

**DESCRIPTIVE NOTES**

Carbonate masses of the Upper Devonian Fairholme-Woodbend group include some of the major oil and gas fields of Alberta. These masses are commonly referred to as "reefs" and probably comprise not only reef structures but also carbonate deposits formed under a variety of conditions, including banks, benches, bays, lagoons, etc. The predominant lithology is crystalline grey dolomite, probably a replacement of limestone but with little of the original texture preserved. The Redwater, Golden Spike, Doherty and Willington "reefs" are, however, predominantly limestone. These discrete carbonate masses form the upper part of the Leduc formation ("reef complex"). They are separated from each other and overlain by greenish grey calcareous shale which is believed to be the impermeable barrier that has allowed entrapment of oil and gas.

The map shows the occurrences of carbonate masses revealed by data from drilling. Differences in their form and extent are apparent in different parts of the province. The differences are undoubtedly the result of variations in the conditions under which the masses were deposited. In southern Alberta, massive grey carbonates, referred to as the "shelf margin reef complex" (Peace River member of the Southsask formation), have an accurate distribution from the vicinity of the headwaters of North Ram River in the west through Drumheller to the Vermilion area in the east. This area forms the southern limit of the main body of greenish grey shales of the Ireton formation, the apparent "off-reef" or basinal deposits. Southward, over the southern Alberta shelf, the carbonates grade to evaporites, shales, and siltstones. Southward, in the Lewis thrust sheet, a few apparently isolated reefs occur in a shale-siltstone sequence. In southeastern British Columbia, for example in the Lizard Range, the equivalent strata are shales, shaly limestones and siltstones similar to those south of Bow River between the carbonate shelf deposits and the Castle Mountain thrust. No data are available to indicate the relationship between this western area, characterized predominantly by clastics, and the evaporitic deposits of the southern Alberta plains, but carbonate may be expected to occur.

North of the shelf area, a zone of broad carbonate banks separated by greenish grey shales stretches from the Southsask complex of the mountains to the Basin complex of the Alberta plains. This zone is transitional to the central Alberta area where the carbonates occur as inter-reef and mounds that form the upper part of the Leduc formation. These have a northeast to southwest distribution and form a number of reef chains, as indicated on the map. In northeastern Alberta, carbonates possibly contemporaneous with the upper part of the Leduc and Peace formations are known as the Grosmont formation. These carbonates, like those in southern Alberta, seem to form a widespread complex which grades northeastward into evaporites and siltstones. In northeastern Alberta, a relatively positive area, the Peace River landmass of Precambrian rocks, is bordered by a narrow belt of limestone "reef" masses are underlain by a platform of lower, highly organic limestone and dolomite, consisting of interbedded stromatolite-coral-algal structures up to 150 feet or more thick and fine-grained to peloidal carbonate rocks. They intertongue with brown argillaceous limestone and black shale interpreted as "off-reef" or "off-reef" deposits. This platform varies in thickness, as a result of the building action of the organic communities which it is composed, in the reef chains where it forms the upper part of the Leduc reef complex. Eastward from this "basal reef" by the Alberta Oil and Gas Conservation Board, it is at least 300 feet thick and ranges up to 700 feet in the "basal reef". Similar thicknesses occur in the shelf and transitional areas of southern Alberta, and in the Peace River landmass. It is known as the Cairn formation. Locally, as on the western slope of the Rimbey-Meadowbrook reef chain, it is overlain by carbonate to clastic may be abrupt. East of the Rimbey-Meadowbrook reef chain, the 300-foot thickness of the Cairn formation and black shales of the Duvernay formation only the lower part of the reef chain, the 300-foot thickness of the Cairn formation. Here, as in the Rocky Mountains, where the same relationship occurs, the pattern of seaward reefing of the upper Leduc rising from a platform of considerably greater extent.

