COMMEMORATING THE 75TH ANNIVERSARY OF THE DISCOVERY OF THE LEDUC FIELD IN FEBRUARY, 1947

February 13, 1947 marked a turning point for Alberta and for Canada. Up until that time, Canada's petroleum industry had been small with only a fraction of the nation's petroleum requirements being met by domestic production. The Ontario oil patch had shrunk to the level of a minor player after almost a century of declining production. Alberta's Turner Valley Field had peaked during the recently-concluded Second World War. Despite sustained efforts to find new sources of domestic supply, disappointment followed disappointment and the search seemed to be nearing an end.

Leduc changed all of that. Almost overnight the initial find was followed up both locally and regionally and the spreads of productive acreage blossomed. Tremendous new production capabilities appeared – and indeed the regulators had to introduce limits on both field and well flow rates. Prorationing was the order of the day. Railways and pipelines had to be run at full capacity and new, expanding markets across the continent had to be cultivated and accessed. It was almost too much of a good thing and indeed explorers were "put on ice" as their skills were no longer needed in the huge surge of reserve delineation and production that followed.

This article will not even try to be a proper retrospective on all the implications that the Leduc discovery had. That work is hopefully still to come.

We can, however, touch on this important aspect of Canadian petroleum history in three ways. We will have looks at:

Part A. The discovery and its immediate aftermath.

Part B. What we understand today about Leduc.

Part C. Some of the key players (although there are too many to name including many past and current members of the Petroleum History Society such as award-winner Dan Claypool).

Readers are referred to the books listed on page 10 for many additional details and perspectives.

LEDUC AND IMPERIAL – AN ENDURING MYTH AND PUZZLE

The story has been repeated down through the ages of Canadian petroleum geology lore that Imperial Oil drilled 133 dry holes in a row before finding the Leduc gusher. Although sounding heroic this claim strains credibility. As far as I know, it has never been documented. Indeed of the numerous "dry holes" drilled, many must have had producible hydrocarbons in them but were probably deemed to be non-commercial at the time. If we had a list we could check locations and uncover what subsequent activity in the basin meant for these wells. Surely Imperial drilled at least some of them as "stratigraphic tests" – i.e. not really intended as exploration wells on a prospect. And whose company lets you drill 133 dry holes anyways?

LEDUC – THE SETTING



Highway map of the Edmonton-Leduc-Devon area. The discovery well for the Leduc Field was south of Devon and west of Nisku. It is indicated on this map by the location of the Canadian Petroleum Discovery Centre (now the Canadian Energy Museum) in the red circle. At that time Leduc, est. 1891, was a small town on the Calgary and Edmonton Railway. Devon was only established in the aftermath of the discovery as a home for Imperial Oil employees working on the field. Nisku has grown as a major regional oil field supply base only since the establishment of its Industrial Park in 1972.

PART A. THE DISCOVERY AND ITS IMMEDIATE AFTERMATH

From "AS REPORTED IN THE HERALD" - text compiled by Allan Connery, 1982, 253 p.

February 14, 1947, as reported from Leduc:

"Imperial Leduc No. 1, 18 miles southwest of Edmonton, is performing with high promise, after kicking off at 4 p.m. Thursday, and is now entitled to be called an oil well, probably an oil well of the highest order.

The well made its debut in somewhat spectacular fashion, snorting and puffing with great bursts of gas and watery oil. They put a flame to the pipe then and the flame rose 30 feet in the air as the well belched only black smoke. With professional perfection it blew a dense black ring in a perfect circle, a ring 30 feet in diameter which rose 50 feet in the air and hung there for several minutes, as the monster puffed and heaved, struggling for breath.

It seemed for a time like the newborn oil well must expire as the flame died to a flicker and for almost an hour the life went weak and the flame went out. Five hundred shivering spectators climbed into their cars and drove away across the frigid plain, blanketed deep in snow.

When all but a few stragglers had left, the new well snorted again. It belched and then roared as the gas burst out and the flare shot skyward almost to a level with the hundred foot derrick. It was an oil well and no one doubted it.

Imperial officials are still reluctant to say too much about their new well, but anyone could see them working hard at efforts of restraint.

The fact is Imperial has found an oil field at last, after 19 years of effort and after an expenditure of \$17,000,000. Since 1939 the company has spent in excess of \$13,000,000, according to figures released today.

