
STEWARD

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75 YEARS OF ALBERTA ENERGY REGULATION

by GORDON JAREMKO

ENERGY RESOURCES CONSERVATION BOARD

Library and Archives Canada Cataloguing in Publication

Jaremko, Gordon
Steward : 75 years of Alberta energy regulation /
Gordon Jaremko.

ISBN 978-0-9918734-0-1 (pbk.)
ISBN 978-0-9918734-2-5 (bound)
ISBN 978-0-9918734-1-8 (PDF)

1. Alberta. Energy Resources Conservation Board.
2. Alberta. Energy Resources Conservation Board — History.
3. Energy development — Government policy — Alberta.
4. Energy development — Law and legislation — Alberta.
5. Energy industries — Law and legislation — Alberta.
I. Alberta. Energy Resources Conservation Board.
II. Title.
III. Title: 75 years of Alberta energy regulation.
IV. Title: Seventy-five years of Alberta energy regulation.

HD9574 C23 A4 J37 2013 354.4'528097123 C2013-980015-8

¶ This book was set in ITC Berkeley Old Style, designed by Frederic W. Goudy in 1938 and reproduced in digital form by Tony Stan in 1983. The sans serif is ITC Legacy Sans, designed by Ronald Arnholm in 1992. The display face is Albertan, which was originally cut in metal at the 16 point size by Canadian designer Jim Rimmer. It was printed and bound in Edmonton, Alberta, by McCallum Printing Group Inc.

Book design by Natalie Olsen, Kisscut Design.

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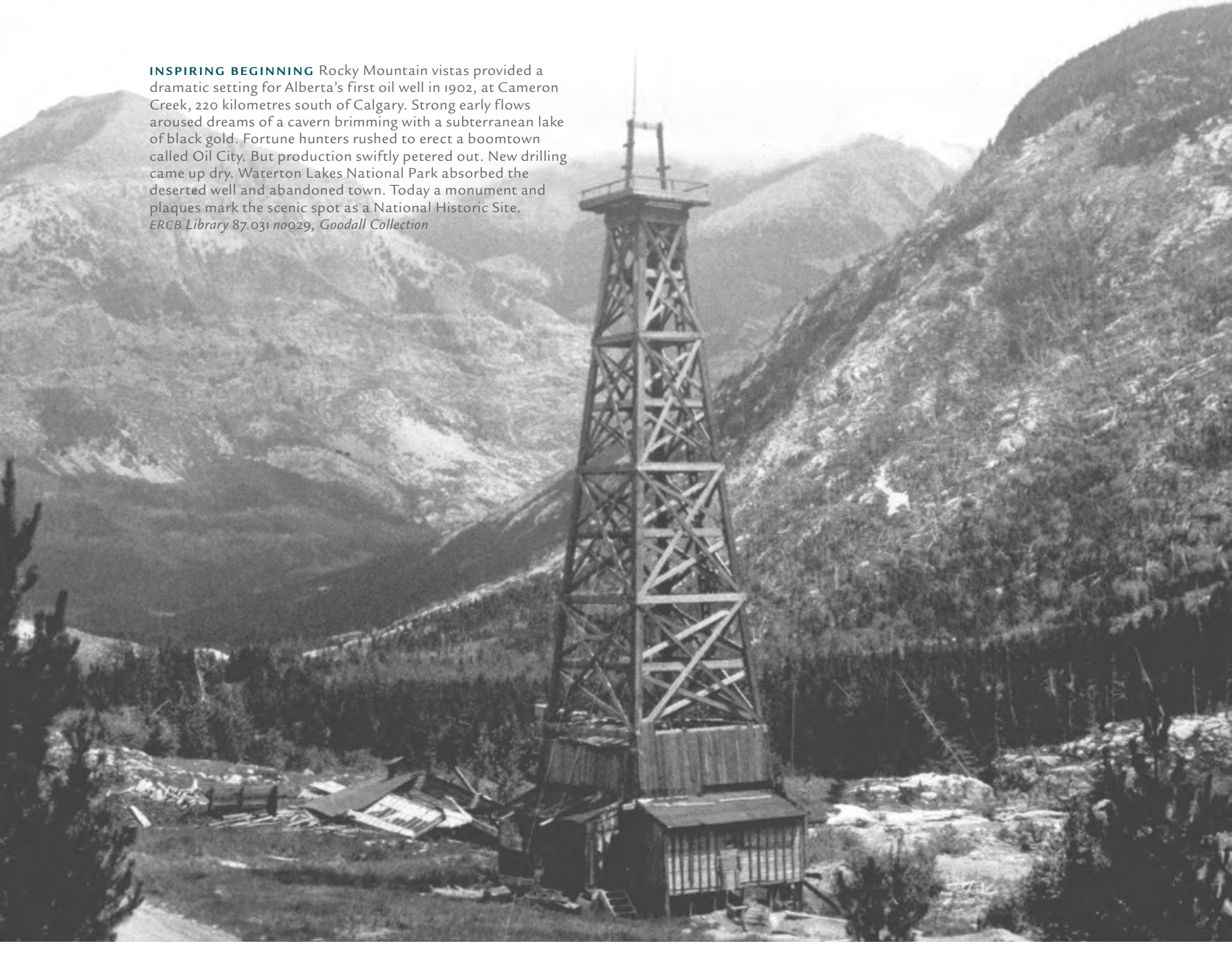

INSPIRING BEGINNING Rocky Mountain vistas provided a dramatic setting for Alberta's first oil well in 1902, at Cameron Creek, 220 kilometres south of Calgary. Strong early flows aroused dreams of a cavern brimming with a subterranean lake of black gold. Fortune hunters rushed to erect a boomtown called Oil City. But production swiftly petered out. New drilling came up dry. Waterton Lakes National Park absorbed the deserted well and abandoned town. Today a monument and plaques mark the scenic spot as a National Historic Site.
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ONE
MANDATE

Peter Lougheed never forgot his first contact as Alberta premier with the provincial Energy Resources Conservation Board (ERCB). After his party's breakthrough victory in the 1971 election, he was enjoying the garden of his southwest Calgary house — but not picking daisies. Rather, he was selecting Alberta's first Conservative cabinet for the government swearing-in ceremony when ERCB chairman George Govier strode into the backyard.

"It was just so startling to me," Lougheed recalled in an interview four decades later. Far from feeling intruded upon, he was honoured by Govier's visit, he added. "He was so highly regarded."

Govier dropped by because he needed to know whether he should keep an imminent date in Poland for a conference of regulatory chiefs from around the world. Would the new Conservative regime want an appointee of the old Social Credit government to represent Alberta on the world stage?

PETER LOUGHEED sustained the ERCB as the only legacy of the old Social Credit regime left unchanged after his Conservatives won power in 1971. *Glenbow Archives na*-2864-19590-15

"We would not have changed that," Lougheed said. "I had no idea that we belonged to an international network of regulators, like a cartel. I was surprised. It was a shock." But he could think of no agency or official more fitting to represent the province abroad. The ERCB and its chairman, he said, exuded "credibility that really gets your attention."

Familiarity bred respect for the ERCB as the Conservatives began to revisit and revamp provincial policies on everything from liquor laws, civil rights, and mental health care to oil and gas royalties. "It [the ERCB] was one of the very few entities we inherited from the Social Credit era that we didn't really change," Lougheed said. "We worked closely and

effectively together. We [the government] were the owner of the natural resources on the public's behalf, and they [the ERCB] were the agent of the owner."

Agent did not mean errand boy. From policing oilfield drilling and setting standards for production measurement equipment on up to the quasi-judicial role of making landmark decisions on contested issues, the ERCB had always operated at arm's length from politicians — and this mandate continued during the Lougheed years.

"We didn't interfere on the technical side," Lougheed said. In big cases that determined the fate of oil sands, natural gas, power, and petrochemical projects, his cabinet accepted ultimate responsibility for ratifying or rejecting board rulings. But the Conservatives upheld the Alberta regulatory tradition of dealing with decision reports as intact packages, an approach that denies even the most senior politicians the power to court favour with voters or companies by changing rulings, reasoning behind the rulings, or approval conditions.

The only special consideration the ERCB grants the provincial cabinet is a courtesy: an early glimpse at its decisions, so there is time to think about political implications and prepare for public questions. "They provided us with the reports — not the drafts," Lougheed said. "We'd get the first look as an opportunity to peruse the document. They would make it public."

THE ALBERTA FORMULA

The garden encounter offers a quick lesson in Alberta's approach to stewarding its natural resources. It is a distinctive, internationally recognized approach located in the moderate centre of the spectrum between state and private enterprise.

To Lougheed, the Alberta formula — business use of public resources under independent expert supervision — was, above all, practical. The ERCB keeps order even as its mandate, rules, and personnel adapt to unpredictable energy markets, technology, and politics.

The formula paid off — big time and consistently, for generations. In the six decades since the 1947 Leduc gusher ushered in the modern Canadian energy industry, the payoff has been astronomical. By 2010, Alberta oil and natural gas sales added up to $1.2 trillion, according to records kept by the Canadian Association of Petroleum Producers. The provincial treasury's share was over $200 billion, including $176 billion in royalties and $28 billion from mineral rights lease auctions.

Convert those old dollars into twenty-first century purchasing power on the Bank of Canada's inflation calculator, and the numbers are even more impressive. Alberta's 1947–2010 oil and gas sales have a true value of $1.7 trillion in today's dollars, including a public share of over $360 billion made up of $314 billion in royalties and $52 billion in sale of rights. The

inflation-adjusted total is nearly double the $859 billion combined income of the entire twelve-nation Organization of Petroleum Exporting Countries in 2008, its best year ever when oil peaked at $147.27 a barrel on July 11.

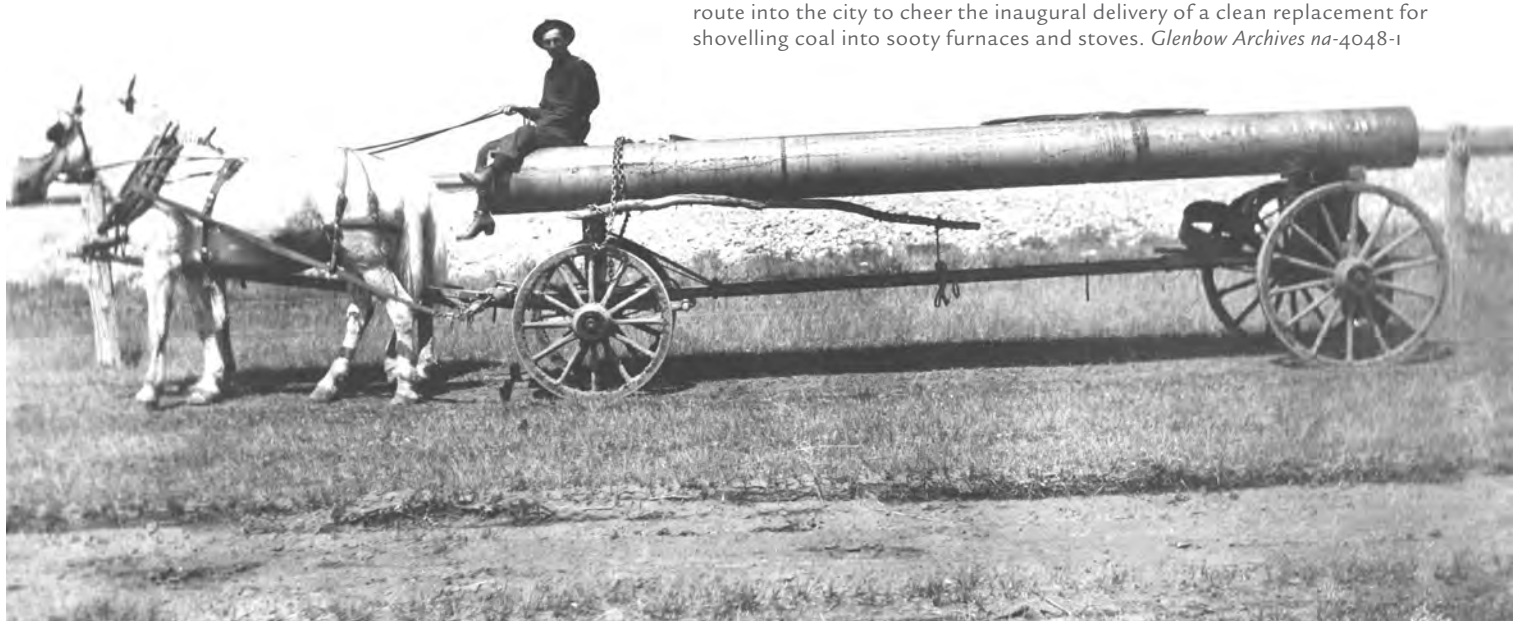
Alberta owes the birth of this fortune to a formula calculated to encourage industry in the public interest, says geologist Frank Fournier in *Oil Exploration in Canada from 1937 to 1947,* the memoir he wrote for Imperial Oil and archived at the Leduc #1 Energy Discovery Centre. In the memoir, Fournier describes the persistence required for Imperial Oil to make the founding discovery of the modern Canadian oil age, even with new seismic survey technology. In a famous eight-year, 133-well drilling campaign, Imperial Oil uncovered the rich geological formations that signalled the find, probing beneath farmland that bore no surface signs of the treasure buried 1.6 kilometres below.

Written just three months after provincial, community, and business leaders celebrated the Leduc find with a first-oil ceremony on February 13, 1947, the memoir explains that Alberta attracted the fortune hunt by taking the right route a decade earlier, when North America chose the road of investor-owned versus state-owned energy. As the Canadian arm of the world's biggest investor-owned energy empire (then Standard, now ExxonMobil), Imperial could spend $18.4 million ($209 million in today's dollars) on the epic trial-and-error drilling campaign because Alberta had policy advantages that countered the technical difficulties the company faced.

"Demand alone will not encourage oil production," Fournier wrote. "A company must be assured that the politics of the country is sound even before considering the geological attractiveness of its basin areas. The petroleum laws must be so designed that the company is given ample time to explore and is rewarded for the money expended. And taxation must be geared to leave sufficient profits to encourage development."

Imperial alone conducted about half of western Canadian oil and gas activity in the 1930s and '40s, and although its international ownership pedigree was well known, the region did not see the energy industry as an unwanted interloper. Visions of growth in that pioneer era foresaw harvesting both private and government wealth from public ownership of resources. In Alberta's case, the government held 81 per cent of the natural endowment, or 537 000 square kilometres of mineral rights, an area three-quarters the size of Texas. If measured by modern energy content rather than geographic extent, the public share of the resource endowment comes even closer to 100 per cent because the provincially owned buried treasure includes the oil sands.

Long experience encouraged belief in home-grown energy enterprise. A railway construction crew made the first Alberta gas find near Medicine Hat in 1883. Lumber baron and politician John Lineham and



HEAVY LIFTING Pipelines have a pedigree in Alberta that dates back to 1912, when construction relied on ancient methods because trucks, roads, and earth-moving machines were still rare novelties. The first line connected southern natural gas wells to homes and businesses in Calgary, where crowds lined its route into the city to cheer the inaugural delivery of a clean replacement for shovelling coal into sooty furnaces and stoves. *Glenbow Archives na*-4048-1

financier George Leeson — Calgarians — chalked up the first oil well in 1902 amid Rocky Mountain scenery that eventually became part of Waterton Lakes National Park. Independent driller Eugene Coste scored the Old Glory well in southeastern Alberta that launched the first commercial gas production and pipeline network in 1909. Okotoks rancher Bill Herron's discovery of the Turner Valley field in 1914 sparked visions of a vast natural resource endowment — one big enough to supply national and international markets and attract global attention.

ENERGY EVOLUTION: HOME AND ABROAD

From an industry perspective, 1938 was a landmark year in international energy evolution. On Canada Day of that year, Alberta created the ERCB's predecessor, the Petroleum and Natural Gas Conservation Board. Just eleven days earlier, Petroleos Mexicanos opened its doors as the sole developer of Mexican oil and gas after the Partido Revolucionario Institucional government expropriated the assets of all investor-owned production companies and banned them from ever returning.

Activity on the continent's northwestern drilling frontier would have grown even if the Second World War had not prompted the search for more fuel sources, Fournier observed. Although the older industry in the United States was still finding as much oil as it pumped out, the average volume tapped by new wells was shrinking because fresh targets were becoming scarce in picked-over fields. Meanwhile, events in the southern Americas made Alberta look like a prospector's Promised Land, with Bolivia confiscating privately owned petroleum properties and Argentina reserving its most promising drilling targets for a new national oil company.

"Chile, Peru, and Brazil did not have workable petroleum laws allowing foreign companies to operate within their boundaries," wrote Fournier. "This left Venezuela, Colombia, and Ecuador for expansion. But even here, the need for caution was apparent with different political parties holding short terms in office. Also, there was the danger that these oil-rich countries might follow the path of Mexico should that country prove itself capable of profitably operating its own oil industry."

From an international perspective, Fournier concluded, the case for sinking wells in Alberta was compelling. "Consider Canada in the year 1937. It had, and still has, a reasonably stable government, and the basin areas of oil-producing territory cover approximately 650 000 square miles [1.7 million square kilometres] or about half the size of the possible producing areas in the United States. The petroleum and natural gas regulations varied from one province to another, but the most attractive area, Alberta, had a workable petroleum law."

DRILLING AND THE DEPRESSION

Capturing and holding the economic high ground was a political feat in the tough economic times of the 1930s. In 1935, at the height of the Great Depression, the Social Credit government swept into power as a protest league. Albertans had no greater love for oil companies than for the banking and media establishments that the Social Credits' radical first cabinet attempted to tax, license, and control. In fact, the legislature unanimously passed a motion on March 24, 1938, that called for a government takeover of all petroleum product sales. The idea was to cut the cost of oil products for consumers and increase cash flows into a provincial treasury that struggled to meet the payroll for a tiny civil service, defaulted on government bonds, and levied an intensely unpopular 2 per cent sales tax as an emergency measure. "This government has taken over the distribution of beer. Why not take over the distribution of gasoline, a more important commodity?" asked the resolution's sponsor, Ponoka Social Credit MLA Edith Rogers.

CONVERT

David Benning made a discovery when he left show business to join the ERCB. Variety and creativity play significant roles in the nonfiction world of oil and gas regulation just as surely as in the movies. "It's opened my eyes," Benning said in an interview after five years with the ERCB. "Every well is unique. Every well presents its own challenges. You need the human eye on it to check the information."

After a career as a movie location scout, assistant director, and editor, Benning became a well log specialist in the ERCB data compliance bureau. Well logs are maps of geological formations made using underground sensors that measure such signals as acoustic echoes and radiation reflections. As a well log specialist, Benning made sure producers deposited these maps in Alberta's public resource archives, as required by law. The rule has been in force since the art of remote sensor logging was imported from France in the 1930s. Seven decades later, the complex blend of rock and technology continued to resist conversion into computer code. The records of spaces and flow channels in Alberta's sponge-like geology — its porosity and permeability — remained graph lines on long strips of paper. Computers could only store hard-copy charts as portable document files. "We're trying to capture that [data] electronically. That'll be a huge milestone when it happens," Benning said.

A colossal number of well logs are stored at the ERCB archives. Using an array of techniques, from acoustic signals to radiation, industry submits five or six logs for every well drilled in Alberta — ranging from 7000 to 21 000 a year depending on economic conditions. In an average year, 90 000 records arrive at the ERCB in batches of up to 700 a day.

The constant activity was quite the change from the "feast-or-famine lifestyle" of a movie career, Benning said. True, he had encountered engaging people in dramatic Alberta places, eating lunch with film talent on top of a mountain during a snow storm, for example. But for the most part the movie industry is "very mundane," he said. "It's hurry-up-and-wait. There's no glamour."

By contrast, the ERCB offers new challenges every day. "It's never the same. You're always collaborating with other people. We have a lot of complex problems," Benning said. "You learn by doing. You can ask three people a question and get five different answers."

On the personal side, the ERCB beat show business by allowing a "work-life balance" between the job and private pursuits. For Benning, those include boxing, running, and travel. In the movies "I felt like I was missing out," he said.

Why choose the ERCB? "I was born and raised in Calgary. What's more Calgary than oil and gas? Maybe it's subconscious. No matter what industry you're in, you're affected by it."

But Rogers did not advocate state ownership of exploration and production. Coming from a politician who later crossed to the avowedly socialist Co-operative Commonwealth Federation (mother of the modern New Democratic Party), her position made clear the divide in political attitude separating Alberta from Mexico and South America.

Oil and gas were seen as raw materials that would benefit all Albertans. "A reduction in the price of gasoline would mean a reduction in the cost of production of our agricultural products," said Rogers. "Alberta has a great natural resource in the Turner Valley oilfield. People should reap more benefits from this resource."

Even at Turner Valley's short-lived wartime peak in 1942, production only hit 27 770 barrels per day. The amount was less than a single stage in one of today's oil sands developments and too low to support construction of a long-distance pipeline. Still the drilling hot spot became a beacon of hope for communities that yearned to break out of the Depression. Nor did the ERCB enforce a slowdown; its mandate did not include deciding whether to tap Alberta's fossil fuel treasures as opposed to hoarding the wealth, declaring agricultural and natural areas off limits, or choosing a totally different economic course. All segments of society saw industry expansion and resource development as a way of escaping the harshness of the era.

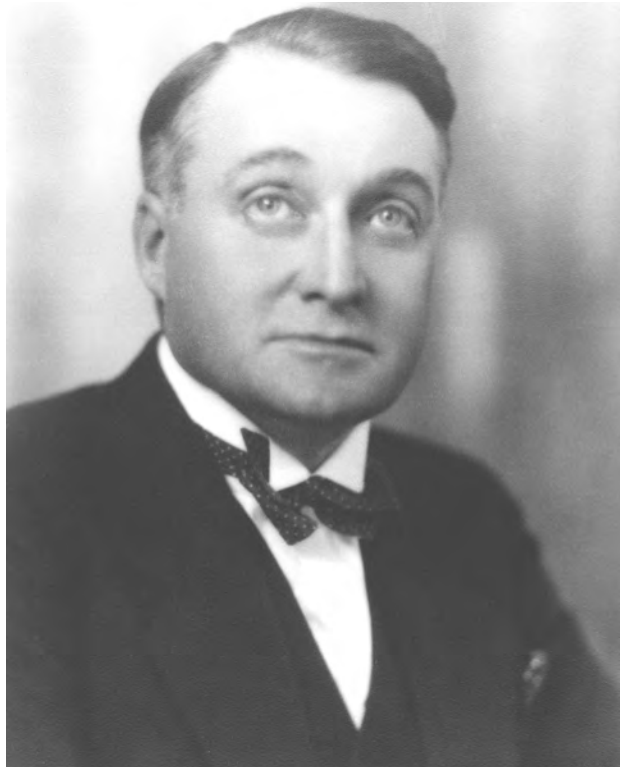
At the height of the Depression, a young Peter Lougheed watched as the law library of his grandfather, Senator James Lougheed, was auctioned off for a song when the family lost its home in a foreclosure. It's an image he never forgot. Unemployment insurance did not exist. Severe shortages of jobs for money, room and board, or any form of barter forced 15 000 single Albertans to crowd into federal government labour camps. One in seven families in Edmonton, Calgary, and Lethbridge — including up to 30 per cent of those communities' children — qualified for severely restricted relief schemes that granted benefits only to households that could prove they were destitute after selling everything they owned.

