Shamrock in the field.

DOGAMI revised rules for oil and gas exploration and printed several publications related to oil and gas.

LEASING ACTIVITY

Interest in new leases on federal land dropped during 1985, but the number of acres under lease remained steady due to issuance of leases applied for in 1984. Applications in Oregon numbered 55 for a total of 246,964 acres, a drop of nearly 80 percent from 1984. Leases issued, however, increased from 237,034 acres in 1984 to 629,691 acres in 1985, a total of 174 tracts. Crook County was again the most-leased county (172,888 acres), followed by Harney County (125,646 acres) and Grant County (91,297 acres). Expired and terminated leases during the year totaled 768,644 acres, somewhat less than the previous year. By year's end, leased federal land consisted of 4,023,891 acres in 1,764 tracts.

Applications for leases of state land increased in early 1985, resulting in a lease sale held on July 24 by the Oregon Division of State Lands. This was the first such auction since February 1982. Acreage in nine counties was leased, for a total of 58,662 acres on 183 leases. A top bid of $42 per acre in Columbia County helped bring the total bonus bids to $41,192. Most acreage receiving bids was in the Mist Gas Field area. On December 31,



Map showing major oil and gas leasing in Oregon, 1985. Map shows acreage applied for, issued, and assigned. Withdrawals not shown. Data courtesy Greater Columbia LANDATA.

there were 794 state oil and gas leases in effect, encompassing 301,080 acres. Lease rental income for the year was $368,401, and Clatsop County had the most state acreage under lease of any county. Surrendered leases amounted to 43,474 acres during 1985.

There were no new significant county lease sales or auctions during the year.

DRILLING

Twenty-six oil and gas wells were drilled in the state in 1985, plus one redrill. This is an increase of ten wells, or nearly 60 percent, over 1984. This increase continues the upward trend started in 1984 which followed three years of decreased activity. Eighteen wells and the redrill were within the boundaries of the Mist Gas Field, a pattern that has continued since the field discovery in 1979. Two additional wells were located nearby in Columbia and Clatsop Counties, while the remaining five were scattered in western and central Oregon (see map).

Driller and roughnecks running drill pipe into Columbia County 23-35, Mist Gas Field. The well was later plugged and abandoned.

Wells in the Willamette Valley include one drilled near St. Louis by Oregon Natural Gas Development (2,511 ft, abandoned) and two drilled north of Eugene, one by Leavitt Exploration and one by Ty Settles. The wells, drilled to 2,871 ft and 1,600 ft, respectively, were also dry. But they indicate a continued interest in the valley, where wells have been drilled each year since 1979.

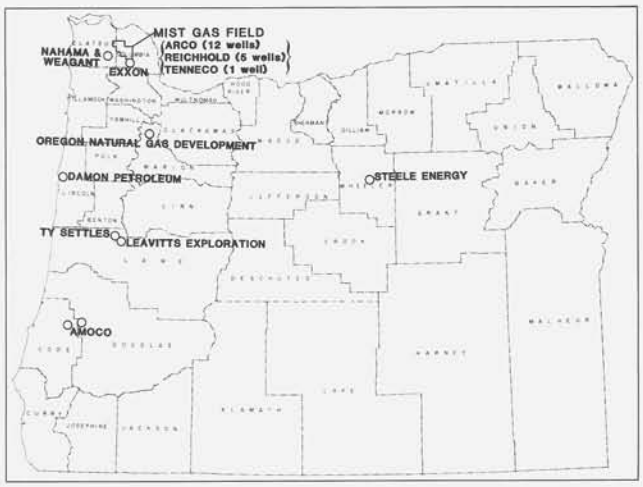
Permitting of wells was also up in 1985, with 53 permits to drill issued (Table 1). This nearly doubles the number of 1984 permits. Fifteen expired permits were canceled during the year (Table 2).

Eleven different operators explored in the state, with four as new operators: ARCO, Exxon, Settles, and Tenneco. ARCO was very successful, with seven new completions in Mist Gas Field, while Tenneco had one completion. All other wells were dry holes.