In the last 10 years Imperial has drilled 114 wildcat wells and has done almost half the total of all geological work carried out in Western Canada. It took that to hit the jack-pot – as indeed it appears to be.

Veteran Turner Valley oil men say this well compares with crude oil wells in that remarkable field.

Walker Taylor, Imperial's western manager, stressed the need for oil in Canada, a country which produces only 11 per cent of its consumption. He especially stressed the need for oil on the prairies, where high freight costs boost the cost of gasoline. He said that new fields were not being found in the States fast enough to keep up with the rate of depletion. As a result we have had to take the crumbs, whatever type of oil, we could get and be thankful for that.

Follow-up February 13, 1948

One year ago today Imperial Oil Ltd. Struck pay dirt in its Imperial Leduc No. 1. All indications were that a new oil field had been discovered. Today the most optimistic predictions of a year ago stand justified.

An area of 8,100 acres has been proven up as oil land. Today 41 wells are pouring out rich liquid into tanks, stemming the tide of U.S. imports and halting the flow of U.S. dollars southward. Imperial has completed 29 producers and has still to strike its first failure. Independents have competed twelve producers. Imperial, with another 14 wells located, is going full steam ahead.

While more and more wells swell the Leduc field Imperial is rushing work on a 4,000 to 6,000 barrel-a-day refinery in Edmonton, 20 miles away. The plant is being removed from Whitehorse, Yukon.

Meanwhile, Leduc's yield of 5,000 barrels a day is coming south to Calgary.

The development at Leduc in one year has been phenomenal. Already more than half a million barrels of oil have been produced. Turner Valley in its history has produced nearly 90,000,000 barrels, but Imperial estimates of Leduc make it just as large. Calculated recoverable reserves are 100,000,000 barrels."

IMPACTS OF LEDUC OVER THE FOLLOWING DECADE

The impacts of the Leduc discovery are expressed in many ways as is illustrated in the following figures. Figure captions contain additional explanations.

- A1. The initial excitement is portrayed by this industry publication.
- A2. The map shows how the field looked after it was partly developed.
- A3. The spread of oil fields in Alberta mainly sparked by the discovery at Leduc.
- A4. Petroleum industry expenditures by category after Leduc.
- A5. Petroleum-related royalties paid in Alberta following Leduc.
- A6. Shares of Alberta population income by sector following Leduc.
- A7. Tank cars filled with Alberta crude heading for B.C.

A8. Destination for crude as oil production expanded. By inference, areas that previously supplied Alberta and adjacent areas, for example the American West and Mid-West, were displaced. Canada's balance of payments was also greatly improved.

A9. How to drill dry holes in the midst of success. The shape and extent of the Leduc reef was not well known and was ultimately established through a technique called "feeling in the dark". A result was that some companies drilled dry holes because their locations were "off reef" and penetrated either a thick section of shale or at least reef that was below the oil-water contact. A10. Happy drillers given the abundance of work.

A11. Analysis of the number of wells drilled and footages in the Leduc Field as a proportion of total Alberta – showing that as Leduc matured and other field were discovered, Leduc settled into a period of less drilling and more passive production. Remaining marginal locations would not have been economic given the risks involved in drilling them and the fact that oil originally present might have already been drained by adjacent producers.

A12. Growth of reserves and production following Leduc.

A13. Table showing number of wells and average production. As noted, constraints on production actually kept per well production down to levels like 50 barrels per day that must have verged on uneconomic. Total pool production was also limited.

KEY LEDUC-RELATED REFERENCES

Breen, D.H. 1993. Alberta's Petroleum Industry and the Conservation Board. University of Alberta Press and Energy Resources Conservation Board, 800 p. Critical portion is Chapter 5 – The Leduc Discovery and the New Regulatory Environment, pp. 244-317.

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Kerr, A. 1986. Atlantic No. 3. Self-published, 226 p.

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We generally take for granted the network of paved and well-maintained roads that we have these days – and forget that it wasn't always that way. Prior to the prosperity brought by petroleum production, roads were often muddy and unreliable. An assist from your friendly neighborhood tow truck operator was frequently needed – in this case near Leduc. Note the Esso gas station sign in the background (left). "Esso" is, of course, a trademark of Imperial Oil. It means S.O. or Standard Oil, the U.S. parent company of Imperial oil.