The Dirty Thirties scarred even the affluent, who watched hardships unfold from perches in the most durable business or government positions. "I remember the sad figures that came to our door for money or food," recalled Gordon Clarke, an early supporter of Lougheed's Conservatives who grew up in a fine home a few steps from the ERCB's modern downtown Calgary headquarters. He described Alberta's formative economic experience in *Full Steam Ahead,* a self-published account of his family's heating equipment firm, which outlasted the Depression, with customers ranging from the Calgary Petroleum Club to drilling rigs.

"One frigid winter evening, I looked out our living room window, transfixed by the ornate reflection of

our beaded living room lamp, and saw a haggard and hungry face staring back. To this day I don't know if I yelled because I was surprised by the dark face or, in some way, the contrast between my relative comfort and his suffering were too much for a youngster to cope with. I still think about it every time I close my venetian blinds at sundown," Clarke wrote at age eighty-eight.

"Even if you had a roof over your head and food on the table, you always felt torn by what was going on around you," Clarke continued. "It just seemed like everything was out of balance." He paints a scene from 1935 that has his grandfather, a longtime supporter and friend of Conservative Prime Minister R.B. Bennett, standing at a window in Calgary's Southam Building, "throwing packs of cigarettes down to men who came off a train to march down Seventh Avenue and protest atrocities of the relief camps set up by the Bennett government."



JUSTICE ALEXANDER MCGILLIVRAY led a provincial public inquiry that in 1940 rendered a favourable verdict on the Alberta formula of free-enterprise oil kept honest by ERCB regulation. *Glenbow Archives na*-2982-2

INVESTING IN THE INDUSTRY

Alberta was starved for investment and employment. The government responded, but not with state-owned enterprises. The Social Credit cabinet reacted to the legislature's call for an energy contribution to curing the Depression by appointing a royal commission in October 1938. Led by Justice Alexander McGillivray, an appellate judge and former Alberta Conservative leader, the commission recommended changing only policy details, such as the ERCB composition and rights to appeal its rulings to the courts. While the recommended changes were few, the gold mine of expert opinions and information collected during the commission was significant: 15 674 pages of oral testimony transcripts, 747 written exhibits, and a

book-length report released in June 1940. Besides laying out the ERCB's role as guardian of the public interest in oil and gas, the report named challenges posed by industry.

Technology and finance were the peaceful parts of the livelier economic landscape Albertans yearned to enter, the commission learned. Especially in pioneer exploration stages, resource development is a natural hotbed of high spirits, said John Frey, a star witness from the U.S. Department of the Interior. As associate director of petroleum conservation, he drew on lessons taught by tumult in Texas and Oklahoma, where 1920s and '30s efforts to tame oil rushes embroiled watchdog agencies in lawsuits and ignited periodic emergency declarations of martial law.

"The oil industry is not a 'corner grocery' at all. It is a highly speculative venture," Frey said. "We are dealing with human emotions when we are dealing with the oil man mind." He added, "The man or company that is not willing to venture much with the possibility of ultimate profit has not an oil man type of mind. The oil man must believe in himself. He must believe in his judgement. He must be willing to take a chance — a long chance. He must not be discouraged by failures. He must look ahead to the ultimate future. If he drills eighteen wells in a row that are dry holes, he still has his mind on the nineteenth one which is going to turn out to be a producer. It is that highly speculative nature that puts the oil industry in a category very different from any other type of industrial activity. Someone has described an oil-well driller as a man who produces a hole in the ground with an optimist on top."

No such characters stepped forward from the business establishments of central Canada and Great Britain, despite concerted efforts to draw them out. Social Credit lands and mines minister Nathan Tanner and founding ERCB chairman Bill Knode made fruitless treks to Toronto and London in the spring of 1939 to describe Alberta's resource endowment and accommodating development policy.

In an ERCB oral history interview four decades later, Knode's wife, Margaret, who had accompanied her husband, still bristled over the lofty indifference afforded the mission. On Bay Street the answer was, "Not a cent," she recalled. In London, where Canadian ambassador Vincent Massey introduced Tanner and Knode to the imperial elite, the Canadians heard, "We won't help you at all — we don't have any money to help the colonies."

After three months of hobnobbing with "lord whosit and whatsit," including Winston Churchill, the mission left Britain empty-handed. "In their high silk hats I tell you they were the best looking group of men you ever saw that went out to try and get money and came back with not a penny," Margaret Knode said. "Until Bill died he was mad at the Englishmen."

Next stop, the United States. As Margaret puts it, "Sure, there's where they got their help."

ROYAL COMMISSION FINDINGS

Alberta's Royal Commission on Petroleum concluded that the legislature's desire for government intervention to keep order among the fortune hunters attracted by the natural resource roulette made good sense. "We have ample evidence to show that over-production has brought about chaos in the industry," wrote McGillivray.

"If it were not for the financial risk involved to the taxpayers in making a thorough exploration of likely oil country, we would think that the ideal would be exploration by government. We say this for the simple reason that unless a means of rewarding a successful private explorer, other than by production be worked out, it is generally necessary for him to forthwith produce the oil discovered regardless of market demand in order that he may get back his exploration expenses.

"Unless government intervenes, unrestrained private enterprise would lead competing firms to ignore the nation's needs for natural resource reserves and flood existing markets "in such a way as to undermine economic stability," McGillivray wrote. "If there were great reserves of oil discovered by a government these reserves could be, as we think they should be, developed by private interests but this would be allowed only as and when required."

Yet the commission refrained from recommending that Alberta try even a partial copy of the Mexican approach of putting the public interest in the driver's seat by staging a government takeover. "After giving the matter some anxious thought, we have come to the conclusion that with the limited number of taxpayers there are in Alberta, the provincial government would not be justified in alone taking the risks of exploratory effort in a large way," the inquiry concluded. "We cannot lose sight of the fact that great expense is involved in any large exploratory undertaking and that the history of private exploration is interwoven with examples of financial collapse."

Albertans continued to flirt with state enterprise in the energy sector. Political agitation for public ownership prompted the Social Credit regime to add a referendum on a government takeover of electricity generation and transmission to the ballot in the 1948 provincial election. With 50.03 per cent voting against takeover and 49.97 in favour, private power firms stayed in business by a razor-thin 151-vote margin. As with oil and gas, the advocates of government ownership sought public power as the way to accelerate and spread development rather than stop it. The idea was especially popular in rural areas, where stringing lines for electricity was costlier and slower than in the more compact cities.

Despite failed efforts to coax orthodox Canadian business into entering oil and gas fields, the early trials of Alberta's formula for orderly private resource enterprise in Turner Valley ended in success. Not only did home-grown and U.S.-controlled industry persevere to make the discovery at Leduc, but early ERCB safety and environmental standards helped to propel technical aspects of the breakthrough.

LEGAL EAGLE

As law department counsel, ***Gary Perkins*** served at a time when ERCB's legal role was undergoing great change. Until the late 1990s, the ERCB's expert staff asked its questions at public hearings on industrial projects, he recalled in an interview. The hearings focused on technical matters raised by engineers and earth scientists, not on disputes requiring lawyers.

A decade later, ERCB cases increasingly involved hybrids of technical and legal expertise. Issues that no longer centred on the ERCB's core technical expertise still had to be understood. "What's happening is we're getting challenged more," said Perkins from ERCB headquarters in Calgary. "I don't think a day goes by when somebody doesn't come by my office and say, 'Got a minute?'"

For example, Canada's constitution and the nation's highest courts decreed that aboriginal rights had to be respected by consulting with communities on industrial development. That decision raised many touchy questions. How would the legal "duty to consult" be shared among project sponsors and regulatory tribunals? As a provincial agency, how much responsibility did the ERCB have to native affairs as opposed to federal authorities? Apart from the jurisdictional division of powers, what were the ingredients of acceptably meaningful consultation on projects with effects that ranged from light touches to significant intrusions on aboriginal settlements and territorial claims?

Environmental issues were no less thorny. Perkins cited a court case that grew out of a dispute over the

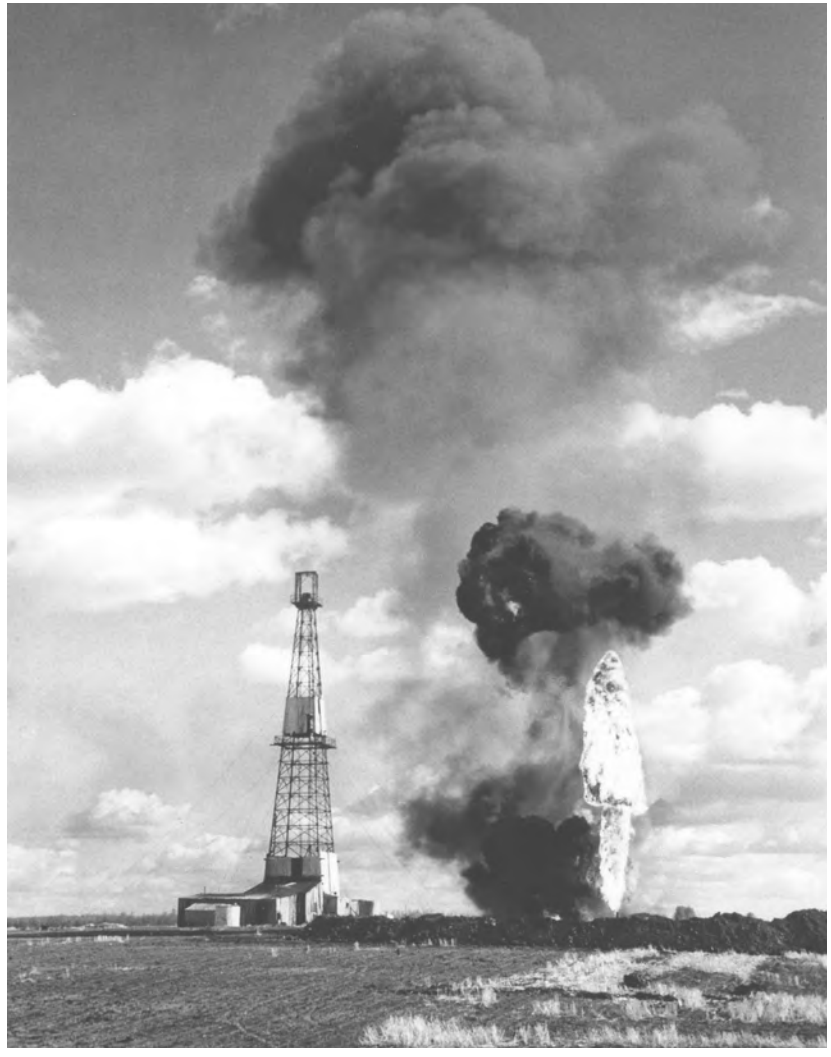
approval of a single well. Interveners feared the well would impact a 2500-square-metre patch of landscape suspected to be grizzly habitat. On a larger scale, joint review panels were set up by the ERCB and Ottawa's Canadian Environmental Assessment Agency to decide the fate of oil sands schemes. Lawyers from both sides were required to determine how the relationship worked in practice, and to define the scope of inquiries or to-do lists of issues demanded by evolving standards. "We've got to be fair. We've got to adhere to the rules," Perkins said.

To handle the increasing number of cases and their complexity, more lawyers were needed. In 2008, legislation restored the ERCB and the Alberta Utilities Commission as two independent entities, ending a twelve-year marriage of cost-cutting convenience. At the time, the two agencies shared 14 lawyers. Three years later, the ERCB alone had 14 lawyers on staff; another 10 worked for the commission.

A WINNING COMBINATION

"The work of the conservation board paid off," said Charles Stelck, an Edmonton earth scientist who earned a spot in the Canadian Petroleum Hall of Fame by working with Imperial Oil and other firms during the industry's pioneer era and then training generations of geologists as a University of Alberta professor. In an oral history interview with the Alberta Geological Survey, he described how upholding ERCB regulations contributed to the event that set the province on its growth path.

Stelck credits the discovery of the modern industry's founding gusher to Imperial geologists Des Boggs and Doug Blair — plus an ERCB engineer whose name has been lost in the mists of time. Boggs supplied the knowledge: when he studied the successful 1920 Imperial exploration at Norman Wells, Northwest Territories, Boggs learned that western Canadian oil hunters should look for fossil coral reefs formed in the Devonian geological era 400 million years ago. Blair supplied on-the-ground know-how: he knew the likelihood of a strike in the Edmonton area was high because the Bruderheim farming community contained the geological formation that Boggs described. The ERCB supplied the regulations: drilling can't interfere with bodies of water.



FLASHY LAUNCH On February 13, 1947, Leduc No. 1 ushered in the modern age of Canadian energy development with a brief, ceremonial test flare and doughnut-shaped smoke puffs. Employing new geological knowledge, improved drilling technology, and methodical petroleum engineering under ERCB supervision, industry made a string of fresh discoveries that swiftly eclipsed its best performances before the Second World War. *ERCB Library* 2012.003 *no*001, *Provincial Archives of Alberta*

Here's how it played out. In the winter of 1946–1947, Imperial sent two drilling crews into Leduc County southwest of Edmonton. The sites were named Leduc Rig Number One and Leduc Rig Number Two. At first, the signs were less than promising. Number Two came up dry. Number One was forced to move because the proposed site was in the middle of a farm slough, which contravened the ERCB rule against interfering with bodies of water. So, the ERCB engineer ordered a location change, inadvertently moving the drilling rig right where it needed to be. "If the well had been drilled there [in the slough], it would have been a dry hole," Stelck recalled. The pond was off the geological target. "It really comes down to three things: Des Boggs recognized the reef up north, Doug Blair recognized the reef at Bruderheim, and the unknown engineer moved the well west of its proposed site just to keep out of the slough — they're the discoverers of Leduc."

THE ERCB CREED: CONSERVATION

George Govier, the ERCB's longest-serving and best-known leader, joined the ERCB in 1948 and chaired it from 1962 to 1978. A plaque at the entrance to the custom-built hearing room at the agency's downtown Calgary headquarters, Govier Hall, reminds all who pass of his contributions to the orderly development of oil and gas in Alberta. He is the man widely heralded for instilling the culture of responsibility, discipline, constructive regulation, realism, and adaptability that prevails at the ERCB to this day.

Under the leadership of Lougheed's backyard visitor, the ERCB's role as a builder of Alberta crystallized into a creed that emphasized the operative word in the ERCB's name — conservation — as a matter of public interest or trust. The concept has the broadest possible meaning: making the most of the province's resource endowment for the benefit of all Albertans.

"Government's responsibility is on behalf of the people whether they share in actual ownership of the resources or not," said Govier in a paper he presented to the petroleum section of the Canadian Institute of Mining Engineers in 1968. "Even without a direct ownership interest, society at large has a legitimate interest in seeing that the natural resources are developed without waste. Industry shares the conservation responsibility first as a responsible member of society, to whom the privilege of developing the resources has been granted, and secondly in its own good business interest."

The ERCB creed recognizes the importance of shared responsibility and mutual respect for all elements of the public interest in Alberta resources — from investors and blue-collar oilfield workers to farmers and scholars. In a speech to the Red Deer Rotary Club in 1970, the year that Alberta appointed the first-ever environment minister in Canada, Govier described

a collective duty to work out constructive responses to the industry's effects on the natural world. "The last two or three years have seen a great increase in public concern over pollution of all kinds and from all sources. This is good and we must all accept greater responsibility for the preservation of our environment. It is unfortunate, however, that this justifiable concern over a serious problem has led to so many emotion-charged generalizations."

Govier continued: "In the complex oil and gas producing industry there are many substances from many different operations which, if great care is not taken, could cause pollution." As examples, he named "sour gas" contaminated with potentially lethal hydrogen sulphide, oil sands plant chemicals, and waste tailings left over from bitumen mining.

"Responsibility for the control of pollution to standards acceptable to the community clearly lies with the individuals, companies, and industry which acquire the rights to explore and drill for, produce, process, and transport our oil and gas resources," Govier said. "Government's role — or that of its agencies — is to devise proper standards of air, water, and land quality in order to formulate necessary rules and regulations, and to carry out inspections of the industry operations and monitoring of the environment."

From an ERCB perspective, environmental issues are practical matters. Govier said, "If government's standards, regulations, and enforcement are sound, they will be realistically based upon the facts. They will be sensitive to the wishes of the community — those are facts too — but they will also recognize the hard facts of technology and economics. Our environment must be preserved but realism must prevail — we cannot frustrate the development and use of our energy resources."

THE ERCB'S TECHNICAL ERA

From the industry's early focus on production efficiency and safety to its more recent focus on environmental and community protection, Govier taught Alberta and the ERCB to adopt the best technology and operating procedures available as a matter of duty. During his career, the public held ERCB leaders in high esteem as trustworthy guides in energy resource development.

"After oil and gas are discovered they must still be recovered. Our real petroleum heritage is only the oil and gas we can recover. In the past very few years, the petroleum engineer and other scientists have learned a great deal," Govier told a CBC radio audience in December 1955. "So striking have the technical developments been that it is a blessing that we are only now discovering Canada's greatest oil and gas resources when our understanding of the recovery process is at least approaching adequacy. What a tragic thing it might have been had Alberta's Leduc field been

discovered fifty or even twenty years ago! With the knowledge of recovery that was available at that time many millions of barrels of oil and billions of cubic feet of gas would have been wasted."

For nearly a quarter of a century, Govier trained generations of industry and government leaders in resource management. From 1940 until 1963, he taught at the University of Alberta, eventually becoming the head of its Chemical and Petroleum Engineering Department and then the dean of engineering.

In scholarly and regulatory roles alike, Govier's intensely practical outlook modelled a way of thinking that Lougheed often extolled as uniquely Albertan, with its emphasis on "doers, not critics." In 1961, Govier explained his approach in *Science or Engineering?*, a "university on the air" program with the then provincially owned CKUA radio network.

"The object of science is to learn and to understand. Science is not concerned with the use to which its knowledge is put," said Govier. "Engineering is the art or technique of applying the findings of science, together with knowledge of economics and of man and

BIRTH OF AN ERA Business, government, and community leaders turned out in force on February 13, 1947, to witness the start of production by the Leduc No. 1 well 40 kilometres southwest of downtown Edmonton. The successful conclusion to an epic of subterranean exploration ushered in the modern Alberta era of jumbo discoveries, expanding markets, plant construction, pipeline development, economic growth, and ever more thorough conservation, safety, and environmental regulation. *Glenbow Archives ip-6f-3*

of his wants, to the design, construction, and operation of machines, structures, and processes." Both fields require a student to be comfortable with mathematics, chemistry, and physics. "In the case of the prospective engineer, his interest in scientific subjects is usually closely related to the idea of building something or applying the knowledge. He exhibits creative talents. He is more interested in putting something together than in taking it apart just to see what makes it tick."

Engineers are natural candidates to lead agencies whose stock-in-trade involves technical matters like measurement, machines, and the behaviour of natural materials and structures, Govier maintained. "I believe boards not only to be consistent with but essential to good government, especially in view of many special and complex problems which arise in our modern society. From my own experience I can say problems exist — in seemingly unlimited numbers — which require a degree of intensive study based on specialized knowledge that no government could hope to cope with directly," he told the Engineering Institute of Canada at a meeting in Edmonton in 1953. "The orderly step-by-step, logical reasoning process which characterizes the engineering method and the mature and competent engineer seem to me almost ideally suited to the handling of the type of problem dealt with by many administrative boards. This method has no room for prejudice, preconceived ideas, political expediency, or the like. It allows for analysis of the facts — the evidence — and the formulation of a solution, with understanding and judgement based on them."

The ERCB period with Govier in the driver's seat is known as its "technical era." This label relies only partly on Govier's way of doing business, for his outlook also matched the times. Efficient extraction, transportation, and marketing of resources dominated the industry's agenda. Community representatives and environmental organizations rarely participated. ERCB cases involved industrial experts almost exclusively. But the chairman anticipated change.

Govier taught the ERCB — and leaders in business, the professions, and government — to think big, to consider what has become known as industry's "social licence to operate." In a 1964 address to the Canadian Natural Gas Processing Association, Govier described the writing on the wall. In his presentation, titled "Avoiding Technical Obsolescence," he said, "The engineer cannot afford the ivory tower luxury of the scientist who is searching only for scientific truths and facts. The engineer must understand economics, business, government, and government boards. An understanding of history, philosophy, human relations, and social trends is important to him. Music, art, and the theatre must also aid him in the difficult task of understanding man. And he must understand man if he is to use his knowledge and technical skills for the benefit of man."

MOVER

Joey Wilson shrugged off her friends' jokes when they kidded her about growing up to be a bean counter. After all, at the ERCB, a "bean counter" was a position with a title, variety, training, and prospects of advancement.

Wilson started at the ERCB in 2001. A decade later, her experience proves that the renowned Alberta go-getter ethic was not just talk. She started as a counter clerk in information services, dispensing reports and looking after subscriptions to official data gazettes. Beyond the first stage of fetching and carrying, "Information services demands broad knowledge. It gives you a good overview of the board." As part of that entry-level job, dry documents were brought to life when a "field trip" allowed her to see industry in action when she observed a drilling rig, an oil production battery, a natural gas processing plant, and pipeline construction. "In the office you're constantly giving out all this information. It clicked in when you saw those things."

Following in the footsteps of generations of staff before her, and with the full support of the ERCB, Wilson upgraded her occupational status and job qualifications. She was on her way to becoming a Certified General Accountant, a credential well beyond her beginner's ticket as a technical school graduate in business administration. "Most everybody here is working on designations of some sort. It's one of the biggest reasons to stay with the board — to continue your education," Wilson said. "You also move around

within the organization. It's not just one thing you're doing."

Wilson enjoys her work as a financial analyst. "I think it's exciting. It's constantly changing," she said in an interview. "Even though you're doing the same things," such as reviewing expense statements and budgeting, "it's always different. You talk to a lot of people. You deal with different branches. There's no repetition."

While Fort McMurray and the oil sands attract many ambitious eastern Canadians, the ERCB was the draw for Wilson. As a young mother of two, she said, her budding ERCB career has provided opportunities that were not available in her home town of Bay Roberts, Newfoundland.

STRENGTH OF CONVICTION

In 1994, sixteen years after retiring from the ERCB, Govier continued to show the strength of his convictions. During a final career as an energy consultant and elder statesman, he led the professional and environmental communities in protest against political interference with the court-like regulatory regime that he had built.

At that time, the provincial cabinet, fighting to control budget deficits brought on by gutted energy prices and royalties, arranged a cost-cutting marriage of convenience between the ERCB and the Public Utilities Board, calling it the Alberta Energy and Utilities Board, or EUB for short. Govier stepped forward when Premier Ralph Klein took matters a step further by appointing a political rival whom he had dismissed from the cabinet, Ken Kowalski, to chair the amalgamation.

"The appointment of a politician to the chairmanship of the combined boards, however well qualified Kowalski might have been for his former duties, is little short of scandalous," Govier wrote in a guest column in the *Calgary Herald*. "It disregards the tradition of technical competence and political independence of the board. It overlooks the well-qualified internal candidates. And, I believe, it will result in the loss of many highly qualified and experienced members and staff of the ERCB who see the stature of the board diminished and the opportunities for their professional growth and advancement seriously reduced." The stakes were high for everyone, he argued: "The people of Alberta and the oil and gas, coal, and electrical industries have benefited from the board's competent and impartial regulation of the province's energy resources. The government itself has shared in the board's worldwide reputation." Premier Klein withdrew the political appointment a week later. Kowalski stayed in the legislature as MLA for the Barrhead riding and eventually became Speaker of the Assembly.