Two wells exceeded 11,000 ft in depth: one drilled by Amoco in Douglas County and one by Exxon in Columbia County. Both were dry holes but helped to boost the total drilled footage to 84,169 ft, the highest since 1982. For two wells in progress at the beginning of 1985, only the footage drilled during the year is included in the total. The average well depth was about 3,500 ft, slightly deeper than in 1984.

DISCOVERIES AND GAS PRODUCTION

The Mist Gas Field experienced its best year to date in terms of number of new wells completed to production. Eight new producers were drilled, and three were on line by year's end. These wells represent seven new pools, continuing the trend of small one- or two-well pools. Two of the new wells, ARCO



Oil and gas drilling sites in Oregon, 1985.

Crown Zellerbach 23-15 and 31-16, expanded the extent of production for a distance of nearly 5 mi to the southeast from previous production. Due to the nitrogen content of these wells, however, they have not yet been put on line.

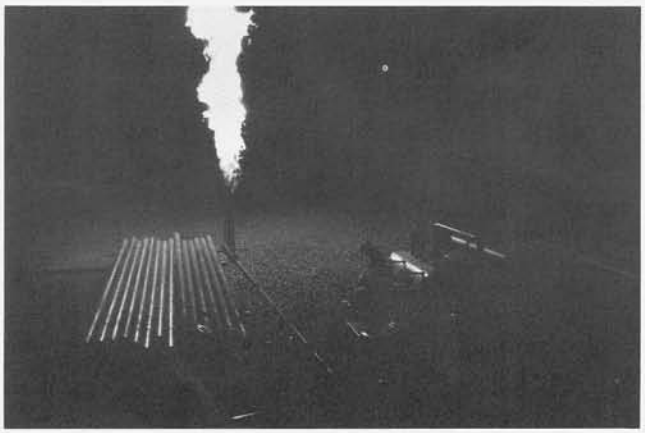
ARCO and Tenneco are the operators of all the new producers; both companies are new to Oregon exploration. Much of the ARCO activity is the result of its takeover of Reichhold Energy holdings during the year (see below).

By the end of the year, the number of wells on line increased from six to nine. This will increase by several more wells in 1986 as pipelines are installed to the remaining 1985 completions. Only two wells, Columbia County 13-34 and Longview Fibre 12-33, from the original northern part of the field remain in production.

Production for the year totaled 4.08 billion cubic feet (Bcf), an increase from the 1984 total of 2.79 Bcf. The rate averaged 11.1 million cubic feet per day (MMcfd), bringing the cumulative field production at the end of 1985 to 23.3 Bcf. Wellhead gas prices varied between $0.232 and $0.281 per therm during the year, and the total value of gas produced was $9.8 million.

ARCO PURCHASES REICHHOLD

After sharing in production of a Reichhold well in 1984 due to a farmout agreement, ARCO began drilling its own wells last year. The first attempt, Columbia County 44-21, was a new pool discovery testing at 1.8 MMcfd (Tables 1 and 3). The company



Initial production test of Tenneco Oil Company's Columbia County 41-28, Tenneco's first completed well in the state. The tested flow was 1.1 million cubic feet per day.