Figure A1. Announcing the big news in February 1947. Classic production test picture at the discovery well with berm in the foreground, taken by Harry Pollard.



Figure A2. The Leduc-Woodbend and Golden Spike fields in 1951 (from Hanson 1958, Figure 16, p. 71). As governed by regulation, oil pools were drilled up on a 40 acre spacing (16 wells per square mile), centered on each LSD (legal subdivision). This map is useful for surface reference but it does not indicate which formation is being produced at each location. Wells were drilled for just one, for example the Leduc (D3). Where both formations were productive, two wells were drilled per LSD, one for each. In the areas off the main concentration of wells, the McLeod and Gilbert pools were in the Cretaceous whereas the extremely prolific Golden Spike pool, considered to be a separate field, was in the D3. Note that most production was funneled through the 8 inch pipeline to the railhead at Nisku. Subsurface formations are named for adjacent geographical locations such as Leduc, Nisku and Calmar.



Figure A3. Main oil fields discovered in Alberta, 1947-1953 (from Hanson 1958, Figure 25, p. 95). A similar distribution exists for natural gas fields. Most fields were in the Devonian part of the section but a few, like Pembina in the Cretaceous, were not. The charm of the Western Canada Sedimentary Basin is the presence of hydrocarbon accumulations in many levels of the sequence that has led to the expression that it is a basin the "keeps on giving". Failure in one objective was often offset by success in another layer, whether intentionally or by accident.



Figure A4. Estimated new investment in petroleum production in Alberta 1947-1956 (millions of dollars) (from Hanson 1958, Figure 38. p. 137).







Figure A6. Estimated percentage of personal income generated in Alberta by petroleum, agricultural and other industries, 1947-1956 (from Hanson 1958, Figure 55, p. 260).



Figure A7. Imperial Oil used trains to deliver the first volumes of Alberta crude to the West Coast in the Fall of 1952, a year before the TransMountain crude oil pipeline system to the coast was completed (Photo: Glenbow Archives IP-2c-16).





Weekly Oil Review

Leduc Con.'s Plunge Features Dull Week

Well Has Only 15 Feet in Which to Produce Answer; Interest Switches to Millet-Leduc

By C. V. MYERS [Calgary Herald Oil Editor] It has been a slow week on the Calgary oil market. Most spectacular development was the sudden downward plunge of Leduc Consolidated. Selling for \$1.60 in July, the stock gradually declined to around \$1.00 through August. Tuesday's close was 90 cents; it had dropped to 65 cents Thursday,

and Friday it fell to a low of 33 cents on the Calgary exchange.

Reason for catastrophic sly was the failure of the D-3 oil zone to materialize at its proper level. On Friday it was looking as if Leduc Consolidated might be just over the edge of the coral reef that contained the oil. It still had a contained the oil. It still had a margin of about 15 feet, however, above the water level. If it didn't find the zone in the next core, Leduc Consolidated would be be washed up.

> ATLANTIC OIL Company announced the purchase of a choice quarter section in the proven section of the field. Even failure by adjoining Leduc Consolidated appeared unlikely to affect Atlantic prospects adversely.

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But on the whole the oil industry needed a new strike to revive interest, and in mid-week attention veered off sharply to the southeast where high promise was materializing at the Millet-Leduc wildcat.

The well was 17 miles southeast of the weduc field and its main promise seemed to be in the D-1 and D-2 zones. The first zone showed good porosity but was not tested. Officials announced that they would proceed 400 feet further to D-2 which was responsible for the original Leduc dis-

shife for the original Leduc dis-covery in Imperial Leduc No. 1. IF THEY FOUND production here they would take it, if not they would go back and test D-1. If Millet-Leduc came in it would cause a bigger oil boom than Leduc, because many independents blanketed this new area.

If Millet-Leduc didn't come in, the new boom would have to wait for some other wildcat. It might take days, weeks, or months. But sometime it would ht ppen; oil was in those central Alberta strata ard plenty of wildcats were drilling.

FAILURE WOULD knock out most of the Consolidated property to the south and southeast, leaving only one hopeful location, a quarter of a mile north of the present well. If No. 1 was a success, it would just get in under the line, and Friday it appeared that two oil wells was the maximum Consolidated could expect.