Asked in an interview how he acquired his instinct for balancing industry, government, communities, and environmental interests, Govier replied, "It's hard to elaborate. It just seemed right. Had that question been put to my father, who was not knowledgeable about oil and gas, he would have recognized that the resources really belonged to the people and that industry had a responsibility to them in developing those resources. It seemed like justice to me."

A LASTING LEGACY

Neither government's nor industry's perception of the ERCB has changed since Lougheed and Govier's garden encounter at the dawn of the Conservatives' unbroken four decades in office. "It's a fundamental building block in the resource development of Alberta," said Murray Smith, the province's energy minister from 2001 to 2004 and its envoy to Washington, D.C., until 2007.

"It's the meeting point between people who profit from oil and gas development and people affected by it," he added. "The ERCB is not there to say 'no.' They're there to say to industry that you have to do it in such a way that you meet Alberta's standards of conservation and orderly development."

As he approached retirement, after returning to business and finance roles and with no desire to return to government, Smith reflected on the continuing need for the ERCB. "The board is ubiquitous," he said, describing regulatory hoops that an oil sands technology firm in his portfolio of corporate interests had to jump through to fulfill conservation, safety, and environmental requirements for a proposed production test site.

The time involved in satisfying ERCB regulations did not delight Smith's brisk executive side. "Sure it takes too long," he said. But the public servant in him came out on top. "The supervision is a good thing. We don't want to ruin the reservoir," he said. "The board makes decisions now that are global in scale. We wouldn't have got this far without the board doing what they do, and having done what they've done."

MEET GEORGE GOVIER

George Govier was built to last. Always trim, fit, and alert, he was an active downhill skier until age ninety-one and, incidentally, never broke a bone on the slopes. For gentler relaxation, he and his wife, Doris, were avid ballroom dancers with fond memories of the mid-twentieth-century big band era.

Born in 1917, he's descended from Huguenots, who took refuge in England from persecution as the Protestant minority in France then migrated to Canada, at first as Ontario farmers and boat builders. Govier's branch of the family rode the roller coaster of the Great Depression and recovery in the West. His father, George Arthur Govier, built up a thriving general store south of Calgary in Nanton and repeated the feat on a larger scale in warmer southern British Columbia at Penticton until hard times sank the business. The family made a comeback in Vancouver. The elder Govier became a haberdasher when men's hats were a fashion must.

On the long path to a PhD in engineering, the future ERCB chairman got his introduction to the oil industry doing shift work at a refinery in the Vancouver suburb of Burnaby. "It was not a sophisticated training program," he recalled. "I cut weeds, cleaned oil drums, and did a lot of manual labour. I learned a lot though, about people. I learned what the labour employees thought of management. I learned to respect people who were doing ordinary jobs. I learned those jobs were important. Maybe weed cutting wasn't, but cleaning oil barrels was. The experience helped me try to create an atmosphere of mutual respect at the board."

He tried his hand at gritty drilling and production by taking a summer job at Turner Valley in 1946, between advanced studies at the University of Alberta

GEORGE AND DORIS GOVIER, avid skiers and ballroom dancers, and a household name on the Alberta energy scene for more than half a century, including 30 years of leadership with the ERCB followed by a retirement career as an elder statesman consultant to industry and public services.
ERCB Library 87.022 no256, Bohme Collection

and Michigan University. His academic work earned him a reputation as a pioneer petroleum engineer. When the Leduc gusher exploded onto the scene, Social Credit premier Ernest Manning knew that busy times requiring expertise lay ahead for the ERCB, and he personally helped recruit Govier.

The scholar in government harness ran a tight ship, animated by a strong sense of duty. Govier's style and legacy embraced the value of a collective spirit. Earle Shirley, whose thirty-two-year career with the ERCB included a stint at its helm as chief operating officer, found Govier's focus on the collective good to be "the exception in the civilian world." A three-year veteran on Canadian navy vessels, Shirley felt at home with Govier's approach when he joined the ERCB as a newly minted geologist from New Brunswick. "I didn't go looking for it [a military-style esprit de corps], but I found it," Shirley said in an interview following his retirement. "Camaraderie blended with focus. In the military it's the norm—the whole notion of individual identity subordinated into the unit. The ERCB has such an element. Our raison d'être as an organization is about serving Albertans."

CONSTANT REMINDER Looking south from Calgary hilltops, Turner Valley flares lit up the night sky as the fledgling fossil fuel industry burned off natural gas that cloaked its prime targets: gasoline-like petroleum liquids at first, then oil. As a landmark of the 1910s, '20s and '30s, the glow stood out as a sign of colossal waste, ignited civic campaigns for conservation, and inspired creation of the ERCB. *Glenbow Archives nd*-8-457

TWO CONSERVATION

Do oil and natural gas fields need a watchdog? Gwyn Morgan, a pillar of Canadian business with deep roots in the oil patch, answers without hesitation: "Absolutely," he said during an interview. "No question."

Over four decades, Morgan rose to the presidency of Encana Corporation, the country's top gas producer, and then chaired its biggest engineering firm, SNC Lavalin. But he started out on the other side of the table, policing industry. After graduating from the University of Alberta's engineering program in 1967, he served almost four years with the Energy Resources Conservation Board, and he never forgot that gritty first job.

As an Edmonton-based ERCB inspector, Morgan survived the infamous winter of '69, when the mercury dropped to −50°C in northern reaches of his territory in places like the Rainbow Lake oilfield. In

the summers, he learned to stay cool through relationship "hot spells" between communities and industry. Experience taught him the value of a referee with the expertise, independence, and authority to make rulings that everyone trusted. On field duty for the ERCB, he saw the need up close and personal.

For example, when Morgan was investigating complaints of gas in water wells near Sherwood Park, he "met a farmer looking like he'd been through a war." Morgan recalled, "His wife was there too. I saw the remains of a water pump house. It [had] exploded. He was okay. . . . We did our work. We concluded there was shallow gas throughout the region and the water wells were in contact with it. There were also deeper conventional gas wells. We did geochemical analysis. There was no correlation. My job was to tell these people it was not the gas industry that was causing the problem."

COORDINATING THE COMMONS

Farmers were not the only ones Morgan presented with verdicts that could be hard to swallow. The regulations he enforced also reined in Alberta's oil entrepreneurs: the wide spacing required between wells limited drilling; waste prevention tactics restrained production; the need to locate surface facilities in safe zones required changes of plans; and proper equipment specifications raised costs.

"The bottom line was that without a coordinator it would have been chaos," recalled Morgan, whose tenure at the ERCB overlapped with Govier's time at the helm. "The ERCB under George Govier had a real logical way of looking at things: If you don't have rules of the game and just let loose a bunch of people into the field you're going to have a mess." Govier was ahead of his time in seeing the extent of standards needed, Morgan added. "Science has made all these technical things obvious today. But when Dr. Govier was putting together the modern board they weren't that obvious."

While Morgan patrolled his ERCB beat, American ecologist Garett Hardin coined a famous title and provided the classic explanation for the disorder that prompted Alberta to create its oilfield guardian. In "The Tragedy of the Commons," published by *Science* magazine in 1968 and still widely circulated as a foundation for modern sustainable development and adaptive management, Hardin described how and why honest and rational economic behaviour inevitably harms natural resources if supervision in the public interest is absent.

"Picture a pasture open to all," Hardin wrote. "It is to be expected that each herdsman will try to keep as many cattle as possible on the commons." The range stays roomy and fertile so long as tribal wars, poaching, and disease hold down human and livestock populations. But when law, order, and health care enable

growth, "the inherent logic of the commons remorselessly generates tragedy."

Hardin's argument continues: "As a rational being, each herdsman seeks to maximize his gain. Explicitly or implicitly, more or less consciously, he asks, 'What is the utility to me of adding one more animal to my herd?' This utility has one negative and one positive component. The positive component is a function of the increment of one animal. Since the herdsman receives all the proceeds from the sale of the additional animal the positive utility is nearly plus-one. The negative component is a function of the additional overgrazing created by one more animal. Since, however, the effects of overgrazing are shared by all the herdsmen, the negative utility for any particular decision-making herdsman is only a fraction of minus-one."

The economic arithmetic eventually backfires. "The rational herdsman concludes that the only sensible course is to add another animal to his herd — and another and another. But this is the conclusion reached by each and every rational herdsman sharing a commons. Therein is the tragedy. Each man is locked into a system that compels him to increase his herd without limit — in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all."

The understanding that oil and natural gas reservoirs have limits and need protection did not come naturally to the industry's pioneers. Fortune hunters who located well sites by finding surface seeps and promoted drilling company shares as tickets to a bonanza had no technology or incentive to define the limits of their finds. With deposits trapped in sponge-like formations of porous sedimentary rock, work was only beginning on the modern art of determining a reserve's productive lifespan by measuring and managing the gas and water pressure driving underground oil flows.

PROMOTING THE BOUNTY

Early chatter about Alberta's petroleum bounty echoed the imagery used by railway and settlement promoters to lure ranchers and homesteaders out to risky frontiers on high, dry, and stormy western plains. Boosters brimmed with optimism over drilling successes such as a 1905 well in the southwestern corner of the province near Pincher Creek. "The highest quality of oil" — a flood exceeding 300 000 gallons or 8570 barrels per day — came "gushing from a 12-inch [30-centimetre diameter] hole 50 feet [15 metres] into the air," announced the *Okotoks Review,* the hometown newspaper of the driller, John Lineham.

The article described Alberta's energy deposits as a subterranean sea of wealth. An ancient volcanic eruption, Lineham said, created "a basin-like vacuum

BLACK GOLD RUSH Early Alberta drilling successes inspired visions of wealth, frenzies of company formation, and blizzards of share sales, as recalled by this portrait of a lively downtown Calgary curb market fuelled by the first Turner Valley discovery well in 1914. *Glenbow Archives ip-6c-1*

into which the oil — made by distillation of large coal bodies lying to the west — seeped until it formed vast lakes underlying the rock formation at a depth of about 1000 feet [300 metres]. When the value of the discovery is fully realized by the civilized world Alberta will spring into fame for its new product which will cause the eyes of other countries to look upon Canada even more enviously than at present."

Promotional literature of the time promised drilling investors great personal gain. The Rocky Mountain Development Co., created in 1902 to exploit the first Alberta oil find near Waterton Lakes, predicted an astronomical annual return for a Canadian well flowing 300 barrels per day. American oil had averaged $1.15 a barrel the past five years while scarcer Canadian output fetched $10, the company noted. With production costs just a nickel a barrel, "You can easily figure out how Rockefeller became a billionaire. Few people realize the magnitude of the oil business. No wonder the phrase 'struck oil' is synonymous with suddenly acquired wealth."

Alberta became notorious for black gold rushes ignited by small finds, fuelled by promoters, and liable to skin wishful thinkers. In November 1913, with drilling on the first Turner Valley discovery well progressing 50 kilometres to the south amid rumours of an imminent gusher, *Calgary Herald* editors wearied of the pattern and called for a respite: "For months the people of this city and country have been hard up. They have been busy trying to catch up on their debts. Nothing could be worse for them — and nothing worse for Calgary — than a boom in oil stocks such as seems to be starting. The *Herald* knows instances of clerks in stores, servant girls, office girls, wives of small tradesmen, mechanics and others having been canvassed within the past two months with every artifice and promise that scheming could invent."

Alberta was far from alone in its bouts of enthusiasm for drilling, or in its vulnerability to promoters. Seen in those early days as a lighter and cleaner substitute for coal, oil had a positive image that is inconceivable amid twenty-first-century anxiety over carbon emissions and global warming. Henri Berenger, France's First World War petroleum minister and a celebrated diplomat in his era, put the predominant view into oft-quoted words: "He who owns the oil will own the world, for he will rule the sea by means of the heavy oils, the air by means of the ultra-refined oils, and the land by means of petrol and the illuminating oils. And in addition to these he will rule his fellow men in an economic sense, by reason of the fantastic wealth he will derive from oil — the wonderful substance which is more sought after and more precious today than gold itself."

CATCHER

Brenda Benson's screen saver — a picture of a leaping swordfish like one she hooked on vacation in the Gulf of Mexico — matched her role in ERCB headquarters. Working in compliance assurance, she made sure Albertans caught an even bigger prize: energy royalties that pay for services from education to roads.

The legislature and cabinet set royalty rates on the four-fifths of the province's oil and gas deposits that the government owns as a public trust. But the conservation mandate that launched the ERCB in 1938 spawned production reporting that determined the scale of the wealth collected by those rates.

For Benson, knowing the information's value made the otherwise dry data inspirational. "I have a passion about compliance assurance. It's exciting," she said as she entered the fourth decade of her ERCB career. Unlike legions of counterparts who submit reports from the private sector, she added, "You're not just dealing with your own company. You're looking at the entire industry."

After graduating from high school, Benson enlisted with the ERCB, and she hasn't looked back. She started at the bottom, filing well logs in the ERCB archives housed in the headquarters' basement, stepped up into public information services, and kept on climbing into more responsible roles. "This is an employer that lets you grow. If you prove yourself and you're really conscientious, you can move," she said.

Companies are quick to spot uneven treatment and demand equal favour if they deem anyone has gained an unfair advantage or been excused for a failure. "They talk out there — it's a small world," she said, pointing out her window at Calgary office towers. To maintain credibility and avoid conflict, reporting requirements and noncompliance fees for lapses have to be the same for everyone. "We ensure we're fair and consistent on how we manage compliance."

Benson recited digital improvements that have minimized bygone monthly drudgery. "We used to get 12 000 paper reports, key-punch them onto tape, have IT load it onto the mainframe computer, then edit the results and telephone around to double-check." Like the ERCB, "Industry really is accountable," Benson said.

TURNER VALLEY FALLOUT

The boom-'n'-bust cycle driven by visions of black gold has been documented by Glenbow Archives director Douglas Cass in *Investment in the Alberta Petroleum Industry, 1912–1930* (master's thesis, University of Calgary, 1985).

In the wake of the first Turner Valley discovery well in May 1914, more than 350 brokers and 500 sales agents took out Alberta licenses to peddle shares in 490 companies, most of them new. Besides the Calgary Stock Exchange, which operated under a charter enacted by the provincial legislature in 1913, at least five private trading floors opened. In the week ending May 30 alone, 80 firms launched with declared plans to raise $80 million for more drilling. The province created its first regulatory agency — the Alberta Board of Public Utility Commissioners, ancestor of the modern Alberta Utilities Commission — with a mandate to detect and prevent stock market abuses in addition to policing prices of consumer essentials, from electricity to milk.

By 1917, as expanding the Turner Valley bonanza turned out to take more time and money than expected, the corporate flock scattered. The private exchanges collapsed. The last eight members of the Calgary Stock Exchange suspended its operations.

Order was no easier to impose on the oilfields. Discovery wells, the first pinpricks into bottled-up geological traps, hit pressure that often overpowered early drilling gear. The strength of those freshly released underground forces made it a stretch to believe that supplies were limited and had to be conserved.

Calgary magnate Eric L. Harvie recalled the natural drama unleashed at the second of three big Turner Valley discoveries in 1924. "At a depth of 3740 feet [1122 metres], after drilling 290 feet [87 metres] into limestone, gas with a pressure of more than 2000 pounds per square inch was struck." The force lifted a 400-ton [390 metric tonne], 3000-foot [900-metre] vertical steel pipeline, which had been lowered in pieces to line or case the hole. "So great was the pressure on the pioneer well that the casing, valves, gauges — everything — were slowly pushed up until they were 136 feet [41 metres] in the air," all the way up at the top of the drilling derrick. "Only when the gas began to escape around the outside of the casing did they settle back in place." Even after being put into production, the well continued to vent unused gas; run through a safety valve into an open incineration trench, it burned day and night. "With its spectacular flare pit, referred to for years as Hell's Half Acre, it soon became known throughout many parts of the world and focused wide attention on Turner Valley."

Harvie was speaking at the twentieth-anniversary celebration of Turner Valley's third and biggest discovery well, which hit crude oil at a depth of 8200 feet [2500 metres] in June 1936. The celebration highlighted Alberta's continuing love affair with black gold:

5000 oil company employees sporting papier-mâché driller's hats listened to the speech, and industry and community leaders took in two days of exhibitions and picnics in downtown Calgary and Turner Valley.

TOWERING FLARES

Harvie's speech also illustrates why the 1914 and 1924 Turner Valley finds became the breeding ground for the province's conservation regime. The oil coming out of those early Turner Valley wells was a light liquid known as naphtha, condensate, or natural gasoline. Pure enough to burn in automobiles without refining, naphtha was more valuable at the time than the natural gas that spewed out in even greater quantities along with it. Except for rig workers' shacks and small-town businesses next to the wells, the local market for natural gas was tiny and already taken. Calgary, 50 kilometres north of the field, had just 55 000 residents at the time of the 1914 discovery. They were served by a pipeline completed in 1912 from a 1909 gas find called Old Glory, 240 kilometres southeast of the city at Bow Island. The second Turner Valley discovery in 1924 greatly exceeded the additional capacity required by a population that was growing but still only 65 000. At the time, Calgary gas consumption averaged 20 million cubic feet per day, peaking at 70 million on the coldest winter days. That's less than one-tenth of the estimated daily average of 500–600 million cubic feet per day flared into the sky at Turner Valley as industrial waste. Even today, storing a resource as volatile as gas for later use involves an expensive array of airtight hardware, managed underground rock formations, and injection and extraction wells. Given those realities, the oil men equipped Turner Valley with a separator to strip out and capture the naphtha and flared off most of the gas.

The early wells, separator equipment, and non-stop natural gas flare literally shone a public spotlight on a flaw in the Rule of Capture long applied to resources, from minerals to wild animals and water. A common-law version of finders-keepers, with a pedigree dating back to the Roman Empire, the Rule of Capture worked well for centuries as a standard of fairness, spurring the discovery of ancient prizes from gold to coal. But unlike solid wealth sources, which stay put in underground veins and can be stockpiled for milling and marketing, oil and gas flow across property lines and mineral lease boundaries. Each discovery of a new geological reservoir ignites a scramble to beat rivals to the mobile wealth by drilling wells and draining geological reservoirs fast. When deposits contain more than one resource, the most valuable commodity is taken first and others are treated as nuisances.

The towering flames seared memories into early ERCB employees, as captured in oral history interviews on file in the ERCB library. "I didn't know what it was to sleep in the dark for many years," said Chuck

Moore, who grew up and worked in 1920s and '30s Turner Valley. "We had these yellow blinds. With the blind pulled you could read a newspaper or a book." The flares were so big and bright that they posed a night-driving hazard, he added. "You'd have a heck of a time staying on the road. Sometimes you'd have to stick your head out the window to see past the reflections on the windshield." Moore blamed the flares for a road accident that killed one friend and badly injured another.

"It was quite a show place for tourists," recalled J. Grant Spratt, a geologist whose career included roles in both the federal and provincial governments as well as in industry. "Almost every night there was that great red glare in the skies. People would go out visiting it from Calgary and eastern Canada and the United States." From a distance, the effect at night could be as striking as the first daytime glimpse of the Rocky Mountains to travelers crossing Canada from east to west. "The first airplanes that came through here used Turner Valley to get their beam for Calgary," Spratt said. As far away as Medicine Hat, 267 kilometres southeast of the city, "they could see the reflection of the flares in the skies."

Promoters used Turner Valley as a hard-sell form of investor relations, said Bert Corey, who took part in the antics after leaving the ERCB to be a well operating contractor. His customers included renowned masters of the oil game such as brothers Frank and George

BYGONE LANDMARK Early oilfields routinely burned off gases while testing the production capacity of wells or when ready markets were unavailable for some petroleum products. Progressively tightening ERCB regulation virtually eliminated pillars of fire, such as this 1920s Turner Valley inferno, as a waste of valuable Alberta resources and a source of pollution. *Glenbow Archives ip-6c-7*

STEEL GANG In 1912, labour crews used muscle power for 86 days to build by hand the 170 miles (270 kilometres) of Alberta's first natural gas delivery service, the Bow Island Pipeline, from a southeastern discovery known as Old Glory to Calgary and Lethbridge. The project included an early taste of the western petroleum industry's international flavour. Construction was financed by a share sale to British investors that raised $4.5 million ($93 million in twenty-first-century currency).
ERCB Library 2012.001 *no*002, *Glenbow Archives na*-4048-2

McMahon, whose family name is immortalized on Calgary's football stadium.

"George McMahon would come out with prospective investors and he would say, 'Bert, would you come with us today out to one of the wells.' And I'd say, 'Sure, come on.' And he'd say, 'Now I want to impress these people. Would you just tell these separator operators to cock the well open?' And I'd say 'okay' and go over and tip the guy off. And all of a sudden he'd open up the valve as wide as it would go. There'd be a huge roar. Smoke and gas would come out of the flare pit. Invariably there'd be a huge smoke ring. It would float up into the sky. You could tell in the Valley where somebody was showing off for promoters. You could see the smoke rings. They were very noticeable — beautiful. The investors thought this was outstanding, and it was."

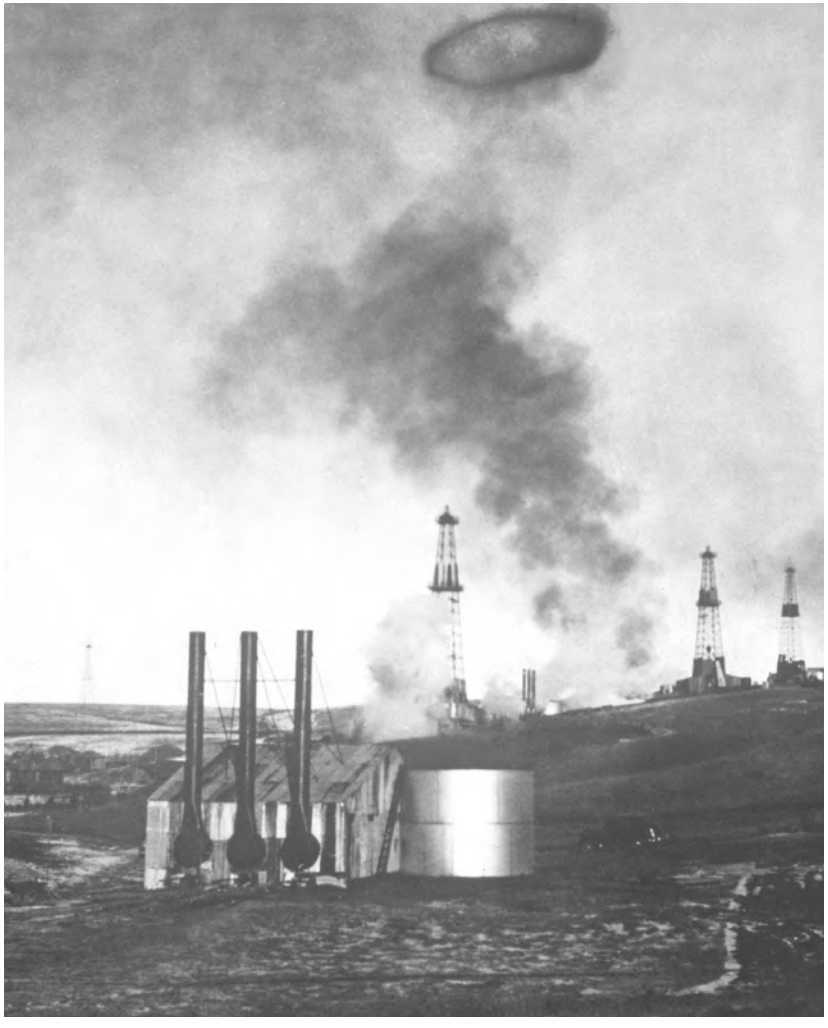
Early oil kings made no apologies for such behaviour. "The promoters, they are a necessary evil," Corey said. "In most endeavours you have to get somebody that sells other people on the merits of a particular enterprise or an operation or an opportunity. These are the people who are the salesmen. They are a catalyst between the raw land, the finances, and the people — whatever you will — to get this group together so that you could get the business going and wells drilled. The promoter was the one that found the money and of course took the grief when an operation failed."