Table 1. *Oil and gas permits and drilling activity in Oregon, 1985*

Permit no.	Operator, well, API number	Location	Status, depth (ft) TD = total depth PTD = proposed TD RD = redrill
237	ARCO Oil & Gas Co.* Columbia County 23-22 009-00116	SW¼ sec. 22 T. 6 N., R. 5 W. Columbia County	Completed, gas; TD: 2,028.
268	Amoco Production Co. Weyerhaeuser B-1 019-00027	SW¼ sec. 13 T. 25 S., R. 9 W. Douglas County	Abandoned, dry holes; TD: 11,330.
275	Oregon Nat. Gas Dev. DeShazer 13-22 047-00018	SW¼ sec. 22 T. 5 S., R. 2 W. Marion County	Abandoned, dry holes; TD: 2,511.
276	Steele Energy Corp. Keys 1 069-00008	NW¼ sec. 28 T. 9 S., R. 23 E. Wheeler County	Idle; TD: 6,539.
277	ARCO Oil & Gas Co.* Longview Fibre 23-36 009-00132	SW¼ sec. 36 T. 6 N., R. 5 W. Columbia County	Completed, gas; TD: 1,879.
279	Reichhold Energy Corp. Longview Fibre 42-22 009-00134	NE¼ sec. 22 T. 6 N., R. 5 W. Columbia County	Abandoned, dry hole; TD: 2,278.
281	Leavitt Exploration Jackson 1 039-00006	NW¼ sec. 14 T. 19 S., R. 4 W. Lane County	Permit issued; PTD: 3,000.
282	Leavitt Exploration Jackson 2 039-00007	SE¼ sec. 11 T. 19 S., R. 4 W. Lane County	Permit issued; PTD: 3,000.
283	ARCO Oil & Gas Co. Banzer 34-16 009-00136	SE¼ sec. 16 T. 6 N., R. 5 W. Columbia County	Abandoned, dry hole; TD: 4,902.
284	ARCO Oil & Gas Co. Columbia County 44-21 009-00137	SE¼ sec. 21 T. 6 N., R. 5 W. Columbia County	Completed, gas; TD: 4,500.
285	Ty Settles Cindy 1 039-00008	NW¼ sec. 23 T. 16 S., R. 5 W. Lane County	Idle; TD: 1,600.
286	Ty Settles Cindy 2 039-00009	SW¼ sec. 23 T. 16 S., R. 5 W. Lane County	Application; PTD: 2,500.
287	Reichhold Energy Corp. Columbia County 43-34 009-00138	SE¼ sec. 34 T. 6 N., R. 5 W. Columbia County	Abandoned, dry hole; TD: 2,100. RD: 2,225.
288	Nahama & Weagant Jewell 1-23 007-00017	SW¼ sec. 23 T. 5 N., R. 7 W. Clatsop County	Abandoned, dry hole; TD: 3,190.
289	Reichhold Energy Corp. Crown Zellerbach 34-26 009-00139	SE¼ sec. 26 T. 5 N., R. 4 W. Columbia County	Abandoned, dry hole; TD: 5,838.
290	Reichhold Energy Corp. Columbia County 23-35 009-00140	NW¼ sec. 35 T. 7 N., R. 5 W. Columbia County	Abandoned, dry hole; TD:3,593.
291	Hutchins & Marrs Discovery 1 019-00031	NE¼ sec. 17 T. 30 S., R. 9 W. Douglas County	Permit issued; PTD: 6,000.
292	Reichhold Energy Corp. Columbia County 33-8 009-00141	SE¼ sec. 8 T. 6 N., R. 5 W. Columbia County	Abandoned, dry hole; TD: 3,612.
293	Hutchins & Marrs Great Discovery 2A 019-00032	NW¼ sec. 20 T. 30 S., R. 9 W. Douglas County	Application; PTD: 6,000. Permit denied. (Table 2)
294	Oregon Nat. Gas Dev. Tesch 44-21 047-00019	SE¼ sec. 21 T. 5 S., R. 2 W. Marion County	Permit issued; PTD: 3,000.
295	ARCO Oil & Gas Co. Columbia County 23-19 009-00142	SE¼ sec. 19 T. 6 N., R. 5 W. Columbia County	Abandoned, dry hole; TD: 3,440.
296	ARCO Oil & Gas Co.* Crown Zellerbach 12-1 009-00143	NW¼ sec. 1 T. 5 N., R. 5 W. Columbia County	Completed, gas; TD: 1,721.