Early in the week Imperial brought in another large producer without much visible effect on the market. Leduc No. 8 kicked out more than 100 barre's an hour on more than 100 barre, s an hour on final drill-stem test. The well $w_{1,3}^{(3)}$ slated for steady production in the coming week. Imperial Oil an-nounced that its field pipeline would probably be in operation early in October, increasing the commercial flow of oil from the field. field.

Globe and Leduc West brought their well into steady production Tuesday. The well was the biggest in the field. On open flow it produced 175 barrels in one hour, about \$500 worth of oil. On re-stricted flow it produced 500 barrels daily through a one-thirdof-an-inch diameter opening. Officials said they expected to cut the well to about 350 barrels a day on sustained production. This on sustained production. This would mean an income of \$1,000 a day.

No Oil Zone At **Consolidated** 1

By C. V. MYERS [Calgary Herald Oil Editor] Leduc Consolidated No. 1 has missed the D-3 zone in the Leduc field. The well has cored to 5,362 feet and is still in green shale. nearing the water level in the field.

Hope had been all but com-pletely abandoned for the well to-day. With it goes hope for the bulk of Consolidated acreage, except for the No. 2 well north of No. 1. This well is logging high and little doubt is entertained regarding its prospects, though no well can be counted on until it is in.

The No. 1 failure already practically rules out the No. 3 well, a quarter of a mile south, which is coring at 5,035 feet today, cor-ing for the D-2 zone. The No. 2 well has hit everything high, is at 5,075 feet today.

British American Oil has applied for reservations totalling 300,000 acres north of the Peace River in the Whitemud Hills area.

Figure A9. Three news items from the Leduc Field as reported in the Calgary Herald on September 6, 1947, approx. seven months after the discovery.



Figure A10. Happy roughnecks working for Imperial Oil subsidiary Royalite on a Stony Plain well, near Edmonton in 1950 (photo from the Provincial Archives of Alberta, as extracted from Gould 1976, p. 211). Many rig workers farmed during the summer and worked the rigs during the winter to make money for their operations and their families.







Figure A12. Gross additions to reserves and annual production of crude oil in Alberta, 1947-1956. (from Hanson 1958, Figure 36, p. 125).

Year	Production millions of barrels	Number of Producing Wells	Value of Production at Well Head millions of dollars	Average Price per Barrel dollars	Average tion per Vear	Produc- Well
1946	6.7	523	12 7	1 90	12 800	35
1947	6.4	606	14.7	2.30	10,600	2.9
1948	10.5	714	33.6	3.20	14,700	40
1949	19.8	1,242	57.4	2.90	15,900	44
1950	27.2	1,995	80.6	2.97	13,600	37
1951	45.9	2,731	115.8	2.52	16,800	46
1952	58.9	3,661	139.7	2.37	16,000	44
1953	76.8	4,504	193.1	2.52	17,000	47
1954	87.6	5,068	227.9	2.60	17,300	47
1955	113.0	6,138	274.2	2.42	18,400	49
1956	143.9	7,390	355.2	2.47	19,400	53

Figure A13. Crude oil production data, Alberta, 1946-1956 (excluding natural gasoline and other liquid hydrocarbons) (from Hanson 1958, p. 124). Note the relatively constant price per barrel and the average daily and annual well production numbers. Both were heavily influenced by regulation including the prorationing of production. The strong growth in the number of producing wells, however, drove the need to constantly expand the marketing area of the crude being produced into adjacent provinces and the U.S.

PART B: WHAT WE UNDERSTAND TODAY ABOUT LEDUC

The petroleum industry spent a tremendous amount of time and money delineating the Leduc Field (or more formally the Leduc-Woodbend 050-26W4 Field) and presumably made a lot of money doing so – although a full cycle analysis of that has not been done as far as I know.