Wasteful stunts were no loss from a commercial point of view. By the late 1920s, the Turner Valley glut drove gas down to eight cents per thousand cubic feet — and that was after extracting impurities such as sulphur for use in furnaces and stoves, recalled Gordon Connell, who became the ERCB's first chief engineer in 1938. Raw gas at wellheads fetched two cents, barely enough to cover processing fees, if that. For producers, the value of gas was at best zero or at worst a penalty lopped off their oil income, which hovered around $1.25 a barrel in 1938 ($19.58 in today's loonies).

WATCHDOG ON DUTY

That was the atmosphere surrounding the Alberta government's decision to create a watchdog for the energy commons. Braced for a fight, the provincial cabinet recruited William F. Knode, a veteran of the Texas Railroad Commission's conservation battles, as the ERCB's first chairman. "Bill Knode was a rough, tough individual," Connell said. "But he got the board started. It was necessary to take some fairly tough measures in the beginning."

In ERCB oral history interviews thirty years later, Knode said attitudes in Alberta echoed what he'd seen in Texas. "The oil man had a peculiar mental block against gas," he said. "You would see flares all over an oilfield. I mean you'd see them for miles, maybe not concentrated like in Turner Valley, but very comparable per barrel of oil produced against the total gas wasted."



PIONEER STUNT Making wells blow smoke rings was a favourite item in the stock-promoter bag of tricks during the early years of Alberta oil. The spectacular way of calling attention to drilling successes died out as ERCB conservation regulation brought waste, pollution, and safety hazards under control. *ERCB Library* 87.022 *no*025, *Bohme Collection*

In Texas, the waste extended over the entire state, he added, but the fixation on oil was the same. "As far as the oil man was concerned it was 'To hell with the gas, we want these liquids and let the gas go because there was no market.'"

Personally and professionally, "I became fascinated with your country and the potential," Knode said. Tapping that potential, however, required huge shifts in mindset. "You had to educate the producers to the probable benefits of conservation, the maximum recovery from the reservoirs and both above-ground and underground prevention of waste. This all brought on whirls and whirls of studies by very capable engineers and geologists on reservoirs. I would say during that seven-year period from '31 when we got started in Texas until '38 the advance of scientific knowledge of reservoirs was better than it had been in the 30 years before that at least."

Persuading Alberta entrepreneurs to practice the care the scholars preached turned out to be a long mission. "It was more or less just scientific research to the fellows here. It was an educational program, the first two years," Knode said. "The first steps were to get the producers to go along with the idea that this conservation was to the benefit of the reservoir, and to prove to them that the future potential of the gas was much greater than the little bit of condensate they were recovering. This of course met with a lot of resistance."

TURNING OFF THE GAS

The waste and the opposition to interference are well documented — most graphically in testimony collected during a 1933 lawsuit that stopped the first attempt to impose order on the youthful industry. "Very little more than 10 per cent of what passes out of the wells is, except for the recovery of naphtha, applied to any useful purpose," said the Supreme Court of Canada in its final verdict against the Alberta government in the case *Spooner Oils Ltd. v. Turner Valley Gas Conservation, [1933] S.C.R. 629.*

Pioneer tycoons such as Spooner had high stakes in the fight to keep old liberties. During the roaring '20s, Spooner lived at the top of the social ladder in Calgary's biggest house: a 9000-square-foot Elbow Drive mansion that is still preserved as a historic site, gleaming inside and out with columns, arches, Italian marble, English woodwork, and other period splendour. The conflict in Turner Valley shook the foundations of early oil wealth. As Chief Justice Lyman Duff observed, "The effect of the order of the Board upon the operations of the company has been to reduce its production of naphtha by something like 95 per cent."

The Turner Valley board's contested directive, known as Order Number 1, tried to give meaning to a 1930 political triumph: a transfer agreement giving Alberta title to its natural resources. The province's most popular crusade, supported by all parties since Alberta's birth in 1905, this action pulled control of underground wealth from Ottawa. The Supreme Court said conservation was possible in principle, but in practice the opening move stumbled over two obstacles. First, the transfer agreement failed to specify that new provincial rules applied to mineral leases granted by the federal government before 1930. Second, Alberta needed to do more than appoint a local watchdog over one industry hot spot. To make conservation stick, the province had to spell out that wasteful old customs were no longer acceptable, and that the new standards applied across its entire 537 000-square-kilometre natural resource commons.

TURNER VALLEY BARRICADE
As a champion of fiercely independent oil entrepreneurs, Calgary business baron Arthur Spooner fought off Alberta's first foray into conservation. In 1933 a firm he named after himself won a court ruling that barred action to stop waste by wells on petroleum leases granted by the federal government before its 1930 transfer of natural resources to provincial ownership. His resistance faction was overcome in 1938 by a transfer agreement amendment and the creation of the modern ERCB, empowered to enforce regulation. *ERCB Library 87.031 no038, Goodall Collection*

PIONEER JUMBLE
A dense, wasteful, and hazardous jam of unregulated derricks, offices, and homes jostled one another for room in Turner Valley by the time a twenty-five-year Alberta campaign to obtain ownership and control of mineral resources from the federal government at last succeeded in 1930. The ERCB grew out of popular demand for orderly development to make the most of the province's natural endowment. *Glenbow Archives na*-1487-1

The Supreme Court's ruling turned out to be a tall order. Regime change came first: in 1935, Social Credit ousted the last United Farmers of Alberta government, which was distracted and shaken by scandal and the Great Depression. Next came prolonged efforts to catch the attention of the government in Ottawa. Then, after an amendment to the natural resources transfer arrangement established the province's authority, the legislature passed two versions of the bill creating the ERCB before the government's lawyers were satisfied that any future protest lawsuits could be repelled.

Public hearings on the legislation sent industry a message that the province meant to enforce waste reduction. The government revealed that Knode was its highest paid employee at $1000 a month, equivalent to $15 660 today. When oil entrepreneurs—teamed up

as the Alberta Petroleum Producers Association, with former UFA premier Herbert Greenfield as president — demanded promises that business would not be hurt, Knode stood firm: "If the legislature cannot secure conservation in Turner Valley by an act administered by a board, then it is my recommendation that the government take over operation of the field itself. This is a matter of utmost importance to the government and to the people of the province." The legislation passed with only one change requiring study of a compensation scheme for firms hurt by waste control.

The debate boiled over into confrontation. For public consumption, resistance leaders stuck to formal rhetoric. Model Oils managing director W.C. Fisher, for example, branded the province's actions as "confiscation and expropriation." The clash of powerful personalities in the climax of Alberta's oil range war occurred out of sight of the rudimentary 1930s news media, and no shots were fired. But insiders who knew said the drama bordered on violent. Oral tradition among political and business leaders preserves this confrontation as the final act in establishing the ERCB's authority.

Preston Manning recalled the drama in *A Salute to the People of the EUB,* a video released for the agency's seventieth anniversary in 2008. The regulator's name at the time of the filming, Alberta Energy and Utilities Board, obscured its heritage. His father, Ernest Manning, played a role in the watchdog's birth as industry minister in the '30s before beginning his twenty-five-year stint as Alberta's longest-serving premier in 1943. The family memory of Knode taking charge was still vivid. "He was one of these rough, tough guys who could deal with the rough, tough crowd at Turner Valley," said the younger Manning. "When Knode first proposed conservation measures and said he was going to shut down wells some early producers who were rough, tough guys said there was no way they were going to conform to some board order. He would get in his truck, drive down there, find the guy that owned the well and tell him 'We're going to seal your well — and if you touch those seals we're going to put you in jail.'"

William Epstein, a Calgary lawyer who rose into international practice with the United Nations, likewise never forgot his early experience with the ERCB and Knode. "He was a rough diamond," said Epstein. "He really was polite but a rough diamond and he didn't know anything about the law. He was just a man in the field who understood oil and conservation." Albert Mayland — a leader of industry resistance — was just as hard, Epstein added. "We turned all these wells off and put seals on them, and we warned them that if they took off these seals, by God they would be prosecuted. Mayland was a guy who challenged the government — a real tough baby."

Mayland died at age 72 in 1947; the pioneer magnate's stamp still marks east Calgary, where housing

and industrial districts were named after him as the city spread onto one of his ranches. Like Knode, Mayland was an import. Born in Minnesota and raised in Nebraska, he made his first fortune as a Montana horse trader. Relocating to Alberta in 1905, he built a complete cattle kingdom, from pastures to meat packing. As an early investor in Turner Valley, he parlayed drilling successes into an oil empire that stretched beyond wells to refining and a western service station chain branded Purity 99.

The faction of independent oil entrepreneurs led by Mayland eventually gave up on defying Knode's crew only because the government took away the weapon Spooner used to stop the province's first foray into regulation. The 1933 court defeat inspired an amendment in 1938 to the ERCB's founding legislation, banning court appeals of its decisions. "Nobody ever brought the lawsuit. They all took the opinion of their lawyers. They were told lawsuits were a waste of time and money," said Epstein.

A LEGACY OF ENFORCEMENT

The ERCB turned out to be the most durable legacy of the pioneer petroleum era. The public wariness and enforcement structure spawned by conflicts over waste equipped Alberta to make the most of the far larger resources revealed by the 1947 Leduc discovery.

Turner Valley paid a heavy price for learning conservation the hard way. Connell, who followed his stint as the board's first top engineer with a post as chief economist for Gulf Oil, later estimated the loss inflicted by flaring at 750 billion cubic feet, the equivalent of an oil lake filled with 125 million barrels of gas. Knode estimated the cash value of gas wasted between the big discovery of 1924 and the board's arrival in 1938 at $137 million, or $2.2 billion in today's purchasing power.

Turner Valley losses worsened over time. In fact, the field became a textbook case of the rashness of destroying the cap of highly pressured gas needed to push energy to the surface — a cap modern petroleum engineers take care to preserve. Production from the 1936 oil discovery tapered off prematurely during the Second World War and dwindled to a trickle by the early twenty-first century — less than 5000 barrels per day of oil and gas combined, despite efforts to replace the natural driver with man-made injections ranging from water to nitrogen. Total output, about 150 million barrels, has only been about 12 per cent of the estimated 1.3 billion barrels in the geological reservoir, or just half or less of standard recovery rates achieved with orderly conservation practices.

The value of having an oilfield watchdog with teeth became clear a year after the Leduc breakthrough. On farmland a 1.6-kilometre stroll east of that discovery, a follow-up well — Atlantic Number 3 drilled by McMahon crews — blew out. The ERCB took over

the site after futile attempts by its operators to regain control.

It was Alberta's most spectacular blowout — and just 40 kilometres southwest of downtown Edmonton, within easy reach of news media and motion-picture crews. The six-month rampage generated a well-recorded cavalcade of follies. McMahon's Atlantic Oil Co. tried to stop runaway oil flows of 15 000 barrels per day by stuffing a comic array of materials into the hole in the theory that they would swell and congeal into a plug: 10 000 bags of cement, carloads of ping-pong balls, chicken feathers, and cotton seed. A worker blew up a gas-filled outhouse by ducking inside for a forbidden cigarette; he survived a 60-metre flight in the rocketing biffy, but earned an unprintable nickname for life. After flooding a 40-acre [16-hectare] crop field with 1.5 million barrels of oil, the spill caught fire. An 800-foot [240-metre] pillar of flame sent a mushroom cloud of smoke 7000 feet [2100 metres] into the sky for 60 hours, making Alberta famous — and catching potential investors' eyes with images on newspaper front pages and in movie theatre newsreels around the world.

The ERCB took over the wild well and hired senior industry talent to plug the blowout, snuff out the fire, control oil flows with relief wells, and clean up the spill. The disaster cost $1.8 million, or $18 million in twenty-first century dollars, which the ERCB paid out of Atlantic revenues from selling the small lake of spilled oil. Power built into the agency's founding legislation in 1938 made the rescue and salvage job possible. The ERCB had the right to order poorly controlled wells to shut down and seize any that disobeyed. On Atlantic Number 3, they used that authority.

In less dramatic form but on a vastly greater scale, postwar growth confronted the ERCB with the need to keep production orderly. "By 1950 Alberta literally had oil coming out its ears compared to what it could consume or market to other parts of the country," recalled Jack Bray, who worked at the ERCB for decades on keeping the flows orderly.

Until the 1990s, Alberta had capacity to pump more oil than the pipeline network could carry or than available markets could take. Job one became matching supply to demand — and doing it in ways that prevented a repeat of the Turner Valley blowout yet proved fair to all factions of a diverse industry. And so the ERCB's waste prevention role grew into responsibility for resource management. It was a case of the most senior level of government delegating a top provincial priority to trusted specialists. As Premier Ernest Manning said in one of several 1958 appearances before the federal Royal Commission on Energy led by Toronto corporate lawyer Henry Borden, "It is of major importance to the economy of this province and in the interests of Canada as a nation that a vigorous program for the progressive exploration and orderly development of these resources be maintained."

ATTENTION GRABBER Only 1.6 kilometres east of the 1947 Leduc discovery, a blowout at the 1948 Atlantic No. 3 follow-up well called global attention to the large scale of Alberta's newfound wealth. The spill turned a farm field into a flaming mini-lake under a mushroom cloud of black smoke. The spectacle went around the world on newspaper front pages and movie theatre newsreels. The ERCB took over control of the site, supervised industry wild-well taming and cleanup crews, and made the company responsible for the mess cover its costs out of proceeds from selling recovered oil. The site grows organic crops today. *Glenbow Archives ip*-61-19

LAKE OF FIRE Bulldozers built dikes of muddy earth and snow to contain the spill from the 1948 Atlantic No. 3 blowout, where natural underground high pressure drove up a 150-foot (45-metre) geyser of oil. Flames dwarfed the heavy equipment and darkened the southern horizon of Edmonton with inky smoke while industry crews fought to control the runaway well and put out the fire under ERCB supervision. *ERCB Library 87.022 no036, Alberta Government Photograph*

John Diefenbaker's federal Conservatives appointed the commission to find ways of coping with the aftermath of the 1956 Suez Crisis. A brief war over Egyptian nationalization of the Suez Canal had disrupted Middle East deliveries, causing a price spike. Then a peace agreement launched a tanker armada onto a world market that did not until 1960 have the Organization of Petroleum Exporting Countries controlling supplies. The result was a global oil glut and price slump. In addition, the Canadian industry contended with restrictive import quotas that limited flows into the United States, coupled with competition from rising Arab and Venezuelan production.

Barring help from Ottawa to secure markets, Manning warned, "Alberta producers could look forward to marketing in 1960 only approximately 49 per cent of the oil which could be produced under good engineering practice." The squeeze was tightest on home-grown firms, and local players always carried weight with the provincial government, which sought to avoid relying entirely on global corporate giants to fuel the economy. "An integrated company operating in all phases of the industry, and through affiliated companies having reserves in various parts of the world, is not as seriously affected by regional marketing problems," Manning observed. "Such a company can afford to take a much longer-term view and therefore an immediate solution is not as vital to the company's operations. It should be emphasized that the Canadian independents can be very seriously hurt if today's marketing difficulties continue even for a relatively short time."

The like-minded Diefenbaker government reacted by enacting its National Oil Policy (NOP) and creating the National Energy Board (NEB). The NOP propped up sales and prices by banning imports from Canada west of Ottawa and reserving the domestic market for Alberta production. The NEB took responsibility for pipelines that cross provincial or international boundaries. Federal policy followed the Alberta regulatory model, even borrowing ERCB chairman Ian McKinnon to be the NEB's first chair.

ORCHESTRATING CHANGE

The ERCB, meanwhile, orchestrated conservation, supply, demand, and the competing interests of big and small companies into an industrial symphony called pro-rationing. Created, continuously refined, and conducted primarily by George Govier as the ERCB's petroleum engineering maestro, the score was written in mathematics to eliminate any possibility (or appearance) of rule by personalities or favouritism. The tune came out in installments, as monthly book-length orders that directed production by every Alberta oil pool and well.

The score followed by producers intertwined the maximum permissible rate of production without damaging the geological reservoir, or MPR; the forecast of how long properly handled reserves would last, or

recovery life factor; and an economic allowance meant to ensure that output would cover wells' costs. Strict reporting was required. ERCB field inspectors made sure the documentation was accurate by checking the industry's measurement instruments.

The Alberta petroleum symphony included an industrial counterpart to artistic suffering. Engineer Jack Stabback, whose thirty-one-year career with the ERCB and NEB started in 1949, recalled that for two-thirds of those years, the price of oil was about $1.80 a barrel, equivalent to $17.79 today. Production "fluctuated rather significantly throughout the year," at times dropping as low as 40 per cent of capacity. "Obviously there wasn't much profit available to devote a lot of money to housekeeping matters."

Spartan standards prevailed everywhere, from oil production sites to the living and working conditions of ERCB personnel. Stabback's first assignment as inspector moved him away from his native Calgary to an ERCB outpost at Vermilion in the oil lands east of Edmonton. "The accommodation was very rudimentary," he recalled. "I grew up in a city and was rather shocked at the facilities available in a country town. Vermilion was a pretty fair size at that time, with a population well in excess of 1000. But there was no water and sewer system at all. We became acquainted with 'privies.' The ERCB office was on the second storey of a bakery with an outside staircase going up and a privy hanging out at the back."

The Leduc #1 Energy Discovery Centre at the site of the 1947 gusher preserves a sample of living conditions in the pioneer era of Alberta oil. Displays include The Conservation Board Shack, a portable wooden shed mounted on skids and sized to fit onto a flatbed truck. It's proof positive that worker accommodation catered to industrial convenience rather than comfort. Just eight feet (2.4 metres) wide and 24 feet (7.2 metres) long, the cramped structure did triple duty as a business office (where ERCB inspectors traded information on field operations with the drilling rig managers known as tool-pushers), the inspectors' home, and a social club. In the absence of wives and children, evening recreation leaned towards poker games.

"I always liked the ERCB," recalled Discovery Centre president Don Hunter, who studied engineering under Govier and briefly worked for the ERCB at the start of a lifetime career in the industry. His father, Vern Hunter, was the tool-pusher on the rig that hit black gold at Leduc but answered to the nickname Dry Hole as a result of a long string of early drilling failures. "When the board inspectors came out and checked the rigs, it was good for everybody. Maybe only 5 or 10 per cent of the industry people were inclined to take shortcuts — but they would if they could," Hunter recalled in an interview. "I always thought the inspectors were fair. They wouldn't let you get away with anything, but they were fair."

GO-TO GIRL

Shirley McGuffin arrived at the board in 1976. She was urged by her mother to take the job, following the example set by her older sister who found work as an ERCB department manager's secretary.

She started at a time when mainframe computers were built on the scale of factories and created assembly line–like jobs. During that digital pioneer era, computers were machines with moving parts and electrical hardware, not small boxes of microscopic storage chips and electron flow channels. Key punchers typed on devices that turned information into holes in rolls of paper. Flashing lights "read" the holes as signals stored on revolving reels of plastic tape.

"They needed somebody to type a document," McGuffin said, recalling her first venture into key punching in the early '80s. Key punchers are trained to type what is there, not to mentally process what is actually written. But because she wasn't so trained, McGuffin would edit the document as she typed. "It definitely took longer to get the job done."

Her attention to details has set her apart; curiosity and craftsmanship ran in her blood. Her father was an accomplished furniture-maker. At the ERCB she made a point of finding out what the ERCB records were about and how the mainframe collected and stored the data. "Most everything I've learned, I've learned on the job," McGuffin said.

"I jokingly call myself a universal translating machine," she said. "I can translate what the board business means to the IT folks. I can tell the business

side what they [IT personnel] mean. Their brains tend to work in slightly different ways."

Her first-hand knowledge of digital evolution was put to good use when the ERCB set out to combine all of its data into a twenty-first-century business system. She had a hand in projects that would have tested the best formally trained specialists. "I like puzzles," she said. "I like what I do." That included serving as a living database of solutions to digital mysteries posed by the ERCB's complicated computer heritage. "I've become one of the primary users of the mainframe. I'm the go-to girl for anything mainframe."

Fitting a company that found oil into ERCB pro-rationing was akin to learning to play the violin. "I started in the dumb corner," said Dan Claypool, smiling but not joking as he described the start of a four-decade oil career that took him from a Saskatchewan farm to rig labourer to field production and drilling manager of Texaco Canada. In retirement, he conserved industry memories as treasurer of the Leduc #1 Energy Discovery Centre.

Practice was the way to learn. "I was never sharp at math," said Claypool. "The system was so complicated that even the people in our Calgary engineering department didn't understand it. I learned it. I got so I could do it. At night I would try and develop things just so we could understand it."

INDUSTRY ONSIDE

Industry accepted the need for production discipline and its enforcers. "They're the people that keep you in line," Claypool said. "You've got a set of rules and they enforce the system. I always got along great with them. Most were pretty reasonable people. I thought they were necessary. I was paid to follow the rules. I wasn't paid to save money by cutting corners."

Once mastered, the pro-rationing formula helped companies anticipate and respond to the effects of global market movements on Alberta operations. The tempo sped up during the 1970s energy-crisis era,

BITUMEN-BELT BEGINNINGS Oil sands production started small by the standards of the mining and upgrading complexes that now pump out hundreds of thousands of barrels per day. In field trials during 1960, the Syncrude Canada consortium used modest equipment to sample the ore and test the ability of men and machines to operate in the Athabasca deposit north of Fort McMurray. *Glenbow Archives ip-6s-1a*

TECHNOLOGY FRONTIER By 1963, after three years of experiments, Syncrude Canada's Mildred Lake pilot plant began to exhibit the giant scale of development implied by its owners' initial production goal of 100 000 barrels per day. Commercial operation was still 15 years away. First the project had to complete marathons of planning, engineering, technology refinement, ERCB reviews and approvals, cost inquiries, negotiations with provincial and federal governments, and ownership shuffles. *Glenbow Archives ip-6s-3a*

Claypool recalled. Before the Arab oil embargo against the United States, his wells southeast of Edmonton languished. "We had to wring out the rags after wiping the valves to make a profit." As market conditions evolved, the formula guided preparations for change. Claypool more than tripled production in his oilfield to stay in step with demand.

By the time Gwyn Morgan served his apprenticeship with the ERCB, growth strained the 1950s and '60s conservation formula. He remembered his years with the ERCB as an education in necessity as regulations were adapted to address energy realities. When Great Canadian Oil Sands (GCOS) fired up the first bitumen mining and upgrading site in 1967, the work was on the cutting edge of the industry's technology frontier. Syncrude Canada consortium sought approval to build the second Fort McMurray plant and make 100 000 barrels per day, three times as much as GCOS. Oil sands projects required exemptions from pro-rationing because they had to run at full capacity to be economically viable.

Adhering to government policy, the ERCB limited oil sands to 5 per cent of the province's production, with the intent of ensuring that the rest of the industry was not penalized by choking back conventional wells. "The mentality of the era was to predict everything and control everything around the prediction," Morgan said.