Table 1. *Oil and gas permits and drilling activity in Oregon, 1985 — continued*

Permit no.	Operator, well API number	Location	Status, depth (ft) TD = total depth PTD = proposed TD RD = redrill
297	Hutchins & Marrs Georgia Pacific 1 011-00021	NE¼ sec. 14 T. 30 S., R. 10 W. Coos County	Permit issued; PTD: 6,000.
298	Tenneco Oil & Co. Columbia County 11-28 009-00145	NW¼ sec. 28 T. 6 N., R. 5 W. Columbia County	Permit issued; PTD: 3,500.
299	Tenneco Oil Co. Columbia County 14-28 009-00145	SE¼ sec. 28 T. 6 N., R. 5 W. Columbia County	Permit issued; PTD: 3,500.
300	Tenneco Oil Co. Columbia County 33-28 009-00146	SE¼ sec. 28 T. 6 N., R. 5 W. Columbia County	Permit issued; PTD: 3,000.
301	Tenneco Oil Co. Columbia County 41-28 009-00147	NE¼ sec. 28 T. 6 N., R. 5 W. Columbia County	Completed, gas; TD: 2,178.
302	Tenneco Oil Co. Columbia County 42-28 009-00148	NE¼ sec. 28 T. 6 N., R. 5 W. Columbia County	Application; PTD: 3,000.
303	ARCO Oil & Gas Co. Columbia County 11-31 009-00149	NW¼ sec. 31 T. 6 N., R. 3 W. Columbia County	Permit issued; PTD: 12,000.
304	ARCO Oil & Gas Co. Columbia County 33-28 009-00150	SE¼ sec. 28 T. 5 N., R. 5 W. Columbia County	Permit issued; PTD: 5,500.
305	ARCO Oil & Gas Co. Columbia County 41-14 009-00151	NE¼ sec. 14 T. 4 N., R. 3 W. Columbia County	Permit issued; PTD: 12,000.
306	ARCO Oil & Gas Co. Columbia County 43-3 009-00152	SW¼ sec. 3 T. 4 N., R. 3 W. Columbia County	Permit issued; PTD: 12,000 (later withdrawn by ARCO)
307	ARCO Oil & Gas Co.* Crown Zellerbach 31-16 009-00153	NE¼ sec. 16 T. 5 N., R. 4 W. Columbia County	Completed, gas; TD: 2,867.
308	Exxon Corp. Columbia County 1 009-00154	NE¼ sec. 29 T. 5 N., R. 3 W. Columbia County	Permit issued; PTD: 4,000.
309	Exxon Corp. GPE Federal 1 009-00155	SW¼ sec. 3 T. 4 N., R. 3 W. Columbia County	Application; PTD: 10,000. Permit denied. (Table 2)
310	Exxon Corp. GPE Federal 2 009-00156	SE¼ sec. 3 T. 4 N., R. 3 W. Columbia County	Application; PTD: 6,000. Permit denied. (Table 2)
311	Exxon Corp. Crown Zellerbach 1 009-00157	NE¼ sec. 28 T. 5 N., R. 3 W. Columbia County	Permit issued; PTD: 4,000.
312	Exxon Corp. GPE Federal 3 009-00158	SW¼ sec. 35 T. 5 N., R. 3 W. Columbia County	Permit issued; PTD: 4,000.
313	ARCO Oil & Gas Co. Columbia County 22-19 009-00159	NW¼ sec. 19 T. 6 N., R. 5 W. Columbia County	Permit issued; PTD: 3,500.
314	ARCO Oil & Gas Co. Scherf 41-21 009-00160	NE¼ sec. 21 T. 6 N., R. 5 W. Columbia County	Permit issued; PTD: 3,200.
315	Leavitt Exploration Falk 3 039-00010	NE¼ sec. 13 T. 16 S., R. 5 W. Lane County	Application; PTD: 2,500.
316	Leavitt Exploration Jessie 1 039-00011	SW¼ sec. 13 T. 16 S., R. 5 W. Lane County	Application; PTD: 2,500.
317	Leavitt Exploration Merle 1 039-00012	NE¼ sec. 25 T. 16 S., R. 5 W. Lane County	Abandoned, dry hole; TD: 2,871.