When the dust settled, the following information (as extracted from the tabulations of the 1999 volume of the Alberta Energy and Utilities Board and supplemented by the 1960 Oil Fields of Alberta and 1969 Gas Fields of Alberta volumes of the Alberta Society of Petroleum Geologists) can be shared:

Leduc Field totals (all measurements converted to Imperial units):

Oil in place – 783 million barrels Initial recoverable oil by primary production – 330 million barrels Initial recoverable oil by enhanced production – 59 million barrels Total initial recoverable oil – 389 million barrels Cumulative production to 1999 – 385 million barrels

Natural gas in place – 1.2 trillion cubic feet Natural gas initially recoverable – 623 billion cubic feet Natural gas cumulative production to 1999 - 506 billion cubic feet

Oil Pools within the Field (note that in some cases pools are segmented because communication amongst wells or continuity of productive intervals had not been established though it may exist):

Cretaceous Blairmore (Ellerslie) – 25 oil pools Cretaceous Upper Mannville – 1 oil pool Cretaceous Glauconitic – 5 oil pools Devonian D1 (Wabamun) – 2 oil pools Devonian D2 (Nisku) – 8 oil pools Devonian D3 (Leduc) – 15 oil pools

Largest Devonian Pools (oil 39 degree API in both D2 and D3):

Oil - D3A. Column height 38 feet, average pay 35 feet, porosity 10%, water saturation 14%, shrinkage 0.75, gas-oil ratio 553 cubic feet per barrel, initial established reserves 250 million barrels.

Gas – D3A – Solution. Initial established reserves 98 billion cubic feet.

Gas - D3A – Associated. Column height up to 100 feet (gas cap), average pay 60 feet, porosity 8%, water saturation 15%, recovery efficiency 63%, surface loss 15%. Initial established reserves 250 billion cubic feet.

Oil – D2 A. Average pay 62 feet, average porosity 3.4%, water saturation 26%, shrinkage 0.75. Initial established reserves 91 million barrels.

There are two notable solution gas pools and 1 associated gas pool in the D2.

Note: according to the A.S.P.G. compilation, every D2 well seemed to have its own oil-water contact. Perhaps this was a function of tighter wet carbonates at the base of the Nisku.



Figure B1. Core recovered from porous Devonian reservoir, artistically posed in a "pool" of oil (from the dust Jacket of Aubrey Kerr's book "Leduc"). The black oil shown was probably automotive engine oil that was quite dissimilar from actual Leduc oil that was far less viscous and was described as being 39 degrees API and <u>green</u> in colour in both Devonian and Cretaceous reservoirs. Note that the geological explanation for the linear Leduc-Rimbey trend of reefs is still controversial. There may be a deep but elusive set of faults in the underlying Precambrian basement that were periodically active but are not obvious on seismic.



Figure B2. Geological cross-section running approx. SW (left) to NE (right) through the two largest Devonian oil pools at Leduc (disc. 1947) and Redwater (disc. 1948) (from Gussow 1962). Hydrocarbon pools (black) exist at three levels in the Leduc Field – the Leduc Formation (or D3) at the top of the tall "bricked" reefal structure, the regional Nisku Formation (or D2) above it and somewhat controlled by drape over the D3 reef, and at the base of the lower Cretaceous interval off the flanks of the Devonian accumulations (the Detrital" zone). The marginally productive Ellerslie Member slightly higher in the Cretaceous is not shown to be oilbearing in this section. Neither the Wabamun (or D1) at the top of the Paleozoic nor the Cretaceous directly above the D3/D2 are very productive due to the absence of reservoir-quality carbonate or sandstone rocks, respectively. Note that the hydrocarbons in the Leduc D3 are actually comprised of a relatively thin oil column overlain by a thicker gas cap.



Figure B3. Certificate for royalty interest in a Leduc area well.

How to Lose Money at Leduc (maybe)

Transcription: "LEDUC CALMAR WESTERN PROPERTIES No. 5 – NET ROYALTY TRUST

This certifies that (persons X and Y) of (location) are registered in the records of Prudential Trust at Edmonton, Alberta, as being entitled to 1 royalty unit in a trust of 70% of the net proceeds of production of petroleum, natural gas and related hydrocarbons other than coal, recovered, saved and marketed from a well to be drilled at 11-3-50-26W4 in the Province of Alberta, which is down to and including the Nisku member of the Winterburn formation or in any production therefrom, as such net production is defined in a certain trust agreement dated January 22, 1951, made between Western Properties and Prudential Trust as Trustee, whereby 70% of the net proceeds of production from the said well is assigned to the said Trustee for distribution after the deductions provided for therein to the registered holders of 140 royalty units created thereby, each full unit representing a ½ of 1% interest in the net proceeds of production.