When the ERCB promoted him from field inspector to the head office economics bureau, Morgan worked on supply-and-demand calculations that led to the ERCB's 1968 decision to defer the Syncrude application. To make its decision, the ERCB juggled contested evidence presented at lengthy hearings. The uncertainties that had to be considered ranged from the future of Alberta drilling and reserves to the Canadian and U.S. population and energy demand forecasts. The potential effect that the March 1968 discovery at Prudhoe Bay might have on oil supplies presented another wild card. "It was a bizarre experience," Morgan recalled. "It was the beginning of my life lessons of how overdoing regulation could totally screw things up. The problem wasn't Syncrude's plant. It was lack of pipeline capacity and pro-rationing."

Morgan was not alone in questioning the ruling; the deferral "was a blow to us because we had hoped that another oil sands project would start in that four-year period," recalled Russ Patrick, industry minister in the Social Credit government at the time. "That's the only time that cabinet in considering a board recommendation asked me,'What can we do about it?' They asked me would I go back to the board and see what they could do about reconsidering their decision, which I did."

The ERCB's willingness to take another look at the factors leading to the decision did not mark a departure from their role as an independent body, added Patrick. "I sure didn't force them," he said. Rather than give orders, rewrite the decision, or interfere with the conduct of the case, the cabinet just added its voice to project sponsors' request for further review in light of

a changing oil market. Patrick recalled, "I just said, 'Would you review this in light of the problem that it's the consortium asking for it?'" Soon after the initial Syncrude deferral, the excitement that fuelled a world record Alaskan drilling rights auction at Prudhoe Bay gave way to doubts. Harsh Arctic conditions, technology gaps, high costs, unsettled native land claims, and environmental opposition held up Alaskan pipeline construction until 1977. Delays were already obvious by the time the ERCB reconsidered the oil sands decision. Approval was granted in late 1969 after Syncrude agreed to postpone the production start date until at least mid-1976.

Patrick, whose cabinet portfolios included 16 years with the ERCB (ending along with the Social Credit regime in 1971), described oil sands development as a political hot potato from the get go. The ERCB also put GCOS through more than one hearing characterized by long, hard fights among business factions. "We had to face the whole oil industry because we were only selling 40 per cent of what we had [during the prorationing period]," Patrick recalled.

In a lively memoir titled *Black Gold with Grit,* industry trailblazer Joe Fitzgerald recalled the heat that fired the duels between expert witnesses wielding technical reports. "I was lunching, as a guest, in the Calgary Petroleum Club," wrote Fitzgerald. His host left for a moment. "A man joined me, asking if I was indeed 'one of those guys from the tar sands.' Assuming he was curious to learn more about our work I assured him that I indeed was one of them. With that, he demanded proof of my membership in the club or one of its affiliates." When Fitzgerald admitted he was just visiting, the member called the club authority over to the table. "Now the manager was demanding some evidence that I was better than a 'tar sands miner.' Had my host not arrived at the right moment I am sure I would have been promptly thrown out of the Petroleum Club." The member made sure Fitzgerald got the message. "Very well for today, he said, but at the next meeting of the club he was definitely going to move a resolution to see that I, 'and none of your kind,' would ever enjoy privileges at the Calgary Petroleum Club."

NATURAL GAS PARALLELS

When Morgan left the ERCB, he worked in another sector that was pushing against resource management conservation policies. He put together a portfolio of natural gas supplies for export to the United States. The ERCB approved the deal, but the NEB stopped the sale with a federal copy of Alberta regulation. "After two or three years of work they turned us down. It was my second experience with government interference in the market," Morgan said.

Both agencies enforced a "surplus test." Alberta required proof of a gas stockpile big enough to satisfy the province's needs for 30 years. The national version

held onto preserved gas reserves for all of Canada. As the demand for gas grew across the country and in the United States, the surplus tests led to frequent hearings that built up libraries of book-length technical forecasts by duelling experts.

Wary regulators erred on the side of caution, basing supply estimate decisions on high petroleum engineering standards. "Of course the reserves weren't large. Prices were low. Nobody was drilling," Morgan said. "The surplus tests wouldn't allow for potential reserves that would be developed if sales grew."

As with the oil sands, potent economic and political interests drove the gas feuds. Consumers defended big inventories to keep gas cheap. Producers sought sales to light fires under prices and drilling. Conflicts surrounding surplus tests dragged on until two years after the federal, Alberta, Saskatchewan, and British Columbia governments began oil and gas free trade and deregulation by scrapping the 1980 National Energy Program at the 1985 Western Accord on Energy.

Open gas markets marked a radical change. Trade controls mirrored the possessive feelings Albertans felt for this resource jewel and contributed political force to the birth and development of both the ERCB and conservation.

In July 1912, when Alberta's first pipeline carried gas for 240 kilometres from the pioneer Old Glory discovery wells at Bow Island northwest to Calgary, the ceremony drew a crowd estimated at 12 000 — more than one quarter of the city's 44 000 residents. Gas service in Edmonton was steeped in a grassroots tradition, too. The Viking field east of the city was established in 1913 by a 600-member civic group incorporated as the Edmonton Industrial Association Drilling Co. The events that triggered Alberta's 1930s conservation enactments included formal requests by municipal governments, acting on behalf of local consumers, to stop the wasteful gas flares that lit up the province's southern skies.

The surplus-test regime grew out of a provincial gas inquiry led by R.J. Dinning, a master regulator whose previous experience as the founding chairman of the Alberta Liquor Control Board, set up in 1924 to replace prohibition with a sales monopoly and consumption policing, would serve him well. The gas commission he led probed a new dimension of supply management brought on by Alberta's postwar drilling boom.

Gas and oil finds multiplied after the Leduc discovery. Plans were made to build pipelines to central Canada, the U.S. Midwest, and California. To guarantee repayment of construction loans with service revenues, the projects needed decades-long supply commitments. The new burning question became whether or not to dedicate reserves — which were regarded as Alberta's crown jewels — by granting permits for the "removal" of provincial supplies to distant buyers. In the gas lexicon of the day, the word "removal" meant sales to other parts of Canada as well as the United States.

R.J.DINNING ran a 1949 natural gas inquiry that guided provincial policy on preserving reserves for Alberta needs, which Ottawa's National Energy Board eventually copied to conserve supplies for all of Canada. *Glenbow Archives na*-2864-960*per*

At the Dinning inquiry, Edmonton chief city commissioner Dudley Menzies's testimony revealed popular opinion. "The whole present and future economy of the City of Edmonton is so closely associated with and dependent upon gas reserves and consumption that the question of exportation of gas constitutes a subject of deep concern to the inhabitants of this city and district," said Menzies. "The availability of an ample supply of natural gas at low rates constitutes a very attractive feature to commercial, manufacturing, and industrial concerns contemplating establishing business in Alberta." Calgary's arm of the Alberta Teachers' Association sent Dinning a resolution that was also typical of the prevailing mood: just say no to gas exports, the teachers insisted, "unless it can be established beyond all reasonable doubt that the supply is such that the benefits to the people of Alberta will not be endangered."

In the end, the inquiry recommended protecting a fifty-year gas supply for Alberta, and the construction of a pipeline network that would serve as a provincial bulwark between the gas fields and long-distance routes controlled by outsiders. The government mandated a surplus test by enacting the *Gas Resources Preservation Act* and chartered Alberta Gas Trunk Line Co. to build the grid as an investor-owned instrument of provincial policy. Supervision of both innovations added to the ERCB's growing list of responsibilities. The ERCB trimmed the regulated stockpile to a manageable 30 years and entered a decade of hotly contested gas cases.

FUELLING PETROCHEMICAL DIVERSIFICATION

The evidence collected by Dinning — 2541 pages of hearing transcripts and 134 exhibits — foretold a new dimension to conservation and the ERCB's responsibilities. Gas that was rich in liquid by-products was poised to become a raw material for manufacturing. The teachers were in good company when they told the gas inquiry, "Our reserves will prove a real attraction to industry contemplating a move into Alberta, thus improving the great lack of an industrial economy." Expert confirmation came from J.R. Donald, a nationally prominent engineer who was on the Industrial Defence Board of Canada and served as director-general of explosives and chemical production during the Second World War.

Donald said, "Alberta is the one province with substantial production and reserves of natural gas and its industrial possibilities are very great." At the time of the Leduc discovery, oil was nicknamed the "magic barrel" for the multitude of ways it could be used. The Leduc gusher coincided with the emergence of petrochemical manufacturing, which started out by making wartime substitutes for strategic materials such as rubber army truck tires. In peacetime, petroleum products grew to replace natural materials, such as wood and leather, for civilian use. The period following World War II was the dawn of the age of synthetics, turning fossil fuels' carbon and hydrogen molecules into anything from fabrics and packaging to tires and toys. Manufacturers looked for places to put down roots. Donald reported "quite a lot" of interest in Alberta. "We had several inquiries recently which are being followed up in regard to establishing chemical plants on a substantial scale." Provided that a twenty-five-year gas supply stayed available, he foresaw petrochemical investment on the order of $150 million ($1.5 billion today).

Two decades later, with mostly modest forays into the growing field of manufacturing, Donald's expectations were realized. The ERCB acquired a role in making manufacturing development happen by supervising the use of natural gas by-products in new industrial projects. The Conservatives gained power in 1971 on an election platform that pledged economic diversification. Alberta Gas Trunk, investor-owned but aligned with provincial policy, grew a petrochemical arm and teamed up with international giants of the field to build four projects at Joffre, mid-way between Calgary and Edmonton, for $925 million ($4 billion today). The scheme relied on ethane, a hydrocarbon vapour that was compressed into a liquid after being extracted from gas flowing through the provincial pipeline grid at installations known as "straddle plants." In 1974, legislation gave the ERCB the responsibility for managing gas by-product supplies and approving projects that used them as industrial raw materials. A brisk review granted the Joffre complex development permits in November 1975.

EXPLORER

The spirit of exploration that inspired ***Karen Bieber*** to become a geologist still stirs after 15 years with the ERCB. "I find it fascinating," she said in an interview.

Her daily bread kept her feet on the ground. "We do practical geology," Bieber said. She evaluated wells. She mapped rock zones and fossil fuel reserves. She dealt with applications involving such industry schemes as commingling production from multiple zones and using water injections to sustain or increase oil flows. To help the ERCB resolve technical disputes, including which companies should pay what penalties for off-target drilling into each other's discoveries, she asked questions, collected evidence, and helped write decisions.

The resulting treasury of observations fed Bieber's curiosity, aroused years earlier by an introductory geology course at the University of Saskatchewan in Saskatoon. "Every formation is a specific environment," Bieber said. To understand the subterranean world left by stages in the planet's development, "You have to be able to envision what the surface looked like — what was in existence at the time."

Bieber was especially intrigued by sedimentary chert, a "weird" rock heritage of the Jurassic era 200 to 150 million years ago, when dinosaurs prevailed, mammals were only arriving on the scene, and Alberta's oil sands deposits were beginning to evolve. Also known as flint in its most prized form, these geological formations suggest the oceans were saturated with silica rather than salty calcium carbonate, she noted. "It was a much different chemistry."

Curiosity is much more than a purely academic exercise in a discipline that Bieber described as a perpetual work in progress. Case in point: she was part of an ERCB staff team that drew the most complete picture yet of the oil sands. One of the biggest and fastest geological research programs in Alberta history, the effort contributed to a landmark conservation decision by the ERCB. That decision protected billions of barrels of bitumen against damage by putting constraints on hasty drilling for the modest natural gas deposits on top of the oil. "It can be a very varied job. That's what's interesting about this place," Bieber said.

This new role sorely tested the ERCB's core mandate to maintain fair balance among industry factions. At the same time as petrochemical manufacturers ramped up operations in the late 1970s and early '80s, oil firms were building gas-field plants to extract ethane for new uses. The most significant new role was injections into the producers' own wells to extend the lives of 1940s and '50s discoveries by driving more reserves to the surface. Originally an untapped by-product, ethane became a prized item fetching premium prices for volumes that measured in the scores of thousands of barrels per day.

Periodic disputes over field plant construction approvals and gas property rights boiled over into an ethane policy duel. The confrontation started in 1986 and dragged on for two years. In a rare lapse from the customarily reserved language of formal ERCB reports, the ERCB's decision noted that the issue was "controversial and emotional."

The petrochemical firms proposed new plants that would raise their ethane consumption by 50 per cent and sought assured supplies. The oil companies demanded rights to all contents of their gas, plus full value for ethane on an emerging separate market. A provincial cabinet policy statement promised both rival factions access to adequate supply sources. The ERCB translated the government paper into a practical compromise: a guaranteed raw material supply for existing petrochemical sites from their allied pipeline straddle plants, and market prices for ethane from the oil companies' field operations.

With their old plants protected, manufacturers forged ahead with new construction programs. Thanks to ERCB projections of rising gas sales under the new energy free-trade regime, they were confident that ethane supplies would increase. The oil firms reaped growth markets and eventually teamed up to build a new export pipeline for liquids-rich northern gas that bypassed the Alberta grid and its straddle plants, with an express route to Chicago from Fort St. John, B.C.

CONSERVING FOR THE LONG TERM

Although recent public attention has veered to Alberta's record on the natural environment and community relations, conservation remains a core ERCB focus. In the early twenty-first century, the gas-over-bitumen oil sands dispute echoed the Turner Valley battle, with high stakes that were measured in potentially astronomical resource and production losses.

This modern counterpart to the Turner Valley case provided yet another painful exercise in sacrificing short-term gratification to obtain greatly increased value in the long run. The dispute centred on production issues that began in the 1990s, before the industry had mastered a way to extract bitumen from deposits that were too deep for surface mining with shovels and trucks.

The technique — steam-assisted gravity drainage, or SAGD for short — uses parallel horizontal wells for simultaneous downward heat injections and upward oil flows. The circulation drops off prematurely if pressure in the geological reservoir is reduced by draining away caps of gas that overlie bitumen deposits, pioneers of the technique reported.

Acting on applications from oil sands developers, the ERCB took emergency measures by suspending production of nearly 1000 gas wells for the duration of the inquiry. The action followed multiple hearings, spread over years, about wells that were contested separately by gas and bitumen producers. During the inquiry, 27 ERCB staff and 15 industry experts teamed up to review 13 600 square kilometres of oil sands deposits, 3280 wells, and 6600 crates of drilling core samples.

Throughout the prolonged regulatory proceedings, the ERCB refused to yield to public protests. Provincial leaders let technical evidence decide the case, resisting the political temptation to intervene on behalf of gas producers and their investors. With the knowledge gained from the review, the ERCB reopened wells that they determined would not cause damage. The government set up a compensation scheme for firms that lost production. The ERCB estimated that 100 billion barrels of future bitumen extraction were at risk — 600 times as much energy as the one trillion cubic feet of gas involved in the case.

The oil sands conservation fight put the ERCB's independence to a severe test, recalled its chairman at the time, former provincial deputy justice minister Neil McCrank. ERCB engineers Frank Mink, Jim Dilay, and Bill Schnitzler determined that rapid gas drainage would spoil the oil reservoirs if the dispute was decided one well at a time. For the emergency stop-production order and omnibus inquiry, "We had to build our case before the government," McCrank said in an interview. "The government was short of money and this was the cash cow — gas."

On the advice of retired ERCB chairman George Govier, McCrank found a secret weapon — an expert with unbeatable credentials to present the government with a compelling case for holding the bitumen conservation inquiry. McCrank retained Khalid Aziz, a Stanford University professor who was renowned as the world's best petroleum reservoir engineer. "There weren't many secrets at the board. But that was one," McCrank said.

During McCrank's 1998–2007 tour as chairman, the ERCB convinced global industry and governments to accept its reserves estimate of 175 billion barrels, making Alberta the planet's second-largest oil warehouse after Saudi Arabia. "Today we tout bitumen as one of the greatest energy reserves in the world," said McCrank. "If the board hadn't taken the action it did, we might not be able to say that. The government didn't touch what we were trying to do. They let me know

they weren't happy. But they didn't buckle. They didn't fire all of us. They let us do the job."

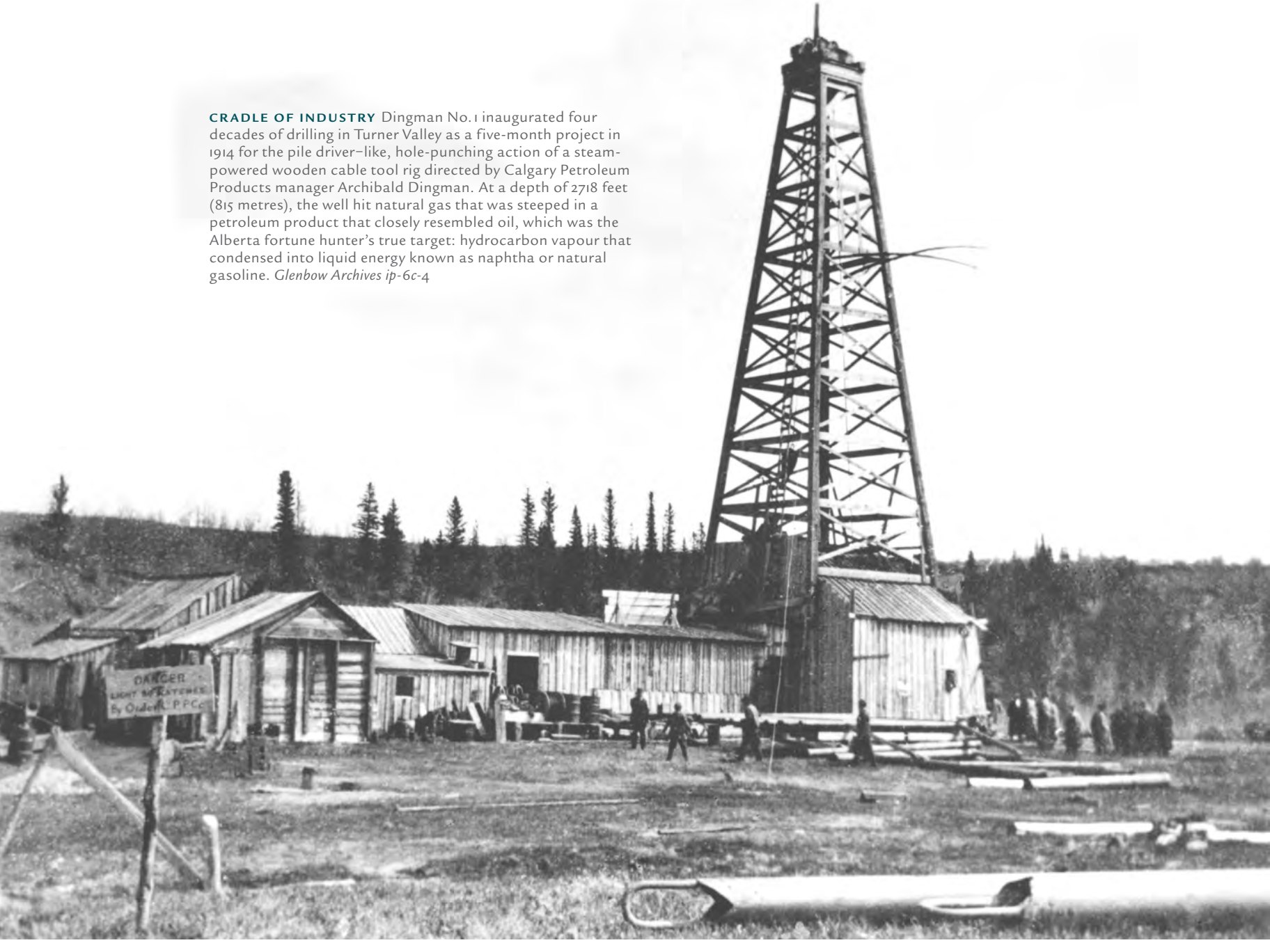
"It was a tough decision," said Murray Smith, provincial energy minister at the time. Stock market shares in the biggest gas producer involved fell by 40 per cent in a single day, he recalled. Gas prices were at record highs, and producers in the bitumen belt paid rich dividends and capital gains that made their shares prized retirement savings and income plans.

When the ERCB made the decision to suspend gas operations suspected of jeopardizing oil sands development, "People came to my office and told me they'd be living in poverty for the rest of their lives," said Smith. "I spoke to the board about a year later. I opened the speech with the fact, 'You're making my life a living hell.'"

In the end, the episode reinforced Smith's belief in the importance of an independent, impartial, and expert conservation agency. "Unless you have these venues and this codified process, people can't find resolutions of conflicts," Smith said. "There's never any successful outcome when politicians intervene in the regulatory process. They change this delicate balance and process." Even elected officials who have technical capabilities need to put their trust in an independent authority, Smith said. "The job of a politician never gives you enough time to put the full skill set into the decision-making process."

The benefits of conservation have been tremendous. ERCB's enforcement of discipline in production fields shares credit with new technology for the modern rebirth of flowing black gold known as "tight oil."

Alberta's resource management regime works like the prudent national bank regulation that saved Canada from the worst effects of the 2008 financial crisis, said Murray Nunns, a geologist and executive who played a star role in the black gold revival. Well-spacing rules preserved unbroken spreads of dense, oil-rich rock that is ripe for tapping by the new generation of horizontal drilling and fracturing with high-pressure shots of fluids, Nunns added. If Alberta had been as open to stampedes of jostling derricks in the industry's pioneer era as most other energy jurisdictions, "They'd have turned it into a pin-cushion."



CRADLE OF INDUSTRY Dingman No. 1 inaugurated four decades of drilling in Turner Valley as a five-month project in 1914 for the pile driver–like, hole-punching action of a steam-powered wooden cable tool rig directed by Calgary Petroleum Products manager Archibald Dingman. At a depth of 2718 feet (815 metres), the well hit natural gas that was steeped in a petroleum product that closely resembled oil, which was the Alberta fortune hunter's true target: hydrocarbon vapour that condensed into liquid energy known as naphtha or natural gasoline. *Glenbow Archives ip-6c-4*

THREE
SAFETY

Mistakes matter on Alberta oil derricks — even the smallest slip-up can have dire consequences. So Natalie Burge, a Red Deer–based ERCB field inspector, was not surprised when a well-site supervisor blushed and scurried off a drilling rig when his cell phone rang during a blowout control exercise.

Burge turned the supervisor's oversight into a reminder. "As we all know, cell phones are not allowed within 25 metres of a well," she told the crew, who had assembled for a post-exercise debriefing in the rig-floor shelter, known as the doghouse. An incoming call on a cell phone fires up its electrical circuits — and that could be all it takes to ignite the vapours that might accumulate on a rig during drilling. In fact, "Anything that's intrinsically unsafe — such as microwave ovens, kettles, or cell phones — must be 25 metres away from the well," added Burge.

Outside the danger zone, the mortified supervisor

waited to speak to Burge. He knew that, of all rig personnel, he should know and abide by the rules. As a supervisor, he belongs to a professional elite whose members have decades of drilling experience and personnel files crammed with credentials. Well owners consider these experts to be independent masters of all trades who can perform virtually every Alberta oilfield task, and they trust them to keep service and supply contractors in line.

Yes, the site supervisor said, he realized that Burge could — and maybe should — issue a high-risk safety violation notice, a serious item on the ERCB sin-scale akin to a police ticket for reckless driving. His obvious chagrin prompted her to settle for a slightly less formal warning. Her inspection report mentioned his lapse and noted that the matter should be addressed in crew safety meetings. "I'm sure it will be," he vowed.