Table 1. *Oil and gas permits and drilling activity in Oregon, 1985 — continued*

Permit no.	Operator, well API number	Location	Status, depth (ft) TD = total depth PTD = proposed TD RD = redrill
318	ARCO Oil & Gas Co.* Columbia County 24-23 009-00161	SW¼ sec. 23 T. 6 N., R. 5 W. Columbia County	Permit issued; PTD: 2,600.
319	ARCO Oil & Gas Co. Columbia County 14-18 009-00162	SW¼ sec. 18 T. 4 N., R. 3 W. Columbia County	Application; PTD: 12,000.
320	Exxon Corp. GPE Federal Com. 1 009-00163	SE¼ sec. 3 T. 4 N., R. 3 W. Columbia County	Abandoned, dry hole; TD: 11,276.
321	Tenneco Oil Co. Columbia County 12-15 009-00164	NW¼ sec. 15 T. 5 N., R. 5 W. Columbia County	Permit issued; PTD: 1,000.
322	Tenneco Oil Co. Columbia County 24-10 009-00165	SW¼ sec. 10 T. 5 N., R. 5 W. Columbia County	Permit issued; PTD: 1,000.
323	Amoco Production Co. Weyerhaeuser F-1 011-00022	NE¼ sec. 10 T. 25 S., R. 10 W. Coos County	Abandoned, dry hole; TD: 4,428.
323	ARCO Oil & Gas Co.* Crown Zellerbach 23-15 009-00166	SW¼ sec. 15 T. 5 N., R. 4 W. Columbia County	Completed, gas; TD: 2,770.
325	ARCO Oil & Gas Co.* Columbia County 41-6 009-00167	NE¼ sec. 6 T. 5 N., R. 5 W. Columbia County	Permit issued; PTD: 2,500.
326	ARCO Oil & Gas Co.* Columbia County 33-6 009-00168	SE¼ sec. 6 T. 5 N., R. 5 W. Columbia County	Permit issued; PTD: 2,500.
327	Damon Petroleum Longview Fibre 3 041-00006	NW¼ sec. 21 T. 9 S., R. 11 W. Lincoln County	Abandoned, dry hole; TD: 3,040.
328	Exxon Corp. Columbia County B-1 009-00169	SW¼ sec. 2 T. 4 N., R. 3 W. Columbia County	Permit issued; PTD: 12,000.
329	Exxon Corp. Columbia County C-1 009-00170	NW¼ sec. 14 T. 4 N., R. 3 W. Columbia County	Permit issued; PTD: 6,800.
330	Diamond Shamrock* Columbia County 33-35 009-00171	SE¼ sec. 35 T. 7 N., R. 5 W. Columbia County	Permit issued; PTD: 3,100.
331	ARCO Oil & Gas Co.* Columbia County 43-32 009-00172	SE¼ sec. 32 T. 6 N., R. 5 W. Columbia County	Permit issued; PTD: 2,500.
332	ARCO Oil & Gas Co.* Columbia County 11-34 009-00173	NW¼ sec. 34 T. 6 N., R. 5 W. Columbia County	Permit issued; PTD: 2,500.
333	ARCO Oil & Gas Co.* Crown Zellerbach 41-2 009-00174	NE¼ sec. 2 T. 5 N., R. 5 W. Columbia County	Abandoned, dry hole; TD: 2,109.
334	ARCO Oil & Gas Co.* Columbia County 13-3 009-00175	SW¼ sec. 3 T. 5 N., R. 5 W. Columbia County	Permit issued; PTD: 2,500.
335	ARCO Oil & Gas Co. Columbia County 41-24 009-00176	NE¼ sec. 24 T. 4 N., R. 4 W. Columbia County	Permit issued; PTD: 12,000.
336	ARCO Oil & Gas Co. Columbia County 22-7 009-00177	NW¼ sec. 7 T. 6 N., R. 5 W. Columbia County	Permit issued; PTD: 4,000.
337	ARCO Oil & Gas Co.* Columbia County 22-27 009-00178	NW¼ sec. 27 T. 6 N., R. 5 W. Columbia County	Abandoned, dry hole; TD: 2,500.
338	ARCO Oil & Gas Co.* Longview Fibre 23-25 009-00179	SW¼ sec. 25 T. 6 N., R. 5 W. Columbia County	Completed, gas; TD: 1,979.
339	ARCO Oil & Gas Co.* Columbia County 32-32 009-00180	NE¼ sec. 32 T. 6 N., R. 5 W. Columbia County	Completed, gas; TD: 2,711.