This certificate is subject in all respects to the terms and conditions of the said trust agreement dated November 18, 1950 and made between Leduc Calmar Oil and Western Properties whereby Western Properties acquired a 70% interest in the net production from the said well to be drilled by and at the sole expense of Western Properties.

The said agreements may be inspected during office hours at the office of Prudential Trust, Edmonton, Alberta, and provide for deductions from the total proceeds of production prior to distribution to holders of the royalty units as follows:

- a. A 12.5% gross royalty payable to the landholder under the head lease covering the said lands.
- b. 12.5% of all crude oil to the original lessee until it shall have received that number of barrels of crude oil as shall be equivalent to 7500 multiplied by the number of wells placed on production on LSD 11 and LSD 12 of Section 3 aforesaid.
- c. Any amounts properly owing to Leduc Calmar Oil for operating costs of said well.
- d. All income and other taxes payable with respect to the production of said well received by the Trustee.
- e. The proportionate share of each unit holder of the Trustee's fees and expenses.
- f. Any amounts expended or borrowed for the purpose of drilling or completing or repairing the said well for the purchase or installation of production equipment as shall not have been paid out of the proceeds of sale of royalty units.

The recorded interest of the holder of this certificate is transferable in whole or in fractions of 1/40 or multiples thereof of a unit on the records of Prudential Trust upon the surrender of this certificate and upon the execution of a transfer in the form endorsed thereon, or by such other form as may be acceptable to the said trustee, and the delivery thereof to the Trustee and upon payment of its proper transfer fees.

Dated at the City of Edmonton, in the Province of Alberta, this April 24, 1964.

Caveat: An investment in this Trust must be considered speculative and should be regarded as a depreciating asset and sufficient allowance made for a return of capital before any computation is made as to the actual income obtained therefrom. The rate of pay-off may vary by reason of fixed allowables, market proration and other factors."

TRUST CERTIFICATE ANALYSIS

Land and investment deals in the petroleum industry are often quite complicated. Just as for stocks, the skilled decision to purchase a royalty interest requires robust knowledge of the investment vehicle itself, its context and some measure of the outlook for production and prices.

The Royalty Trust certificate in Figure B3 is a case in point. Its text has been transcribed on the previous page above for legibility. At the risk of misinterpreting the situation faced by the royalty interest purchasers in 1964, the following observations can be made:

From the nature of the situation, this appears to be related to the sale of royalty interests in freehold land as there is no mention of a Crown royalty.

The original land transaction took place in 1950 wherein Western Properties farmed in on the original leesor (Leduc Calmar) by funding a Nisku-targeted well at the stated location. It appears that this well was to be drilled by Leduc Calmar and subsequently also operated by them so this transaction was simply a way for them to raise the funds for that well's costs.

In 1951 Western Properties retained Prudential Trust to sell these royalty units to investors.

There were presumably other investors in the early 1950's who initially purchased these units. The 1964 transaction recorded by this certificate would therefore have been a re-sale, whose paperwork mechanics are described in the text.

Prior to unit holders receiving any money, there was a laundry list of deductions to be made including pre-existing royalty interests, a bonus slug of the initial production to Leduc Calmar, operating costs, taxes, other expenses and any residual costs associated with the drilling and equipping of the test well. Presumably at the time of the 1964 transaction the payout to Leduc Calmar and the recovery of drilling and equipping costs would have long since been handled and future deductions would have been limited to royalties, operating costs and taxes.

Part of the assessment for such a royalty trust certificate would have to be how much more oil would there be coming from the well for the rest of its productive life. The well location is well within the pool outline for the D2 so that shouldn't have been an issue. Presumably there was some production history to look at. The well and those around it might have been subject to prorationing since 1950 such that depletion might not have been as bad as it could have been, however with a 40 acre well spacing the draw area of the well would be quite small.

Perhaps if the price was right and the outlook for deductions was reasonable, this might have been a worthwhile investment. Perhaps it could also be a play on oil prices, although in the early 1960's there was a global glut of crude oil and prices were depressed. Perhaps they hoping for the first OPEC crisis (didn't happen until 1973).

These speculations are just to illustrate that it may or may not have been a good idea to make this investment. Although it is hard to see on the certificate, the purchasers were from New York and therefore might not have had the best idea of what was going on in Alberta. Without further "forensic" investigations we will never know.