BEYOND COPS AND ROBBERS

Burge's approach with the apologetic crew boss reflects how Alberta regulation aims to foster a voluntarily responsible industry — a philosophy that is the cornerstone of ERCB culture. "The board could have been strong-armed and acted like a very rigid policeman from day one — and turned oil and gas regulation in Alberta into a cops-and-robbers game where the industry got away with everything it could when the board's back was turned, and the board smacked the industry as hard as it could on every occasion it got caught at something," explains retired ERCB chair Gerry DeSorcy. But that has not been the case.

DeSorcy adds, "Over the long haul, in terms of the practice of sound conservation principles, the board's approach has been a better one — working with the industry to make sure that it understands why these things were important, involving the industry in the development of the rules and regulations, and then standing back and letting the industry do what is expected of it and carrying out our surveillance."

This approach has teeth that stay sharp because they only bite rarely. When necessary, observation is close and enforcement swift. At another drilling rig, Chad Temple, a peer of Burge, conducted a similar surprise inspection, but with a much different outcome. When Temple spotted an omission on the circulation form, he immediately issued a high-risk violation notice.

The circulation form, commonly shortened to "circ" or referred to as a stick diagram, is a simple yet crucial one-page chart posted prominently in every doghouse. The term circulation is a loaded word in oilfield vocabulary. It refers to a closed loop of pipe carrying drilling fluids (commonly known as mud) between the rig and a rotating bit far below. As bits penetrate geological formations, mud counters whatever forces push upward. Because that force varies from well to well, a wide range of mixtures and ingredients is used

to make liquid columns that weigh enough to counter anticipated underground pressure. An incomplete loop creates a "kick," an upwards rush of gas or liquid that is liable to quickly worsen into a blowout. In a sense, the circ is an underground counterpart to a road map, showing the rig operator where the bit will go. The bit's course, as outlined on the diagram, provides clues to potential trouble spots by identifying the various geological zones that will be penetrated as the bit travels to its final target. After a century of drilling 480 000 wells, Canadian petroleum professionals have a thorough knowledge of Alberta's geological formations and their corresponding gas, liquid, and pressure hazards.

When an investigation in the northern part of the province was linked to an incomplete circ, ERCB inspectors were put on the alert for sloppy completion of the forms, and Temple took that message to heart. The rig tool-pusher, who is second-in-command at the well after the site supervisor, did not take kindly to the notice, calling it his first "bad board check" in more than 30 years on the job. Temple explained that the well owner is the primary target of the fault notice, and industry insiders know the true culprit is the consultant or manager who crafted the flawed diagram. But the tool-pusher remained inconsolable, pointing out that his name was on the violation notice and fearing that an undeserved stain would blot his record and might hurt future job prospects. Temple refused to back down, saying industry must get the message.

KEEPING AN OPEN MIND

Like her colleague, Burge has first-hand experience with situations that require ERCB inspectors to stand up to senior experts. She recalled a case involving a central Alberta farmer who, for a dozen years, complained about telltale rotten-egg odours wafting from a sour-gas production site. He repeatedly called ERCB inspectors demanding they conduct an emergency check. The gas company insisted that everything was fine, and when the ERCB inspectors showed up, they didn't detect any obvious flaws.

Tempers flared. Gas company personnel began to demand police escorts to the contested site after the farmer greeted them with a shotgun in his hands and shot gophers to smithereens while they serviced equipment. He was almost as mad at the ERCB.

At first, Burge sympathized with the alarmed workers and felt a natural inclination to accept their expert authority. But the farmer's persistence troubled her. She asked herself: What if he is not just a troublemaker? What if he has a legitimate grievance? Why not take a fresh look at the dispute?

Aided by a professional demeanour and an engaging sidekick (a small dog named Newton), Burge persuaded the farmer to cool off long enough to provide details. Under further investigation, the farmer's nose proved to be right. A combination of weather and operating conditions had caused the production hardware to leak. The farmer, the ERCB, and the company, began to

work together. While no lasting friendships emerged, the farmer did put his gun away. Improvements were made. The strong odours ceased. The experience taught Burge to keep an open mind, concentrate on facts, and refuse to let personality conflicts or annoying behaviour obscure the practical nub of a dispute. "If I had a concern and I was told over and over again that it was all in my head, I'd be ticked too," she said.

Keen to stay out of trouble, gas companies respond quickly when ERCB inspectors come across potentially risky situations or conditions that might cause citizens to complain. Temple encountered this willing attitude when he spotted a deserted well during a routine production site check.

The mysterious well, located near a steel equipment shed, was not connected to the other hardware, looked much older, and appeared to be closed with an improvised plug. Plus, the well failed to make the safety grade on two counts: no sign identified the owner and no emergency telephone number was posted. Temple identified the owner by talking to his peers and checking the ERCB data banks. Ends up, it had a decades-old pedigree and had just changed hands for the umpteenth time as an incidental bit of an asset transaction between corporate giants. In short order, Temple fired off a high-risk violation notice to the new owners.

Shortly after the notice went out, the area manager for the new owner called Temple to let him know the missing identification and emergency phone number had been posted. The company also put an advisory into an ERCB voluntary public disclosure network for oilfield operations, announcing that work was under way to bring all active and dormant assets affected by the transaction up to standards.

SWEATING THE SMALL STUFF

Because ERCB safety rules focus on consequences and risks, even the smallest of slip-ups — like the cell phone incident that Burge encountered — can make adrenaline flow in oilfields. On a scorecard that the ERCB calls its risk assessment matrix, any error with the potential to cause multiple fatalities is ranked as "high risk." Even if a disaster has the lowest probability rating of "unlikely," meaning the statistical odds are that the worst-case scenario will unfold less than once in 20 years, the alarm sounds.

Sweating the small stuff is the legacy of a disaster that forever changed the industry's approach to safety regulation and practices. Unlike most historic turning points, this one has a precise date and location. At 2:30 p.m. on October 17, 1982, in a bush area known as Lodgepole, 130 kilometres southwest of Edmonton, a well blew out after the drill bit penetrated a witch's brew of methane, hydrogen sulphide, and liquid hydrocarbon vapour. The dangerous combination, located in a large geological reservoir 3000 metres

beneath the drilling rig, caused monster volumes of hazardous materials to rocket up out of the well bore. According to ERCB estimates, 50 million cubic feet of gas and 6650 barrels per day of condensate or natural gasoline spewed into the atmosphere. That much clean natural gas could satisfy the wintertime daily heating and cooking fuel needs of 2500 typical Alberta households. The blowout's hydrocarbon vapour content, if condensed, could have filled an Olympic-sized swimming pool every two days. It took 67 days to regain control of the well and stop the runaway flows, but not before two wild-well tamers from Texas died on the job. The estimated economic cost of the disaster, from lost production to wrecked equipment and evacuation expenses, ran into hundreds of millions of dollars.

HAZARDOUS HYDROGEN SULPHIDE

Blowouts were nothing new to the industry. However, the Lodgepole calamity was in a class of its own because of the tremendously high concentrations of hydrogen sulphide in the reservoir — 25 per cent, or 250 000 parts per million (ppm). To put that number in context, occupational health and safety codes consider a hydrogen sulphide concentration of 10 ppm acceptable for workers putting in eight-hour shifts. Exposure to 700 ppm or more causes permanent brain damage and death unless a victim is immediately rescued.

TOWERING INFERNO
The 1982 Lodgepole blowout southwest of Edmonton burned the need for improved drilling and public safety into the minds of Alberta's regulatory, government, and business leaders. Wild-well tamers and ERCB inspectors required heat shields to approach the pillar of fire fuelled by sour natural gas laced with high-energy petroleum vapours and lethal hydrogen sulphide. After the smoke cleared, an ERCB inquiry established strict new rules that included thorough emergency planning for communities near sour-gas operations and the drumming into well owners and drilling crews a culture of safety. *Glenbow Archives na*-2864-82-11-10-15

ADJUDICATOR

As a lawyer from New Zealand, ***Erin Maczuga*** had no oil and gas experience before he moved to Alberta and joined the ERCB. Rather, his credentials were in administrative and public service law. He practiced with New Zealand's health ministry, handling government issues such as privacy, contracts, the department's statutory obligations, and prosecutions.

Working as the enforcement advisor in the ERCB compliance assurance section, Maczuga served as the first stop for producers who believed they'd been wrongly issued compliance and enforcement responses by the ERCB's field inspectors and auditors. "Companies win sometimes," reported Maczuga. Of his last six appeal cases, industry came out on top 50 per cent of the time. "There are a variety of reasons," he said, pointing out errors of law or fact, procedural lapses, and insufficient evidence to name a few.

When Maczuga hands down his decisions, he does so in the same spirit that field inspectors and auditors bring to industry offenders. Education and learning are the name of the game for ERCB staff as well as industry, not crime and punishment. "There are no winners or losers," Maczuga said. "You're here to provide a check and balance." When decisions went against ERCB staff, he said, "You tell [them] what was done wrong, and you tell how to improve in future. . . . We're human. We sometimes make mistakes."

Maczuga's workload varied with industry conditions. Some years he handled six appeals; some

years he handled eighteen. Appeals often took up to three months to decide. Most were conducted by exchanges of letters and documents, although hearings with lawyers were possible. Decisions, as well as the episodes that led to the appeal, remained confidential. Disputes only became matters of public record if Maczuga's verdicts were appealed at the next levels: ERCB board members, then the Alberta Court of Appeal.

The ERCB started Maczuga out in corporate enforcement, a role that deals with the end of life of an oil and gas property and those responsible for ensuring they meet their regulatory responsiblities. The enforcement and adjudicator roles have provided him with extensive on-the-job training in Alberta's industry. "It allows you to look at every aspect from drilling rigs to pipelines to production facilities to oil sands."

Just slightly heavier than air, the billowing cloud of hydrogen sulphide rapidly dispersed across the region. In inhabited areas near the well, the highest concentration detected by pollution monitoring devices was 30 ppm. The closest residents complained of headaches, eye irritation, sore throats, bleeding noses in children, shortness of breath, lost appetite, nausea, diarrhea, listlessness, insomnia, stomach cramps, and gas pains. But only 28 individuals and 4 families accepted the company's offer to evacuate them from the area and pay the cost of accommodation a safe distance from the blowout. Farmers said livestock suffered runny eyes and noses, coughing, reduced appetite, digestive problems, and reduced weight gain.

Concentrations of hydrogen sulphide drop rapidly as the gas disperses into the atmosphere. By the time the hydrogen sulphide reached Edmonton, citizens were exposed to 0.5 ppm and in Calgary 0.3 ppm. But even a whiff at 1 ppm of the chemical's rotten-egg odour offends all but the dullest sense of smell. Refined noses wrinkle at levels measured in parts per billion. In the aftermath of the Lodgepole blowout, 1477 Edmonton and Calgary residents were frightened and annoyed enough to make formal complaints to public health authorities. The odour lasted for 26 days, until the wild-well tamers ignited the blowout — a strategy that incinerated the escaping hydrogen sulphide, but made capping the runaway well more difficult.

In 2002, two decades after the Lodgepole incident, ERCB board member Jim Dilay spoke at an international industry conference on safety and environmental issues in Houston. He reminded conference-goers of Alberta's transformative experience. "Let me be clear about this. Hydrogen sulphide is an extremely poisonous substance, as poisonous as hydrogen cyanide," said Dilay. "Hydrogen sulphide is also extremely corrosive. It embrittles various metals, which in turn can cause potentially catastrophic failure when the metal suddenly cracks. So, special metallurgy is required for exploration, production, and processing."

In the aftermath of the Lodgepole incident, the ERCB faced one of the toughest tests of its conservation and safety enforcement mandates. Sour reserves could not simply be declared off limits. The economic sacrifice would be too great, Dilay observed. Instead, the ERCB needed to figure out a way to ensure acceptably low risk levels for companies accessing the reservoirs while addressing the concerns of increasingly wary communities.

The ERCB moved quickly, putting in place a new regime of formal precautions. Key requirements included better information on exploration targets, clearer operating programs, designation of drilling in dangerous formations as "critical sour wells," emergency response and evacuation plans, improved communications among safety and health authorities and between them and the public, and new science on gas dispersion in the atmosphere.

LEARNING FROM DISASTER The ERCB's inquiry into the 1982 Lodgepole well blowout probed technology gaps and human error in the lethal drilling mishap southwest of Edmonton. In addition to documenting causes and consequences, two reports laid foundations of new safety, conduct, and emergency planning codes for industry operations involving sour natural gas laced with hazardous hydrogen sulphide. *ERCB Library* 87.019 *no*003

MINIMIZING SOUR-GAS RISKS

About one-third of Alberta's original gas deposits contained hydrogen sulphide in an average concentration of 9 per cent. Although 50 years of production has reduced the stockpile, the province entered the twenty-first century still studded with sour-gas facilities: 6000 operating wells, 12 500 kilometres of pipelines, and 240 processing plants. In 2000, the ERCB formed the Provincial Advisory Committee on Public Safety and Sour Gas to document the role of and the risks associated with the sour-gas industry. The advisory committee included representatives from business, the general public, government, and the environmental sector. "For the study year 2000 the sour-gas industry supported over 37 000 jobs, generated approximately $1.3 billion in wages and salaries, and contributed over $1.78 billion in royalties and taxes," reported Dilay, who led the committee.

Many safety improvements emphasized the role of industry and regulatory personnel. "It is clear that the major area of deficiency relates to the human factor," concluded the ERCB inquiry into the Lodgepole incident. All the right hardware for sour-gas drilling and blowout control had been on hand at Lodgepole. But the gear was neither maintained nor used properly. Hearings, technical investigations, and a simulated re-run of the blowout's sequence of events "indicated that the failure probably would not have occurred had appropriate practices been followed, notwithstanding the equipment problems," the ERCB reported. For safety's sake, it was time for the Alberta oil and gas industry to let go of its old virtues—bold and fast. "An effective means of reducing the impact of human factor problems would be to require . . . a very cautious and careful manner," said the ERCB.

For oil and gas personnel, new safety precautions included regular renewal of competence and safety certificates, stronger technical support, safe drilling plans with clear instructions, improved working conditions (such as relief staff to let around-the-clock well-site commanders get some sleep), and better training — including risk awareness and readiness at all times to handle unexpected problems. As well, the rapid ignition of sour-gas blowouts, at the cost of destroying drilling equipment, became a standard emergency procedure to prevent the spread of hydrogen sulphide.

Regulators had to sharpen up, too. "The primary responsibility for ensuring that these objectives are achieved lies with industry," the sour-gas disaster inquiry said. Regulators share in the duty. "The ERCB has a responsibility to test whether these objectives are being achieved, and in that regard the inspection system should be carefully reviewed to determine how it can be strengthened to minimize human factor problems."

Developing, reviewing, and raising sour-gas safety, health, and anti-pollution standards has been an Alberta specialty — and necessity — from industry's earliest days. The original Turner Valley discoveries contained hydrogen sulphide in concentrations ranging from 3 to 6 per cent, recalled Elmer Birlie, whose lifetime career of dealing with the smelly side of the province's resources included seven years with the ERCB. In the 1940s and early '50s, "When I first started, there were no books on processing gas like the gas we have in Alberta. You couldn't even find hardly any mention of hydrogen sulphide," Birlie said in an oral history interview. At that time, just short drives from Calgary, hydrogen sulphide levels in gas reserves hit 35 per cent at Okotoks and 40 per cent at Olds.

By 1957, emissions monitors, known as "birdhouses" because of their shape and locations, sprouted up near sour-gas plants. As well, the ERCB regulated the height of exhaust stacks, guided by emerging research regarding atmospheric gas dispersal and ground-level concentrations. Emergency breathing systems for workers could be found in every corner of a hazardous site. For the safety of nearby residents and highway travelers, the Okotoks plant, which was managed by Birlie, devised Alberta's first emergency public evacuation plan in cooperation with the ERCB, the police, and a Calgary hospital.

RAMPING UP PUBLIC SAFETY

The worst Okotoks mishap on record underlined the need for even more precautions. In September 1959, a corroded valve burst at the Okotoks plant. A hard north wind blew a plume of escaping sour gas across the southern Alberta plain. In High River, about 25 kilometres south of the plant, "The colour of the houses changed from white to brown due to the reaction of the hydrogen sulphide with lead in the paint. Fortunately — very, very fortunately — nobody was hurt," Birlie recalled.

Industrial growth, suburban development in formerly sparsely populated drilling regions, heightened public sensitivity, and the Lodgepole tragedy accelerated the evolution of sour-gas standards. In August 1988, after leading a three-year review that involved government, business, and public representatives, the ERCB and Alberta Environment announced new safety and cleanup benchmarks. These benchmarks enforced improved standards for "recovery rates" — the requirements for turning hydrogen sulphide into safely stored, transported, and marketed mineral sulphur. A standard of 99.8 per cent was set for the biggest, newest plants. For the first time, sulphur recovery rules were imposed on previously exempt small sour-gas installations. For these smaller plants, with daily processing flows as low as one tonne per day, owners could deduct up to half the costs of cleanup equipment from the provincial treasury's production royalties. "The new

requirements will push the existing technology and operations to the maximum," the ruling predicted.

A dozen years later, with access to new technology and cash, another environmental advisory group decided it was time to improve upon the 1980s benchmarks. Starting in 2000, the ERCB extended the sulphur recovery code to include all industrial sites with sour gas as a by-product, including bitumen upgraders and oil refineries. Exemptions that the 1980s rules had granted to old plants deemed too costly to renovate or likely to be scrapped faster than significant improvements could be made were "grandfathered in," with a final expiry date set for December 31, 2016.

In the first decade of the twenty-first century, annual ERCB reports on Alberta's complex array of sour-gas sites documented emissions reductions of up to 80 per cent.

In 2000, ERCB chair Neil McCrank launched an expanded reincarnation of the 1982 and 1988 inquiries. He appointed retired ERCB chair Gerry DeSorcy to lead the Provincial Advisory Committee on Public Safety and Sour Gas. DeSorcy accepted the assignment on the condition that McCrank and the ERCB would respond to *all* of the committee's findings. After a year of intense study, the 22-member group recommended 87 improvements in six areas: health effects and research, development planning and approval, operations, emergency preparedness and information, communication, and consultation. By mid-2007, the ERCB had addressed all of the recommendations. Innovations ranged from a sour-gas manual for citizens to new inspection rules, toughened procedures for pipeline safety tests, and coordinated development planning in rural and urban areas where the hazardous resource is found. The ERCB described the 87 recommendations as "a fundamental cultural shift" for the industry.

The Lodgepole blowout marked the end of the frontier adventure phase of the Alberta oil and gas industry. Today, safety supersedes risk and little of the industry's old customs survive — except for memories of exhilarating fortune hunts with drilling rigs. Veterans' recollections highlight the difference that Lodgepole made.

MEMORIES OF THE FRONTIER ERA

In the explorer era between the Leduc discovery and the sour-gas blowout, ERCB inspectors were rough and ready rangers, roaming to keep up with the industry crews they tracked. When Ed May quit his job in an Edmonton oil refinery to become an inspector with the ERCB in 1970, his monthly income fell from $1000 to $475. "My father thought I was nuts. It was the best decision I ever made in my life. I'd sign up again tomorrow."

May's new position provided an escape from punching time clocks and working repetitive shifts confined

by tanks, pipes, and security fences. Instead, he was roving Alberta's drilling frontier to check out rigs and remote production sites. "We didn't get paid overtime. We worked night and day. We loved it," May recalled. "We had no two-way radios or emergency breathing apparatus. We had no pickup trucks. That would have looked like we were being lavish. We had Chevy Biscaynes," from the no-frills bottom end of Detroit's product line. "We jacked up the front end and put on metal skid plates. We put truck flaps under the gas tanks so as not to knock them off. We'd go out to rigs wherever they were, and whenever they worked. The weather didn't matter. I was 27. It was exciting. It was fun. We were like policemen. My wife [Judi, a school teacher] never complained once."

NATE GOODMAN *(left)* **AND TED BAUGH** sporting the rough-and-ready style of the oil and gas exploration era when they began long and distinguished regulatory careers in the ERCB field centre near the 1947 Leduc discovery well. This photo was taken in front of the original ERCB Shack, now preserved at the Leduc #1 Energy Discovery Centre. *ERCB Library* 87.013 *no*001

May and his fellow inspectors tracked down drilling rigs by following one-lane equipment trails that had been bulldozed through virgin woods. Bouncing over ruts, washboard ripples, potholes, rocks, and stumps, the cars were driven for a maximum of 25 000 miles (40 000 kilometres) before they had to be traded in. "You'd never have wanted to buy our used ones," quipped May.

The trails were long. "We'd go 150 miles north of Red Earth Creek," an aboriginal hamlet and industry outpost at the same latitude as Fort McMurray but in a more remote area known as the Back Lakes. "It was nothing to drive 80 miles on a cutline, going 10 to 15 miles an hour. When it got hot — and it would hit 85°F or more up north — there was dust and you had to roll up the windows. There was no air-conditioning. It was like sitting in a tin can with the lid on. You can't imagine how dirty those cars were."

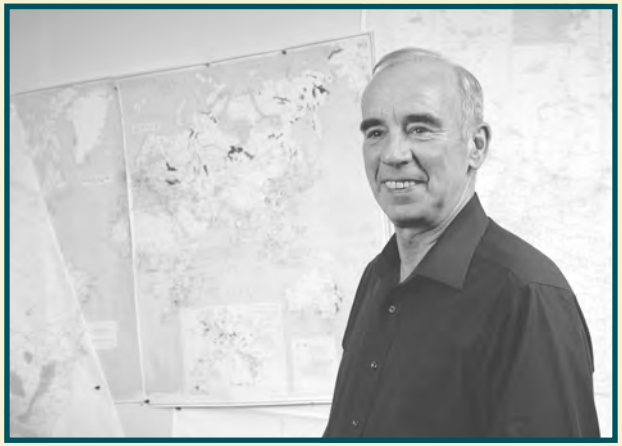
May won a one million kilometre safe-driving award, but only started counting after his first decade with the ERCB. "I got stuck many times," he recalls. He also had two accidents, including a near-lethal brush with an oncoming vehicle that popped up over a hilltop on a single-lane track and "sliced the driver's side of my car open like a can-opener." May said the ERCB was lucky to have never lost an inspector to a fatal road accident. Still, he kept going back for more. After all, "When you're young, you're bullet-proof."

COAL PATROL

At the coal desk in the resource evaluation department, ***Barry Stewart*** greeted visitors to his corner of the ERCB with a joke. "We're sort of the poor country cousins of the energy industry," he said, referring to coal's status as the lowest-priced fossil fuel.

Public safety has been an Alberta coal issue since before the ERCB was born. In Edmonton, a mini coal boom dug its own grave. Peaking in 1922 with 3600 underground miners digging 12 000 tonnes per day out of shallow seams beneath the city, all but four of the burrows were ordered to close after an inquiry found that cave-ins were making the ground settle, jeopardizing building foundations and causing cracks in roads, streetcar tracks, and sewers. In 1931, provincial legislation banned coal mining under all Alberta towns and roads.

Population growth and real estate development amplify the old risk when new communities are built in areas that are studded with remnants of old underground mines that can collapse, Stewart said. The ERCB coal atlas identifies abandoned sites liable to be encountered by projects ranging from houses to golf courses and light rail transit lines. "If you build a structure on one, there is always the possibility of the



weight making the ground subside, causing damage and even death." Target audiences for ERCB coal mine maps include petroleum-industry land developers and municipal planning authorities. "Everything we have here is for public viewing."