Table 1. *Oil and gas permits and drilling activity in Oregon, 1985 — continued*

Permit no.	Operator, well API number	Location	Status, depth (ft) TD = total depth PTD = proposed TD RD = redrill
340	ARCO Oil & Gas Co. Columbia County 14-30 009-00181	SW¼ sec. 30 T. 6 N., R. 3 W. Columbia County	Permit issued; PTD: 6,300. (directional)
341	ARCO Oil & Gas Co. Longview Fibre 41-35 009-00182	NE¼ sec. 35 T. 6 N., R. 5 W. Columbia County	Permit issued; PTD: 1,920.
342	ARCO Oil & Gas Co. Columbia County 31-27 009-00183	NE¼ sec. 27 T. 6 N., R. 5 W. Columbia County	Permit issued; PTD: 2,115.
343	ARCO Oil & Gas Co. Longview Fibre 34-25 009-00184	SE¼ sec. 25 T. 6 N., R. 5 W. Columbia County	Permit issued; PTD: 2,020.
344	ARCO Oil & Gas Co. Columbia County 41-2-1 009-00185	NE¼ sec. 2 T. 5 N., R. 5 W. Columbia County	Permit issued; PTD: 2,000. (directional)

*Formerly Reichhold Energy well

Drill pipe location for Reichhold Energy Corporation's Columbia County 23-35.

had extensive lease holdings in the southern part of the field and continued exploration with Banzer 34-16 and Columbia County 23-19, which proved to be dry holes.

During the year, Reichhold Chemicals, Inc., parent company of Reichhold Energy Corporation, decided to sell the subsidiary, resulting in the eventual purchase by ARCO Oil and Gas Company, effective October 1, 1985. ARCO took over all leases, wells, and permits to drill held by Reichhold.

Reichhold Energy was formed in January 1975 to explore for energy resources to supply the Reichhold Chemicals fertilizer plant in St. Helens, Oregon. Their efforts, along with those of their partners, Oregon Natural Gas Development and Diamond Shamrock, resulted in the Mist Gas Field discovery in 1979. The company sold the St. Helens plant in early 1985.

After the sale of Reichhold Energy, Diamond Shamrock decided to sell its Oregon holdings, which ARCO also bought late in the year. This included leases and permits formerly held by Diamond Shamrock. As a result, the operators in the field now consist of ARCO, Oregon Natural Gas Development, and Tenneco.

OTHER ACTIVITY

The Northwest Petroleum Association remained very active in spite of the downturn in the industry. Membership stood at 165 at the end of the year. In addition to monthly meetings, the organization held two symposia during the year. One on the Mist Gas Field area consisted of a day devoted to papers on many aspects of field development, from leasing to geology to economics, followed by a day in the field to see the geology of the region.

Table 2. *Canceled and denied permits, 1985*

Permit no.	Operator, well, API number	Location	Issue date	Cancellation date	Reason
228	Reichhold Energy Corp. Columbia County 23-28 009-00111	SW¼ sec. 28 T. 7 N., R. 5 W. Columbia County	3-18-83	3-18-85	Expired
229	Reichhold Energy Corp. Columbia County 23-35 009-00112	SW¼ sec. 35 T. 7 N., R. 5 W. Columbia County	3-4-83	3-4-85	Expired
231	Reichhold Energy Corp. Longview Fibre 23-12 009-00114	SW¼ sec. 12 T. 6 N., R. 5 W. Columbia County	3-4-83	3-4-85	Expired
250	Reichhold Energy Corp. Longview Fibre 33-36 009-00120	SW¼ sec. 36 T. 6 N., R. 5 W. Columbia County	9-21-83	9-27-85	Expired
251	Reichhold Energy Corp. Grimsbo 11-16 009-00121	NW¼ sec. 16 T. 6 N., R. 5 W. Columbia County	9-21-83	9-27-85	Expired
254	Oregon Nat. Gas Dev. Dougherty 1-21 049-00001	NE¼ sec. 21 T. 1 S., R. 27 E. Morrow County	12-9-83	12-9-85	Expired
257	Reichhold Energy Corp. Columbia County 21-27 009-00125	NW¼ sec. 27 T. 6 N., R. 5 W. Columbia County	2-7-84	3-1-85	Expired
269	Reichhold Energy Corp. Longview Fibre 13-23 009-00131	SW¼ sec. 23 T. 6 N., R. 5 W. Columbia County	8-21-84	8-23-85	Expired
270	Hutchins & Marrs Great Discovery 3 019-00028	SW¼ sec. 20 T. 30 S., R. 9 W. Douglas County	8-23-84	8-23-85	Expired
271	Hutchins & Marrs Great Discovery 4 019-00029	SW¼ sec. 20 T. 30 S., R. 9 W. Douglas County	8-23-84	8-23-85	Expired
272	Hutchins & Marrs Great Discovery 5 019-00030	SW¼ sec. 20 T. 30 S., R. 9 W. Douglas County	8-23-84	8-23-85	Expired
273	Oregon Nat. Gas Dev. Buck 44-16 047-00016	SW¼ sec. 16 T. 5 S., R. 2 W. Marion County	10-17-84	12-20-85	Expired
274	Oregon Nat. Gas Dev. Cunningham 32-21 047-00017	NE¼ sec. 21 T. 5 S., R. 2 W. Marion County	10-17-84	12-20-85	Expired
278	ARCO Oil & Gas Co.* Invest. Mgmt. 22-20 009-00133	NW¼ sec. 20 T. 6 N., R. 4 W. Columbia County	11-27-84	12-23-85	Expired
280	ARCO Oil & Gas Co.* Columbia County 44-10 009-00135	SW¼ sec. 10 T. 6 N., R. 5 W. Columbia County	11-27-84	12-23-85	Expired
293	Hutchins & Marrs Great Discovery 2A 019-00032	NW¼ sec. 20 T. 30 S., R. 9 W. Douglas County			Permit denied due to idle well in same drilling unit.
309	Exxon Corp. GPE Federal 1 009-00155	SW¼ sec. 3 T. 4 N., R. 3 W. Columbia County			Permit denied due to existing permit in drilling unit.
310	Exxon Corp. GPE Federal 2 009-00156	SE¼ sec. 3 T. 4 N., R. 3 W. Columbia County			Permit denied due to existing permit in drilling unit.