PART C: SOME OF THE KEY PLAYERS

Success has many parents, as they say, and that is certainly the case for Leduc.

The staff of Imperial Oil were very persistent, to say the least, about testing the petroleum potential of western Canada. Of course they had a head start on everyone else, having been the discoverers of the Norman Wells Field in the Northwest Territories 1920, and through Royalite Oil, the major player in the Turner Valley Field that dominated activity in western Canada from 1914 to 1946. Ted Link (Figure C1) was Imperial's Chief Geologist and he "kept the faith" that at some point a major producer would be found. Having said that, Imperial was on the verge of abandoning its efforts in Western Canada, having allegedly drilled 133 dry holes looking for "the big one". The name of Imperial Oil tool pusher Vern "Dry Hole" Hunter certainly takes on significant meaning in this context. Indeed at the end of 1946, Imperial competitor Shell Canada had done exactly that and had uprooted its Calgary exploration staff and relocated them to New Brunswick to pursue what they thought might be Gulf Coast analog salt domes in that province. Once the true scope uncovered by Leduc in Western Canada was admitted to (a tough piece of truth to bite off), Shell returned in 1949 but faced a situation in which little prospective acreage remained – but that's another story.

Aubrey Kerr (Figure C2 and C3) recounts that there was a subtle hint of a dip reversal in the sparce outcropping Cretaceous beds near the location of the Leduc prospect. Some thought that this was a distal expression of the compressional deformation in the Rocky Mountains to the west. Few imagined that there could be a deep-seated carbonate reef over which there was differential compaction. Indeed it took many years before the true nature and geometry of the Leduc D3 accumulation was established and widely accepted. Aubrey was there for it all – and we are deeply in his debt for his recording of this history and his many publications – books and articles – on both Leduc and the broader span of Canadian petroleum history.

Some folks were in the right place at the right time. Lawyer Eric Harvie (Figure C4) had accumulated a broad swath of subsurface petroleum rights, in part by picking up interests in old railway grant lands that others had relinquished through non-payment of rentals.

The growth of the industry involved multitudes of technical professionals – geologists, geophysicists, engineers - and business people – landmen, marketers, economists, managers. The prosperity in the oil patch attracted people from across Canada and around the world. It was, in many ways, a modern day gold rush.

Of course the everyday heroes were the working people of Alberta and the other Prairie Provinces who worked the rigs, shot the seismic and produced the wells (Figures C5 and C6). They were often accompanied by their families, living in small trailers through freezing winters and sweltering summers (see Aubrey's shack in Figure C3).

One has to wonder what Alberta would be like today if Leduc had not been discovered – or even if its discovery had been delayed a decade or two. Such near misses are common in the explorations histories of basins globally. Maybe we'd all be working elsewhere or riding horses to the next Calgary Stampede!



Figure C1. Scurry-Malmo No. 1 discovery well examined by Spi Langston (right), President of Scurry Oils, and Theodore Link (left), consultant for Scurry Oils (from Hilborn 1968, p. 228). At this point in his career Link had retired from Imperial Oil after a tremendous run of success including Norman Wells and Leduc. He had directed Imperial's exploration efforts as its Chief Geologist. By the mid-1950's Link had become Chief Geologist at Cree Oil, a small independent Western Canada concern that played in multiple fairways. In 1958 Cree was taken over by Winnipeg-based North Star Oil, a predominantly downstream player that was seeking to become more vertically integrated. North Star was acquired by Shell Canada in 1960.



Figure C2. Geologist Aubrey Kerr uses a microscope to examine drill cuttings from a Leduc area well, checking for rock types, porosity, and indications of hydrocarbons. Note the bags of cuttings hanging above him to dry (from Aubrey Kerr collection).



Figure C3. Wellsite shack occupied by geologist Aubrey Kerr during well operations, at least during the summer. Not quite an ATCO trailer! These humble abodes could be loaded on flatbed trucks and moved to the next drilling location (from Aubrey Kerr collection).



Figure C4. Lawyer Eric Harvie accumulated a huge, though scattered, spread of subsurface mineral rights during the period of time before 1947 and was well positioned to make the most of them when exploration and production exploded in the aftermath of the Leduc discovery. Most of the fortune that Harvie realized was donated to a range of philanthropic causes including the Glenbow Museum in Calgary. This largess greatly enriched the cultural life of Alberta.