Stewart has up-close and personal knowledge of underground hazards. Before he moved to Alberta, he worked in northern Ontario's gold and silver mines. As a summer student job, he first worked as a timber man's helper, shoring up shafts and tunnels. "It gave you an incentive to remain in school," he recalled.

More alarming, May said, were scares in light airplanes: a nose-first winter landing into a snowdrift and a fuel leak that a rig tool-pusher stopped with an improvised repair using pliers. "I thought we were dead. It took me some years to get back my confidence flying." Adrenaline rushes only made the job more addictive. "How could you not love your work?" he asks.

LODGEPOLE FORESHADOWED

May experienced his biggest rush in an event that foreshadowed the 1982 Lodgepole disaster. Five years earlier, also in the Lodgepole area but in a hidden valley farther from nearby towns, May was the ERCB's site chief at a blowout that may have been even bigger than the one in 1982. This earlier disaster was less documented, but May estimates the runaway flows at 100 million cubic feet of 30 per cent sour gas and 1200 barrels of condensate per day. In a −40°C winter that congealed escaping sulphurous vapours into yellow wax piles akin to snowdrifts, he kept tabs on an epic effort led by celebrity wild-well tamer Red Adair, who capped the blowout on New Year's Day 1978.

"It was the most unbelievable experience of my life. You saw what Ma Nature could do," May recalled. "Adair worked up to his waist in sour condensate." Thirty kilometres downwind, the escaping plume of gas steeped in hydrogen sulphide touched the ground. "You couldn't breathe, it was so stinky. Household silverware turned black. Lead-based paint on houses turned black." Up close, "It was deafening. You could almost feel the vibrations."

In 1977, no one had truck-mounted air monitoring devices to map out danger zones. Country residents and ERCB personnel carried fibre tubes soaked in a chemical that changed colour when it came into contact with hydrogen sulphide. "You pinned it on your shirt. If it turned brown you knew you had to get the H out of there," May said. "We evacuated people. We didn't have manuals. We were shooting from the hip."

May reached the same verdict as the ERCB did with both Lodgepole cases—human error was the root of the problem. "They fell asleep at the switch," he said. "Those rigs had the best equipment. There was no excuse for those wells to blow out. It was just a sloppy operation."

LODGEPOLE REDUX

Ron Paulson was the ERCB supervisor for the Lodgepole area in 1982, when the second drilling catastrophe interrupted a quiet Sunday afternoon. Interviewed three decades later, he could still "remember the call like yesterday." On the access road to the well, he knew there was "a major problem" because the rig crew stood in a huddle more than a kilometre from the site. From aloft in a hired helicopter, Paulson could tell "there was a total loss of control. You could see the jet stream of the natural gas venting, and a mist and cloud of the condensate."

Down on the ground, as blowout fighters from two different companies struggled to restore control, Paulson "walked up to within 50 feet of the well head while it was on fire behind a corrugated tin shield." He recalled, "When you stuck your face out to take a look you had instant sunburn. The heat was tremendous. I'll never forget the sound. It was like standing by a jet engine going at full speed. The ground was vibrating. What struck me was the raw power of Mother Nature. It was just mind-boggling — the sheer volume and velocity of the gas exiting the pipe. It's quite a visual and audio experience."

EXPANDING ROLES

The stricter regulatory structure that was put in place after the 1982 blowout inquiry began to evolve during that earlier Lodgepole event. "Even back then we were not passive and standing on the sidelines," said Paulson. With field surveillance colleagues Bill Wylie and Jim Reid, Paulson took an active role. In daily meetings with the well owner and blowout fighters, the ERCB representatives made it plain: "We're going to be fully informed and participating. We're not going to interfere and do the work ourselves. But we're involved with the well control plan, emergency response, community relations, and communicating information. We were there to make sure public and environmental protection was occurring."

The new safety regime implemented after the Lodgepole blowouts included an enhanced role for Alberta Health in hazard documentation, policies, procedures, and emergency response. Not least, the ERCB drew the medical profession into oil and gas matters "as a creditable source the public depends upon," said Paulson. "They don't believe the company. They don't believe us. It makes a difference if you have a doctor who's a public trustee saying 'here's the scoop.'"

The role of ERCB field inspectors also changed. "They needed to move from being a kind of technocrat into being a versatile master of all trades. In the old days you dealt with the companies and that was it. It was mostly about resource conservation as a highly technical, engineering exercise to ensure that every drop of oil and gas that could be produced was produced." After Lodgepole, inspectors became responsible for a much broader list of duties. "You needed to know, for instance, about emergency response — combining the roles of fireman, arson investigator, electrical power protector, media reporter, and implementer of the new code. The little old ERCB field hand became involved as a blowout first responder, public complaint agent and investigator, contributor to rules and regulation changes, and implementer of those. Your circle of encounters grew beyond industry to take in local governments, the public, the provincial government, and environmental non-government organizations. Our educational requirements went up. Our skills and abilities went up," Paulson said.

"We really had to look for that versatile person. At one moment you're looking at well site equipment. Then the farmer stops you at the gate and you become the community relations expert. Then you're called to a blowout and become a first responder. We place huge demands on our field people to be experts in everything."

As well as being versatile, field inspectors require the moral fibre to perform without applause. "We're kind of like undertakers," said Dwayne Waisman, who retired as manager of public safety and field surveillance operations after starting at the bottom and rising up the ranks in a thirty-five-year career with the ERCB. Even in areas of intense drilling and production, Albertans pay little attention to the ERCB, its rules and regulations, and their rights in dealings with industry — except when conflict or trouble arise, said Waisman. "You're so busy you do not have time to know about things like your area board inspector. You don't want to ever see the guy. But when you need him you want to see him yesterday."

As educators, field inspectors take a proactive approach, spreading the word on industry trends, landowner rights, and regulatory evolution to any and all who will listen. This missionary activity might take place at a community fair or in meetings with local political leaders. "Most people just want information," Waisman said. "And they'll make an informed decision."

CAUTIOUS AND CAREFUL

The number of public complaints received by the ERCB has remained static — about 800 to 900 a year — despite population growth and residential and recreational development spreading into drilling and production areas. The numbers confirm that the Lodgepole disasters changed Alberta's industry, Waisman said. "Cautious and careful was a new thing. In the 1950s and '60s the attitude was kind of 'Oh boy, this is a new business, get out of our way, we're making the province rich beyond its wildest dreams.' It only took a wreck like that to show us. Industry learned it had to be informed and care about the community, and not just go at it alone."

When the ERCB showered the industry with an abundance of new directives, "The industry didn't balk. They didn't want another blowout," Waisman recalled. "You hardly ever have to inspect an operation twice. Nowadays your trouble cases are fly-by-nighters wanting to get rich quick. They haven't got the message. It's true we've only got 115 inspectors. But what they forget is there's another three million people out there who have eyes and don't mind picking up the phone to call us."

Modern digital information technology also makes it easier to identify sloppy operations. The ERCB's safety and surveillance network uses a guidance system called OSI, which stands for operator history, site sensitivity, and inherent risk. The system uses

a point scale to identify priority targets for the field patrol. About 15 000 inspections are conducted every year. The industry's annual rate of compliance with regulatory requirements is routinely 95 per cent or higher.

Operations that have been flagged by an inspector may be subject to a cascade of further actions. For example, failure to respond to a high-risk violation notice immediately leads to suspension of the operation. Monthly enforcement reports are posted publicly and include locations, names, infractions, and corrective measures. Offenders lose the right to speedy approval of routine, low-risk projects. As well, the presidents of negligent companies are called on the carpet — ordered to meet senior ERCB officials to explain their problems and describe their plans for improvement.

RAISING THE BAR GETS RESULTS

"This industry can do anything when they're challenged to do it," said May. He recited a case in sour gas–prone central Alberta as a good case in point.

A high in the energy-market cycle whipped up a wave of drilling and processing — as well as 500 public complaints a year against the flaring of sulphur-rich gas during maintenance periods and well production tests. "The complaints were legitimate," said May. In high volumes, the incinerated form of hydrogen sulphide, which is called sulphur dioxide, is both a safety hazard and an annoyance with its irritating aroma of burnt matches.

The Red Deer ERCB branch pulled out all the stops in responding to the complaints. They called on top ERCB officers from headquarters in Calgary to sniff around. As well, they summoned regional industry chiefs to a meeting and asked: What are the best improvements you can make? The answer — it was technically possible to cut sulphur emissions from well-flaring in half and then to zero. But the two-step process would take time. Importantly, the feat would be economically feasible but only if all the firms involved followed the same agenda and none gained a competitive advantage by evading the added costs. May obtained unanimous agreement to roll out the emissions reductions plan on a two-year schedule. He shamed a last holdout into line by threatening to reveal the company's name and make the management explain itself at a public meeting. The central Alberta success set a precedent that became a template for a province-wide cleanup. "We shoved them into it. We said it was the right thing to do," May said. After the program started, "We never had a whimper because the companies knew it was the right thing to do."

MAKING A DIFFERENCE IN THE FIELD

Field inspectors see themselves as teachers, not avengers. Prior to joining the Red Deer–based crew, Burge served as an English language instructor in Tanzania. She returned to a decade of apprenticeships in oil and gas — the family trade, her father and uncles all working in the industry — working as a company occupational health and safety officer and as a mud-man, a roving provider of drilling fluids.

"I wish I would have done this sooner," she said. "I love what I do. I like the fact that I'm independent and I'm trusted to do the job. When I was doing mud, I saw things I didn't like but I couldn't say anything without losing the job, for instance about environmental clean-ups. I don't make idle threats. If I say I will follow up on something, I will follow up. I will go out and see if an order to dispose of a pail of contaminated soil has been followed."

Burge said, "I feel like I'm making a difference. I do believe there's that little seed planted every time I stress something. When you say 'Put that cell phone away — it's the right thing to do,' you plant a seed in some of those rig workers' minds. They'll say, 'You know what, she's probably right.'"

It is no accident that ERCB jobs become callings that command loyalty and stretch out into careers, Waisman said. In an oil and gas apprenticeship with a corporate giant, he recalled, "I was one of 10 000 and I was a number." At the ERCB, however, "People knew me by name. I wasn't just a number. The people weren't chasing the almighty dollar. They really thought they could make a difference."

The ERCB training and promotion philosophy fosters loyalty — encouraging staff to go as far as they are willing and able to go. "Every time I got bored I got a new job," Waisman said. "Once you feel you're being paid reasonably, the next thing is that people want to be challenged and think they're making a contribution. Also, we've had great leaders."

Paulson saw his lifetime of advancing up ERCB ranks as a case of responding to tough love. In 1972, he joined the ERCB fold as a junior clerk in the Medicine Hat field centre after failing to qualify for the police force because he needed eyeglasses. "I had an excellent tough-love boss. He required that you work hard and long. If you did he would give you the shirt off his back."

In two years, Paulson made the grade as an inspector. On his way up through outposts and into the Calgary head office as field operations manager, he encountered the tough-love approach again and again. "Moving is a pain because it disrupts your family. But from a career point of view it gets you buck naked. You have to re-establish and prove yourself. Going through that exercise makes you more whole," Paulson said. "Because I started as a clerk and finished as a manager, I've always been appreciative and thankful to the ERCB because of its dedication to lifelong learning and to grow skills in an individual. My career isn't just

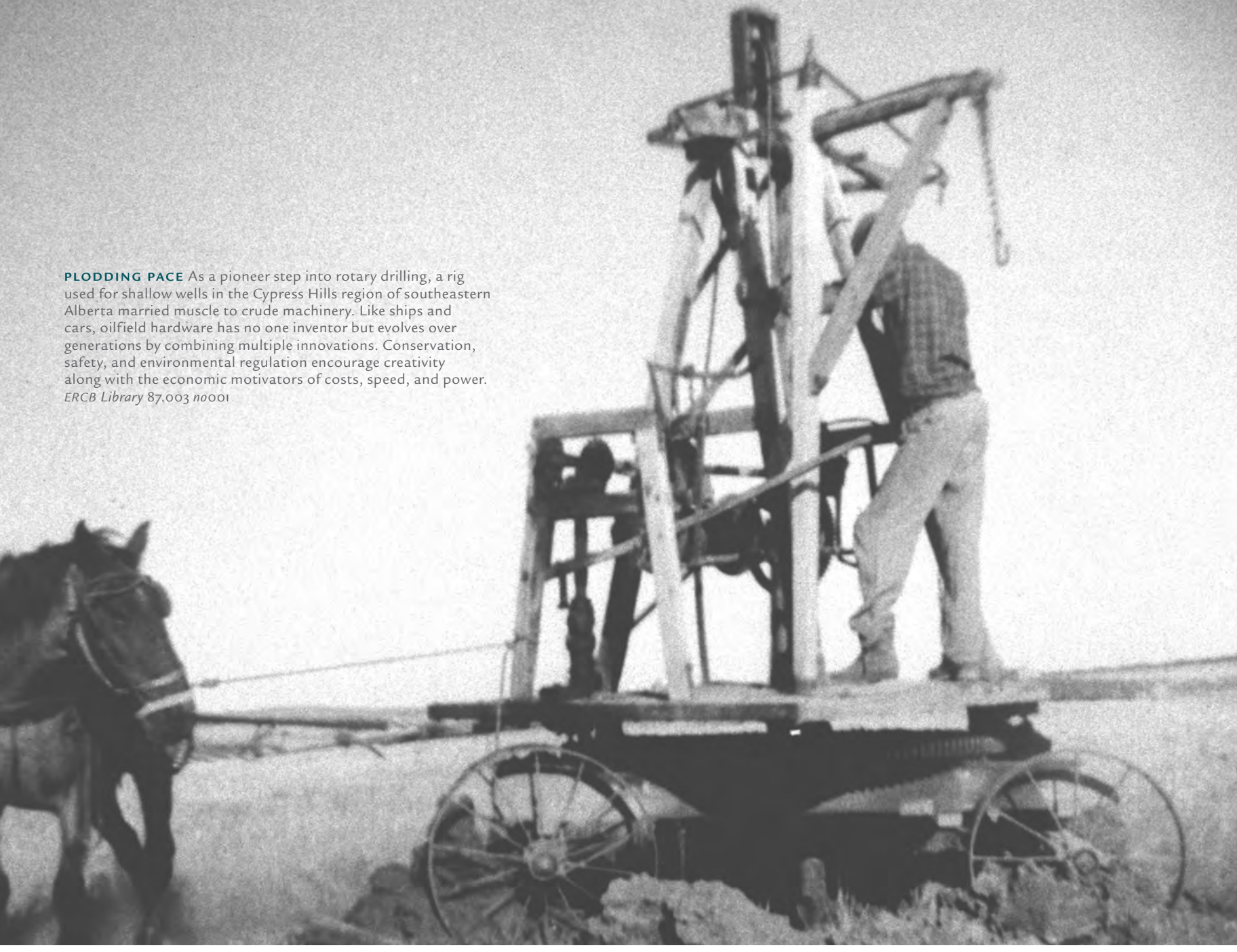
COMING OF AGE
Half a century after its birth in 1938 with a dozen employees, the ERCB squad had matured into a 900-strong regiment of professional and technical talent steeped in specialized knowledge. By the time of this 1992 group portrait, the agency had grown not only in numbers to keep pace with proliferating wells, mines, pipelines, and processing plants, but also in skills to perform expanding roles in safety, environmental protection, community relations, and information services. *ERCB Library* 93.001 *no*008

about me — it's a product of the ERCB giving me that opportunity to grow."

The new generation of ERCB staff packs higher academic and technical credentials. But novices still benefit from following the old path of practical education. "You come out into the field, and it's different," Temple said. "Nothing's perfect like the way they say it is in school."

Education works both ways in oil and gas fields. No two drilling or production sites are identical. Inspectors learn about local adaptations to comply with regulatory and industry requirements. "I earn respect by asking questions," said Temple, who became an inspector before he turned 30 and found he was dealing with veterans who'd been working in the field since before he'd been born. "You don't go out there with the mentality of finding something. You go out with the mentality of learning something every day."

As regulators, "We have to understand principles of natural justice and procedural fairness," Temple said. But the code does not mean inspectors are soft touches, he added as he drove unannounced up to a drilling rig for a surprise inspection. "It never hurts to keep them on their toes."



PLODDING PACE As a pioneer step into rotary drilling, a rig used for shallow wells in the Cypress Hills region of southeastern Alberta married muscle to crude machinery. Like ships and cars, oilfield hardware has no one inventor but evolves over generations by combining multiple innovations. Conservation, safety, and environmental regulation encourage creativity along with the economic motivators of costs, speed, and power. *ERCB Library* 87.003 *no*001

FOUR ENVIRONMENT

Lee Baker and Vince DeRuiter only had to show up. The security gate swung open, granting the duo from the Energy Resources Conservation Board's Fort McMurray regional office access to the oil sands mining operation. Senior staff snapped to attention, prepared to accompany the ERCB inspectors and answer any questions.

The pair had no search warrant. The company neither expected nor received an industrial version of the standard warning against self-incrimination that they would have received from other types of law enforcement. Company officials understood that any flaws the regulatory officers detected could lead to stiff penalties on the spot, including a stop to operations. Even so, no lawyers were invited. No nooks or crannies or questions were off-limits.

Armed with their ERCB identity cards and the authority of *Directive 073,* which outlines expectations

regarding ERCB inspections of mining and upgrading complexes north of Fort McMurray, Baker and DeRuiter received full cooperation from the industrial giant they'd been sent to inspect. They were thorough. They spent a half-day scrutinizing the ore preparation stage of a synthetic crude assembly line, which involves grinding 400-tonne truckloads of ore into small pieces for the next stage — separating bitumen from sand. They walked for kilometres, climbed steel mesh catwalks, and examined every detail of the operation.

"The beauty of this is you get to see the big picture and understand how a whole plant works," said DeRuiter, a former bitumen mine employee who chose the demanding ERCB job over a highly paid career in charge of a few corners of a megaproject. That's a tall order, considering even the most simple, schematic diagram of an oil sands site would fill a jumbo-sized poster. Even then, details vary given the age of an operation and the technology being used.

In the end, Baker and DeRuiter gave passing grades to bins, grinders, conveyor belts, weight scales, and other hardware. But they raised questioning eyebrows at a few environmental slip-ups. Brown water stained the ground beside one ore crushing tower; high up in another, a nest of lubricating oil barrels spoiled the tidiness. Because the mine already showed evidence of corrective action, it was spared from black marks in the formal reports Baker and DeRuiter forwarded to the ERCB and pertinent provincial or federal environmental agencies. To address the first issue, a vacuum truck had already been dispatched to suck up the dirty puddle, which may have been caused by recent wind-driven rain scouring steel structures. To address the second flaw, jumbo storage cabinets, with built-in "secondary containment" or catch-basins to prevent leaks, were being built to store fluids, like those contained in the barrels.

This was not the first visit by Baker and DeRuiter to the oil sand mine, nor would it be their last. Since January 2009, when *Directive 073* came into play, ERCB inspectors have been required to make annual inspections of every section of every mining and upgrading complex north of Fort McMurray. At that time, four complexes were in operation — Suncor, Syncrude, Albian, and Horizon — and a fifth, Kearl, was under construction. A decision on building a sixth, Fort Hills, was imminent. One more, Joslyn, has regulatory approval to start up in 2017. That's a lot of territory to cover. "It's an evolving process," said Baker, a veteran civil servant who was already familiar with the northern bitumen belt before enlisting with the ERCB. He grew up in Fort McMurray after his father landed a job with the first oil sands plant in 1971. "As the years go by, we go deeper and become more technical," he said.

THE ERCB TAKES ACTION

Directive 073, formally titled *Requirements for Inspection and Compliance of Oil Sands Mining and Processing Plant Operations in the Oil Sands Mining Area,* in the oil sands mining area is part of a regulatory package enacted after a lapse of environmental precautions in April 2008 led to the death of 1600 migratory water birds in a bitumen mine tailings pond, resulting in an international outcry and a $3-million fine. The "dead ducks affair" brought an end to self-policing by bitumen mines. The old pattern of lighter regulation was a legacy from lean times when giant complexes were pioneers on the industry's technology frontier, struggling to survive low oil prices in the 1980s and '90s by making their production reliable and cutting high costs. No longer content to assign conditional approvals that allowed owners to comply with regulations at their economic convenience, the ERCB took action.

The new regime, which was under development even before the 2008 incident, required companies to develop ERCB-approved tailings pond management programs that included cleanup targets and waste storage site inspections. Outside the mining area, work in tandem with Alberta Environment focused on water use by thermal in situ projects that use steam injection to extract bitumen from deep deposits.

Most oil sands mining personnel have willingly complied with the stricter environmental regime, Baker said. Some have even identified potential improvements and urged ERCB inspectors to recommend their ideas, bumping them up the corporate priority ladders. "When you talk to the operators — to the guys that run the plants — they tell you what you want to know. They say, 'Just tell us what you want to see,' and they show us."

Generations of ERCB inspectors have witnessed a similar willingness to cooperate. Melinda Czibi, an inspector with the Midnapore field centre who started as a junior clerk and climbed the occupational ladder by learning on the job, described the prevailing attitude in a nutshell: "Companies want to go along to get along," she said in an interview. "Quite often a company will tell us about a complaint they're getting before the public contacts us. They'll fill us in on the situation and how they're working it out." These voluntary confessions suggest the ERCB message is getting through: environmental standards require performance, not just paperwork.

Spreading the environmental message is part and parcel of an ERCB inspector's role — even when it takes time. For example, Czibi set out on a 90-minute drive to follow up on one company's request for a certificate that would cut its cleanup liabilities by declaring a pair of old wells "abandoned" — an industry term for permanently sealed up, leakproof, and reclaimed to a natural state. With help from a precise global positioning system, Czibi located the first of the wells and confirmed that it was indeed abandoned,

with not a blade of grass out of place or a bump on the ground to mark its location. But the second well turned out to be a deserted production site, studded with disused pipe, tanks, and dusty hardware in a weather-beaten metal shack. "No certificate for you today," said Czibi. The condition of the second site prompted her to probe a bit deeper by dialling the site's posted emergency number. Because she received a live response, she did not have to issue a high-risk violation notice. An answering machine would have failed the test.

For Czibi and her fellow ERCB inspectors, exercises like this one are an expected part of the job. "It's a great job, being the eyes and ears of the community. We investigate every single complaint," Czibi said. While responding to a citizen call about a local industry that was disturbing the sleep of nearby residents, Czibi discovered that pollution can take many forms. Driving to the site, she hunkered down for an all-night stakeout in her pickup truck. In this case, she discovered, the company was not secretly burning offensive material or noisily venting a flare stack in the small hours of the morning. The issue was electric glare. Putting a shroud on part of a tall light gave the community back its rest. "I just love it. We're not money-driven. We're all about what's right — what's the right thing to do," she said.

THE NOSE KNOWS

The ERCB enforces a close-to-zero tolerance approach to odour control, protecting even the most delicate nostrils from a stray whiff of hydrogen sulphide, the active ingredient in sour gas, and sulphur dioxide, the result of its incineration. Occupational health and safety standards measure airborne concentrations on these smelliest of Alberta products in parts per million (ppm). In a truck equipped with an instrument as sensitive as a dog's muzzle, known as an air monitoring unit or AMU, ERCB inspector Dean Thompson can sniff out fugitive emissions measured in parts per billion (ppb).