*Formerly Reichhold Energy well.

A second symposium concentrated on Outer Continental Shelf (OCS) development off Oregon and Washington. This was co-sponsored by the Portland Chamber of Commerce Energy Committee and featured speakers from the Western Oil and Gas Association, Minerals Management Service, Exxon, and Governor Atiyeh's office. The federal OCS leasing schedule lists Oregon for leasing as soon as 1991.

The major Oregon Department of Geology and Mineral Industry Governing Board actions in 1985 regarding oil and gas exploration were the adoption of temporary and permanent rule changes. Final permanent changes became effective in November and included changes to definitions, changes to conditions for permit to drill, specific requirements for blowout preventers, standards for plugging a lost radioactive source, revision of

Table 3. *New completed wells, 1985*

Well	Initial production (MMcfd)	Date completed
ARCO Columbia County 32-32	2.2	Nov. 13, 1985
ARCO Columbia County 44-21	1.8	Feb. 10, 1985
ARCO Crown Zellerbach 12-1	1.1	June 30, 1985
ARCO Crown Zellerbach 31-16	5.9	July 30, 1985
ARCO Crown Zellerbach 23-15	4.1	Dec. 10, 1985
ARCO Longview Fibre 23-25	1.2	Dec. 16, 1985
ARCO Longview Fibre 23-36	2.3	Jan. 8, 1985
Tenneco Columbia County 41-28	1.1	Sept. 27, 1985

Table 4. *Production: Mist Gas Field*

1985 Production (Mcf)			
January	271,717	July	385,157
February	242,077	August	386,511
March	301,885	September	405,563
April	300,775	October	346,657
May	364,072	November	361,910
June	372,148	December	348,376
Cumulative (1985):		4,086,848 Mcf	
Cumulative (1979-1985):		23,306,184 Mcf	

directional drilling rule, change of flow-testing rule, change in conditions for unlawfully abandoned status, bond increases, and special spacing rules for Columbia and Clatsop Counties.

DOGAMI released several publications in the Oil and Gas Investigations series during the year. Additions to the series included OGI-10, *Mist Gas Field: Exploration and Development, 1979-1984;* OGI-13, *Biostratigraphy of Exploratory Wells, Southern Willamette Basin;* and OGI-14, *Oil and Gas Investigation of the Astoria Basin, Clatsop and North Tillamook Counties, Northwestern Oregon.* In addition, Open-File Report 0-84-2, *The Mist Gas Field Map* (1:24,000), was revised to reflect recent changes in the field. □

Study shows low coal potential in Arbuckle Mountain area

The Oregon Department of Geology and Mineral Industries (DOGAMI) has released a study of coal deposits in the Arbuckle Mountain area southeast of Heppner in Morrow County. The report concludes that the area shows little potential for hosting minable quantities of coal. There may be, however, reason to investigate the area's promise for oil and gas resources.