Figure C5. Worker filling railway tank car with Leduc crude oil at Nisku in 1950 (photo by Harry Pollard, Provincial Archives of Alberta, number P1540).



Figure C6. Leduc fundamentally changed Alberta for just about everyone – drillers, owners, and workers in related fields like seismic operations – and their families.

PETROLEUM - KEEPING IT IN THE FAMILY



Dr. Michael Pyrcz is a professor in the Department of Petroleum and Geosystems Engineering at the University of Texas in Austin. Your editor happened to sit beside him at an industry luncheon in the United States a number of years ago. His name seemed familiar so I asked him about it. Turns out that he is the grandson of Tymko Pyrcz, an original owner of a criticallylocated quarter section of freehold mineral rights at Leduc (NW quarter of 25-50-26W4). The Pyrcz family had originally come to Canada from Galacia in 1898 and had purchased the land in 1911. Aubrey Kerr devoted a section of his book "Leduc" (pp. 119-126) to the Pyrcz family and their interactions with Imperial Oil and other companies, the courts, the regulators and the oilfield operators. A very entertaining story. According to Aubrey, that patch of land was remarkable because it hosted the first independently drilled well in the field and the first dry hole to be drilled in the field (in addition to three producers). It also hosted the first well to be drilled with a steam rig and the first to use a diamond core barrel. It was originally leased to Imperial Oil but because of a mixup in the older ownership transfer details it had to be given back to the Pyrcz family and was re-leased to another party.

Leduc – Future Potential

Leduc is finsihed, right? Not quite. Although the D2 and D3 oil has long since been depleted there could be secondary recovery to produce the residual oil. The D3 gas cap was blown down in the 1980s. The status of petroleum rights is not clear. Certainly shallow rights reversion and available freehold have made new development plays in the Cretaceous section viable. And who knows – the D3 reef could be just what we are looking for for carbon dioxide storage.

Correction re: SIGNIFICANT ANNIVERSARIES – NORMAN WELLS Petroleum History Society Archives, December 2020, v. XXXI, Number 4, pp. 7-10.

Editor's correction:

ORIGINAL TEXT

"In the mid-1980s, peak oil meant something entirely different than it does today: then it meant peak supply. To address the decline in oil reserves and to access more oil, Imperial devised a plan to extract oil from below the river using manmade islands. At the time, the Norman Wells Field was considered the fourth largest oil deposit in Canada and in 1982 Imperial undertook an expansion and added six more artificial islands and additional wells. The islands were built over two summers, with four islands constructed in 1983 (Rayuka, Rampart, Dehcho and Ekwe) and the remaining two (Iteh K'ee and Little Bear) constructed in 1984. The project manager for this significant undertaking was Mel Benson – one of many Indigenous people who played key roles in the oilfield over its history. Designed to withstand a once-in-250 year flood, each island is a sand-filled structure held by a ring of rock and protected by armour stones at the upstream corner of each to protect from the mighty Mackenzie and the great forces of ice. The islands are connected with 26 km of marine utility corridors carrying produced fluids, injection gas, and water and power cables. During the time of island construction. Interprovincial Pipeline (now Enbridge) which Imperial owned 33% of at the time, started construction of a pipeline from Norman Wells to Zama, Alberta. Commissioned in 1985, the 868-km line could accommodate production of up to 30,000 barrels per day."

REVISION

The highlighted statement above from the top of page 10 in the article is incorrect, specifically that: ... "The project manager for this significant undertaking was Mel Benson – ... "

In fact, the project managers for the Norman Wells Development and Pipeline Project were M. C. (Mike) Arnett for Esso Resources Canada Limited (expansion of the oilfield itself) and William (Bill) Pearce of Interprovincial Pipeline (NW) Ltd. for pipeline construction.

Mel Benson did play an important role in oilfield expansion by managing its Northern Employment Office and community affairs. Northern business support was key to the high level of northern employment on the project.

Note: Mel passed away on September 16, 2021. Our apologies that this correction did not appear in a more timely fashion. Please refer to the Remembrances section of this newsletter for more details on Mel's life and accomplishments.

The P.H.S. regrets any misunderstanding that this error may have caused. The P.H.S. takes no responsibility for inaccuracies in the material as it was taken directly from a feature created by Imperial Oil Limited.