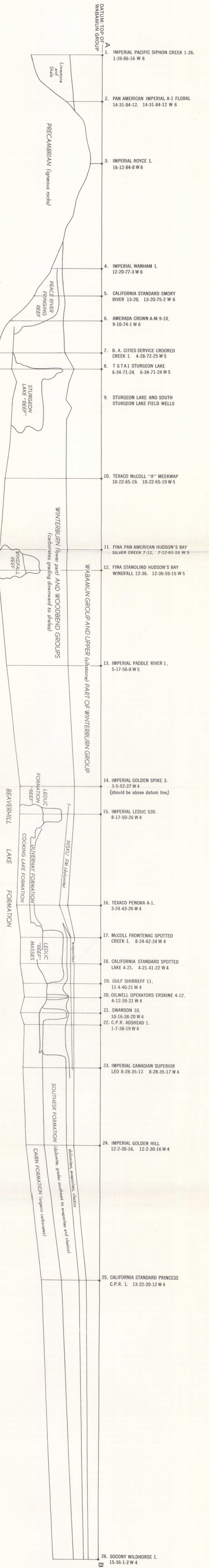
**Distribution of some Reefs and Banks of the Upper Devonian Woodbend and Fairholme Groups in Alberta and Eastern British Columbia**

SCALE ONE INCH TO TWENTY MILES = 1:267,200

- LEGEND**
- Stippled areas show known occurrences of carbonate reefs, reef complexes and banks in the Fairholme and Woodbend groups.
  - Limits of reef masses (defined, approximate, assumed or projected by interpretation of data).
  - Approximate limit of brown stromatolite reef platform - Cairn formation 300 feet thick.
  - Approximate limit of unroofed Woodbend "reefs" and inter-reef shales at same horizon. Eastward from this line Woodbend and older deposits were exposed by post-Devonian pre-Cretaceous erosion.
  - Approximate margin of Foothills Belt.
  - Approximate margin of late Palaeozoic outcrops in the Rocky Mountains and Foothills.
  - Approximate margin of Peace River landmass, emergent during accumulation of Woodbend reefs.

Compiled by Helen R. Belyea, June, 1959  
Cartography by the Geological Survey of Canada, 1960

**SECTION ALONG LINE A-B**  
VERTICAL SCALE 1 INCH = 1000 FEET



1. IMPERIAL PACIFIC SYPHON CREEK 1-26. 1-26-88-16 W 6
2. PAN AMERICAN IMPERIAL A.1 FLORAL. 14-31-84-12. 14-31-84-12 W 6
3. IMPERIAL ROYCE 1. 16-12-84-8 W 6
4. IMPERIAL WANNAM 1. 12-20-77-3 W 6
5. CALIFORNIA STANDARD SMOKY RIVER 13-20. 13-20-75-2 W 6
6. AMERADA CROWN A.M. 9-10. 9-10-74-1 W 6
7. B. A. CITIES SERVICE CROOKED CREEK 1. 4-28-72-25 W 5
8. T.G.T. STURGEON LAKE 9-24-73-24. 9-24-73-24 W 5
9. STURGEON LAKE AND SOUTH STURGEON LAKE FIELD WELLS
10. TEXACO MCCOLL "A" MEADOW 10-22-65-15. 10-22-65-15 W 5
11. FINA PAN AMERICAN HUDSON'S BAY SILVER CREEK 7-12. 7-12-64-18 W 9
12. FINA STANOLIND HUDSON'S BAY WINDFALL 12-35. 12-35-59-15 W 5
13. IMPERIAL RIDGE 1. 5-17-56-8 W 5
14. IMPERIAL GOLDEN SPIKE 3. 3-5-52-27 W 4 (Should be above datum line)
15. IMPERIAL LEDUC 530. 8-17-50-26 W 4
16. TEXACO PERDRA A.1. 3-24-43-28 W 4
17. MCCOLL FRONTENAC SPOTTED CREEK 1. 8-24-42-24 W 4
18. CALIFORNIA STANDARD SPOTTED LAKE 4-21. 4-21-43-22 W 4
19. GULF SHREVEY 11. 11-4-40-21 W 4
20. OILWELL OPERATORS ERSKINE 4-12. 4-12-39-23 W 4
21. SWANSON 10. 10-16-38-20 W 4
22. C.P.A. ARDENNE 1. 1-7-38-19 W 4
23. IMPERIAL CANADIAN SUPERIOR LEO 9-28-35-17. 8-28-35-17 W 4
24. IMPERIAL GOLDEN HILL 12-2-30-16. 12-2-30-16 W 4
25. CALIFORNIA STANDARD PRINCESS C.P.A. 1. 13-22-20-12 W 4
26. SOCONY WILDHORSE 1. 15-35-1-2 W 4