Geology and Coal Resources of the Arbuckle Mountain Coal Field, Morrow County, Oregon, has been published as DOGAMI's Open-File Report 0-86-5 (price $6) and was written by staff geologists Mark L. Ferns and Howard C. Brooks. The study was funded in part by the U.S. Bureau of Land Management and the USDA Forest Service. The 25-page text of the report describes the geology and stratigraphy of the region, its coal occurrences and the conditions of their formation, and its resource potential for coal. An accompanying blackline map shows, on its two parts, (1) the known coal prospects and the distribution of pre-Columbia River Basalt Group rocks south and southeast of Heppner (scale 1:100,000) and (2), in greater detail (scale 1:24,000), the geology of the Johnson Creek area.

The reconnaissance study indicates that sandstones exposed in the core of the Blue Mountains in this area are 2,000 ft thick. These sandstones underlie volcanic rocks and contain lignite coal beds generally less than 2 ft in thickness. Similarly aged sandstone, which occurs in the Methow and Chewaukum areas of central Washington, might be expected to occur beneath the Columbia Plateau and may constitute favorable reservoir rocks for natural gas or oil. □

December 18, 1985, fireball reported

*by Daniel J. Kraus and Richard N. Pugh**

At 8:20 Pacific Daylight Time, December 18, 1985, a large fireball crossed Oregon from Tillamook on the coast to Baker near the Oregon-Idaho border.

The path was from west-northwest to east-southeast. Reports on the angle of descent varied from 20° to 90°. The steeper angles were reported mostly from eastern Oregon.

Almost all of the observers reported the fireball as brilliant, casting shadows. A trained observer in Bend, Oregon, reported a magnitude of at least -8. The fireball seemed to illuminate the northern half of Oregon.

The apparent diameter reported ranged from ¼ to ¾ of a full moon.

Most observers on the west side of the Cascade Mountains saw a round object, while most observers east of the Cascades saw a pear-shaped fireball. One-fourth of the reports had a white fireball, the other three-fourths had a blue-green object. Few people in western Oregon saw a tail, while most observers in eastern Oregon reported a white tail of varying lengths.

Most observers who saw termination reported sparks and fragmentation. The number of fragments reported ranged from 2 to 25.

There were no sounds reported either during or after the event. □

*Dan Kraus is Research Assistant Astronomer at University of Oregon's Pine Mountain Observatory, phone (503) 382-8331. Dick Pugh is Science Department Chairman at Cleveland High School, Portland, Oregon, phone (503) 280-5120. Both are correspondents to the Smithsonian Institution Scientific Event Alert Network (SEAN), a bulletin on short-term phenomena.

Mined Land Reclamation office moves

The Mined Land Reclamation office has moved into temporary new quarters, where it will be until June 1, 1986. The temporary street address is 1800 Geary Street SE. The permanent street address after June 1 will be 1534 Queen Avenue SE, Albany, OR 97321. Rather than change mailing addresses in June, the office has made arrangements to have the Queen Avenue address be the permanent mailing address from now on. The phone number is unchanged: (503) 967-2039. □

*(**Fish**, continued from page 28)*

cies is required to strike a balance between two conflicting uses of the resources of Oregon.

This survey does not answer many questions such as: What are the economic benefits to Cave Junction and to Oregon of gold mining versus those of fishing? What effect did all the mining have on the stream temperature and thus on the fish population? How did the turbidity caused by mining and channel relocation affect downstream fish populations? Should use of one resource be encouraged over the other?

The results of the survey indicate that the relocated stream channel is definitely less productive than the unmined area, but that fish are returning. Repeated surveys over the next three or four years should indicate how long it will take for the fish populations to stabilize in the relocated channel and whether the altered section of the channel will equal the unmined area in productivity. Results of this study apply only to the specific configuration of this relocated stream. A different configuration favoring riffles and pools might have encouraged quicker reestablishment of coho and steelhead populations. □

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