"You don't know how unpredictable wind can be until you have this job," Thompson said as he manoeuvred the AMU to check all points of a sour-gas production site in the foothills southwest of Calgary. "One minute it's one direction, the next it's another, especially in these hills." If his sniffer device finds a leak but not its source, Thompson relies on the regulatory world's equivalent of X-ray vision — an ERCB infrared camera that reveals the feather-like plume of an invisible gas wafting into the atmosphere.

Thompson's tours often serve as a type of backup audit for industry anti-pollution equipment. On an AMU circuit around a sour-gas processing plant that had scored clean from every angle, stationary air quality monitors roosted on posts of neighbouring landowners' barbed-wire fencing. The ERCB instruments are so sensitive that inspector skills include telling

ON PATROL The ERCB's air monitoring unit (AMU) employs instruments that approach the sensitivity of a hunting dog's nose to detect whiffs of pollution measured in parts per billion of the atmosphere. The vehicle drives in circles around potential emissions sources to detect invisible "plumes" or feather-shaped clouds of offending materials borne on variable breezes. The unit patrols both independently and in response to public odour complaints. The high-tech hardware can also include infrared cameras that make odourless gases visible. *ERCB Communications*

industrial smells apart from decaying natural materials such as fallen trees and livestock dung, or puffs from commercial and residential exhaust sources in upwind cities and towns. "I have to be careful that it's not just a small background number," Thompson said, referring to readings that register naturally occurring odours and substances or trace emissions from other sources far from the site under surveillance.

A rotten-egg odour that registers a hydrogen sulphide concentration of 10 ppb or more from a sour-gas site breaks Alberta industrial hygiene rules. The guilty party receives a high-risk violation notice and must clean up its act immediately. The upper limit for the less obnoxious sulphur dioxide is 172 ppb. "The most I've ever come across is 700 ppb," said Thompson.

The microscopic scale used to measure environmental offenses stretches the imagination. In an attempt to put these minuscule numbers in context, employee education suppliers such as Enform — a not-for-profit network supported by all oil- and gas-field employers since its birth in 1961 as the Petroleum Industry Training Service — tend to use everyday, plain language comparisons. Stand on a Calgary sidewalk, states one textbook for a sour-gas course that is compulsory learning for anyone who visits petroleum job sites. Face west and take a one-metre step. That long stride is the first of one million parts of a hike to Vancouver. One ppb is a one-millimetre hair's width on that walk, or a one-centimetre nudge on a trail from the equator to the North Pole.

PUZZLE SOLVER

In her thirty-plus years of mapping a healthy share of Alberta's 420 000 kilometres of pipelines, with 54 000 ERCB licenses in 6773 active operating areas, ***Kerrie Crouch*** had a simple explanation for her endurance: "I've always enjoyed putting puzzles together."

Throughout the project, Crouch had no shortage of pieces to put in place. Every week her department received new entries for the Alberta pipeline map, which is a work in progress. The amount she could accomplish any given day depended on the state of the industry, and business was brisk as the second decade of the twenty-first century ushered in the era of "unconventional" development. Coupled with high oil prices, new drilling and well completion methods reopened old fields where potentially large deposits had been left behind, too tightly embedded in the geological formations to be harvested using previous generations of technology.

On a large map, pipelines lie so thick under Alberta ground that their routes fuse together into ink blots. Crouch said, "Our department processes have changed from tracing only pipelines greater than 50 metres long to all pipelines, regardless of length or transported substance. At one point in time, we used to receive as-built plans from industry that showed every twist and turn, licence owners, contents, and obstacle crossings of the spaghetti-like networks. We need to go back to that level of accuracy, now that we have the technology. This is information you genuinely need to know," she said. "For safety or environmental reasons,

the first place anybody goes is to the ERCB records."

Crouch has been refining her art ever since she arrived at the ERCB from a national engineering firm in southern Ontario, an early adopter of computer-aided drafting. With her peers, she has created a pipeline graphics file that packs high value. To obtain access to this one aspect of the ERCB database, subscribers initially paid fees exceeding $14 000 plus subscription rates approaching $4000 for a year's worth of monthly updates.

Despite the high stakes, a casual onlooker straying into Crouch's quiet section of the ERCB's downtown Calgary headquarters would see no obvious drama. But she was anything but bored. Her occupation's version of excitement was intellectual. "There are so many scenarios," she said. "Picking up even a simple pipeline application can be like opening Pandora's box, or just a can of worms."

EXCEEDING THE RULES

The lesson has been learned. When Red Deer ERCB inspector Tyler Callicott vetted a central Alberta production site, instead of dirt floors in the equipment sheds, he saw monitoring systems, alarms, double-walled tanks, secondary containment dikes, and steel floors for stronger leak prevention. Along with equipment that helps industry make the environmental grade, general tidiness plays a role too. Signs of contamination, such as stains or dead spots in vegetation, prompt inspectors to look for violations of safety and conservation rules as well as environmental regulations. Cleanliness is a sign of a sound operation.

During his inspection, a thin and tidy layer of white gravel around steel sheds and equipment clusters caught Callicott's eye. "That's a culture change," he said. "Layers of piled-up gravel hide leaks. That was old school. You didn't clean up — you just covered up. Now some companies have more stringent rules than we do. That's what we want. You don't want to see companies just meeting the rules. You want to see companies exceeding them."

Alberta's clean industry culture is well known in international business, government, and environmental circles. In 2002, for example, World Bank Group (WBG), an independent financial arm of the United Nations, drew on ERCB regulation to devise its global gas-flaring reduction standard. The program aims to improve oil production practices and reduce the colossal waste of natural gas that, according to WBG estimates, equals one-fourth of total U.S. demand or all the combined consumption of Central and South America and adds 400 million tonnes of carbon dioxide to annual greenhouse gas emissions.

GOING MOBILE
Inside the ERCB's air monitoring unit are workstations with the latest electronic sensors, computer readouts, and digital mapping tools to track down fugitive emissions. *ERCB Communications*

It was no accident that the WBG chose to adopt the ERCB model. In the first decade of the twenty-first century, the ERCB cut gas flaring in Alberta by 80 per cent. The regulation responsible for the reduction — *Directive 060: Upstream Petroleum Industry Flaring, Incinerating, and Venting* — was implemented using a tried-and-true ERCB approach. From experience, the ERCB knew it would be pointless to set lofty,

ideal targets and hope they could be met, or to dictate every detail of industry operations. Instead, the ERCB uses a pragmatic, step-by-step approach to regulation development, an approach that marries the public's wishes with technical and economic reality. To begin, achievable goals are determined, enabling industry to meet the regulation requirements while improving environmental performance. Over time, as experience and knowledge improve, the rules are refined and become more rigorous. Flaring reduction followed this phased-in approach, guided by a coalition of citizens, industry, and local and provincial government agencies known as the Clean Air Strategic Alliance (CASA).

ASSESSING AND ADAPTING

This practical approach has become a national standard, enforced by decisions such as a 2008 verdict by the Federal Court of Canada, in which Justice Daniele Tremblay-Lamer upheld the approval of the Kearl oil sands mine by a joint review panel of the ERCB and the Canadian Environmental Assessment Agency. The judge rejected all but a procedural aspect of the lawsuit by four protest groups, requiring just one change before Kearl could obtain all of its final permits: an expanded statement on squaring development with Canadian carbon emissions policy. The ERCB panel promptly complied. The legal fuss at no time stopped construction.

In her written ruling, Justice Tremblay-Lamer noted that industry and regulators walk a still-evolving environmental line. She cited two environmental doctrines, both backed by international agreements and environmental scholars: the "precautionary principle" and "adaptive management." The precautionary principle demands that measures are in place to anticipate, prevent, and attack the causes of environmental degradation. Lack of scientific certainty about hazards is no excuse for failing to take action. The adaptive management principle recognizes that methods for protecting the air, land, water, and wildlife will change and improve as knowledge and technology advance.

"Adaptive management counters the potentially paralyzing effects of the precautionary principle," states the Kearl court ruling. Justice Tremblay-Lamer wrote that Canada has "a sophisticated legislative system for addressing the uncertainty surrounding environmental effects. To this end, it mandates early assessment of environmental consequences as well as mitigation measures, coupled with the flexibility of follow-up processes capable of adapting to new information and changed circumstances. The dynamic and fluid nature of the process means that perfect certainty regarding environmental effects is not required."

CONSERVATION: A BROADER DEFINITION

Enforcing the environmental mandate came easily to Alberta's oil and gas guardian, retired ERCB chairman Gerry DeSorcy recalled in an interview. "It wasn't a case of dragging the regulator kicking and screaming to the altar." The role evolved naturally from the ERCB's original conservation and safety mandate. During his 38 years with the ERCB, DeSorcy had a front-row seat to the changing scope of regulations, from the province's petroleum pioneer era to the flowering of modern environmental sensibilities.

When DeSorcy, a freshly graduated petroleum engineer, began work as an ERCB field inspector in 1955, "there was great emphasis on preventing waste of the resources," he said. "But there is absolutely no question there was also concern for negative impact on people and the environment, although we didn't use that kind of language in those days. The fundamental objective 50 or 60 years ago was thought of as sound stewardship."

As an inspector, DeSorcy enforced regulations that prohibited drilling in lakes and streams. He upheld requirements for distances between wells and enforced equipment standards for blowout prevention. He made sure borehole casings were leakproof steel and cement, to protect the safety of potable water, and oversaw proper deep underground disposal of salty wastewater from oil and gas reservoirs. He even shut down rigs when he caught workers smoking during hazardous operations.

As the industry mushroomed after the 1947 Leduc discovery, the ERCB responded swiftly to pollution missteps, recalled Frank Manyluk, who rose from inspector to vice-chairman in a thirty-five-year ERCB career that started in 1945. In east-central Alberta's heavy oil region around Vermilion and nearby Lloydminster, companies were initially allowed to store briny water that came up with production in ponds, he said in an oral history interview preserved in ERCB archives. "It soon became evident that this was a temporary solution at best and resulted in the board requiring the completion of salt water disposal wells into appropriate geological zones at considerable depth."

Once regulation shortcomings were exposed, they were quickly addressed. For example, when oil and gas leaked out of well casings and contaminated drinking water, new equipment was devised and cleanup rules put in place in a matter of a few weeks, Manyluk said. The solution was a wellbore exhaust pipe that worked like a safety vent on a steam engine to divert potential leaks into surface production systems. As a result of that innovation, "many serious cases of fresh water pollution with natural gas or crude oil have been prevented."

A STRONG MESSAGE

In early environmental disputes, the government sided with the ERCB. At one time, for example, industry was exerting great pressure to drill into enticing oil targets located beneath freshwater bodies — a regulatory no-no. The ERCB granted permission for a trial run, allowing a rig to dig in a slough. "The experiment showed us that such drilling resulted in considerable pollution of the water and should not be approved," Manyluk recalled. In another attempt to persuade the ERCB to consider wet-well drilling, industry invited Manyluk and senior government officials to tour well sites in Louisiana that were located in watery areas. Manyluk filed a report that was "completely negative and confirmed that such operations should not be permitted in Alberta."

About a year later, a company applied for a licence to drill in an Alberta lake above an expensive Crown mineral lease. As the ERCB official in charge, Manyluk made it known that he intended to reject the application. "Within 48 hours the premier [Ernest Manning] called a meeting in his office, which appropriate senior government officials and I as the board representative attended. Following a discussion for less than one hour it was decided that no such operations would be permitted in Alberta and that the owner of the lease involved would be fully reimbursed for his purchase price," Manyluk said.

Long before CASA and the 1990s crackdown on invisible trace emissions, air pollution was no stranger to Alberta's regulatory agenda. When Rod Edgecombe enlisted with the ERCB in 1951, he first worked as an inspector in a hot drilling region northeast of Edmonton. There, he tracked down sloppy conduct by scanning the horizon for greasy palls of soot. "That's how you knew where oilfields were — by the plumes of black smoke," Edgecombe recalled in an ERCB oral history interview. "There was a period when board staff were asked to watch where these plumes were and get out to where they originated, find out what had happened, and make sure the operator discontinued that practice."

In 1970, the ERCB responded swiftly to a rash of oil spills. The blunders included the biggest pipeline leak in Alberta history, which dumped about 50 000 barrels of oil (eight million litres) onto a muskeg bog in the Nipisi area near Lesser Slave Lake. At the time of the disaster, the ERCB only had two employees responsible for pollution control. The bureau created for the role was in its infancy, and formal procedures for reporting and investigating spills were just getting underway. But good intentions were strong, recalled Ed Brushett, an early environment department manager with the ERCB. "The industry was in fact given an edict, 'Do something about it or else,'" he recalled in an ERCB oral history interview.

The oil companies got the message. They spearheaded the development of a non-profit cleanup network. Initially called PROSCARAC, short for Prairie Regional Oil Spill Containment and Recovery Advisory Committee, the initiative was later renamed Western Canadian Spill Services Ltd. It grew into an industry co-op with more than 540 members paying fees to own 33 spill response units at 26 locations, run training programs and emergency drills, and leap into action when pipelines break.

TAKING CARE OF ORPHANS

Cleaning up messes left behind by old mistakes and failed companies began in 1954, retired ERCB board member Vic Bohme recalled. In an ERCB oral history interview, he estimated that about $2 million (or equivalent of $17 million today) was spent on the first campaign to "abandon"— the industry term for properly seal up — leaking wells known as orphans because they'd been deserted by the original owners.

These early efforts concentrated on an area along the Peace River, a legacy of the 1910–1914 oil rush when the federal government still retained ownership of Alberta's resource endowment. The Peace River fortune hunters drilled into surface seeps, hit fizzy brews of slightly sour gas and salt water, lost control of the flows, went broke, or just walked away after their rudimentary technology proved incapable of mastering high underground pressures. One runny old ruin of a well blocked a bridge project in the town of Peace River. A meat-packing plant used another for free fuel by covering the leak with a box and siphoning off bubbling gas with a hose.

Bohme's cleanup drive put a stop to all but the worst offender, which was known by a variety of telling nicknames: The Well from Hell, Old Salty, The World's Longest Blowout, and 30-Mile, for its distance from the nearest road when it was drilled in 1916. In 2003, a $5-million effort undertaken by about 100 ERCB and industry personnel operating a fleet of modern oilfield hardware finally sealed up the site. The ERCB produced a documentary, *Blowout: Peace River Oil Company's #1,* that recorded the epic well-control effort.

The documentary serves as an enduring reminder of the importance of two programs created to prevent any repeats of the eighty-seven-year leak: the Orphan Well Association and the Licensee Liability Rating (LLR). The Orphan Well Association, guided by the ERCB, administers a cleanup fund that is collected by a levy on industry. (Old Salty was the first orphan well to benefit from the program.) The LLR system, which is set out in *Directive 006,* continuously compares well owners' assets to projected cleanup costs. Security deposits are required when companies' environmental obligations start to exceed the value of their property.

GOING DEEPER The Cold Lake project launched in situ production of oil sands deposits too far below the ground surface for mining. In addition to pioneering a new technology network of wells, steam injections pump arrays, and pipelines, the plant northeast of Edmonton was a turning point in Alberta resource development and environment protection regulation. ERCB hearings on the scheme in 1978 drew unprecedented crowds that inaugurated the modern era of intense public participation in the previously mostly technical Alberta regulatory regime. *Glenbow Archives ip-6t-102*

ENVIRONMENT AND ENTREPRENEURS

Rising environmental standards have fuelled a growing environmental products and services branch of the energy business. The stock-in-trade ranges from hazard and pollution detection devices to response and communications systems. "Regulation attracts people who are capable of creating technology," said Joe Lukacs, a Calgary-based serial entrepreneur in sour-gas control who was an engineering student of George Govier in the 1950s, when the ERCB's longest-serving chairman doubled as a university professor.

After he retired, Lukacs directed Canadian Environmental Technology Advancement Corporation (CETAC-West), a joint federal-provincial non-profit organization created to guide green technology inventors from the idea stage to profitable commercial operations. "Good regulation is probably the most powerful economic force you can have because it forces you to be more efficient," Lukacs said. "Efficiency converts into competitiveness and profits. Sloppy regulation or lack of enforcement encourages mediocrity and waste. No society excels on mediocrity and waste. The civilizations that demand high standards, pushing human achievements to the limit, are the ones that succeed."

COMMUNITIES SPEAK UP

Public hearings on contested well licence applications date back to 1975, when residents of the Quirk Creek area south of Calgary protested a sour-gas site proposal. The ERCB settled that fight by changing the well's location and reviewing its emergency warning and evacuation plans. But the case turned out to be only the first episode in an unending saga of improved drilling standards.

By the time DeSorcy became ERCB chairman in 1987, natural and human environment issues were recognized priorities in Alberta's government and business circles. In 1961, with a growing emphasis on reducing sour-gas plant emissions, Alberta enacted Canada's first clean air legislation. Then, in 1971, the province appointed the nation's first environment minister. The Social Credit government spun off the new cabinet portfolio from the health ministry, which was in charge of pollution controls designed to protect the people. When the Conservatives gained power in mid-1971, they expanded the new role into a full-time department for protecting the land, air, water, and wildlife. Both regimes tapped into energy sector expertise for their inaugural environment ministers. The Socreds' Jim Henderson was a petroleum engineer; the Tories' Bill Yurko, another engineer, had wide experience that included atomic power plants.

Technical issues were not the only force behind the added regulatory dimension, DeSorcy recalled. "There were societal changes, and notably a growing willingness of the public to speak out. My dad did his complaining over a glass of beer with friends. He would no more have thought about airing those concerns with the authorities than flying through the air."

When DeSorcy's term as ERCB chairman ended in 1993, a more environmentally conscious attitude prevailed. After retiring, he served as head of a public review of sour-gas standards, safety, and regulation. In that role, he had his finger on the pulse of the environmental movement. "I was surprised at the number of people — sound, responsible people that we talked with one-on-one, not just at town hall meetings — who said, 'I'm not sure it's worth it any more. As a society we changed from one that said, 'Isn't that awful but we've got to do it,' into one that says, 'There's no room for error.'"

DeSorcy associates the change in public attitude to a specific point in time: the 1978 ERCB hearings on the Cold Lake oil sands development. The original production scheme outlined a megaventure in thermal in situ underground extraction using steam injections that ignited public and expert disputes on multiple fronts. Water supplies, land use, wildlife habitat, plant emissions, energy efficiency, aboriginal rights, and the scope of environmental regulations all came into question as the debate unfolded. The case set a precedent, transforming ERCB hearings from sedate discussions by specialists and lawyers into passionate community dramas seeking specific interventions.

"We were shocked," DeSorcy said. Representatives from 62 groups gathered on the opening day of the hearings in a community hall at Grande Centre, a small town that has since been absorbed into the southeastern bitumen belt's capital city, Cold Lake. The ERCB moved the standing room–only crowd to a larger venue and began nearly six weeks of oral testimony and arguments, which were spread over six months. "It was such an eye-opener to us, as to just how many people wanted to have their say," DeSorcy recalled.

As well as setting a participation precedent, the case ushered in new development and regulatory patterns. When the Cold Lake project's forecast costs rose to $11 billion (about $35 billion in today's dollars), in situ oil sands pioneers invented methods of splitting projects into affordable stages. The ERCB and Alberta Environment outlined a clear division of labour to address overlapping responsibilities. ERCB hearings became a public review of impact assessments and resulting project approval conditions and recommendations. Government department experts attended the hearings, examined reports and witnesses, and later completed final environmental rulings and permits as a separate technical procedure.

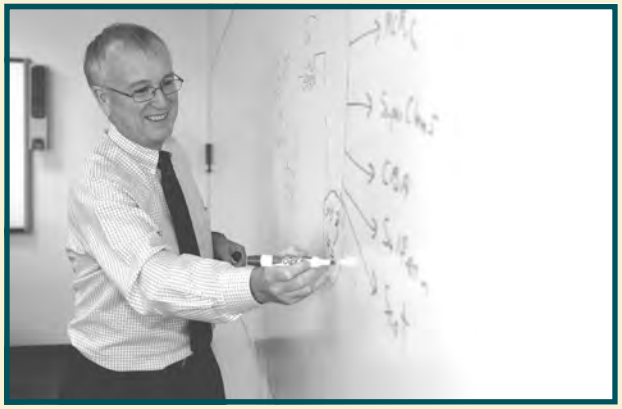
CRUSADER

Jim Spangelo's first taste of the ERCB — working in the lab after graduating with a science degree in the early 1980s — made him a convert. "I said, 'This is the right place for me'," he recalled in an interview.

When he added an engineering degree to his academic credentials, he returned to the ERCB. "It was a great place to work, good people and a wide range of interesting problems to work on." From providing expert support for board members at public hearings to serving on technical committees with industry representatives, "In my mind it's about finding the best solution," Spangelo said. "That's not necessarily the most economic solution."

At community hearings, he helped roving ERCB panels balance industry, farm, town, and aboriginal interests. At corporate headquarters in Calgary, he advanced a twenty-first century version of the original 1930s ERCB mandate to enforce resource conservation by preventing waste. "If I'm participating in hearings it's about listening to technical stuff and people matters and making the right decision," Spangelo said. As a professional regulator, safe handling of sour gas, steeped in hazardous hydrogen sulphide, and careful use of production to run industrial plants both caught his eye.

When the annual average price of natural gas stagnated at half or less of its 2005 peak, Spangelo kept up a crusade for careful use of production used as plant fuel. Just a 10 per cent reduction would save enough gas to heat more than 300 000 Alberta homes, said the ERCB report. While markets were high, a committee of ERCB, industry, and government



experts prodded the captains of industry into adopting best practices for fuel-gas management. As fallen prices bled off the campaign's money driver, Spangelo pressed the issue by actively participating with a team of conservation champions.

In oil and gas regulation, "a strong regulator benefits everyone, both public and industry," Spangelo said. "When there is a need to make improvements, bringing together diverse people that are supported by their organization and are committed to finding a solution can produce novel results. The success that these multistakeholder teams can have is huge. An example of this was the need to address flaring and venting as part of a CASA team. The resulting solution has become a model supported by international agencies. When individuals on these teams, with the support of their organization, believe that an issue must be addressed, professionals and government alike do not easily give up. Their belief in what they are doing and the drive to find a solution can produce world-class results."

COMMON-SENSE CLEANUPS

As with its resource conservation mandate, the ERCB favoured a practical approach to environmental matters. "All biological life is limited by its waste product," said Don Shaw, who helped shape the ERCB's environmental vision and build up its biological laboratory services while serving as its chief chemist from 1965 until he retired in 1986. "You can't live in rubbish," he said in an ERCB oral history interview. "Waste products — now with an ordinary animal other than man all you're looking at is fecal material. But man, Lord bless us, has every kind that you could name and a whole bunch that you wouldn't even think of naming as his waste products — and they're almost all of them detrimental to the environment. Usually the only reason they add to the detriment of the environment is they make money. Make money in plastic sales, for instance — you go and make a lot of plastic and throw it all away."

MARTHA KOSTUCH, a Rocky Mountain House veterinarian and passionate environmentalist who stood out as a force on the Alberta regulatory scene from the 1970s until her death in 2008. *ERCB Library* 87.019 *no*002

Shaw endorsed a common-sense approach to cleanups. Painting a complete scientific portrait of a potentially threatening substance "would take a gang of a dozen PhDs working for a hundred years over a 20 cc sample to determine what was in it," he said. "You would get thousands of compounds, perhaps even millions of compounds, many of which would be of potential concern. Which specific ones, it doesn't really matter. The point is, you could take out the whole clump if you treated them in some sensible, reasonable, cost-effective manner."

ERCB pragmatism shows up even in its toughest reviews, including a critical 2010 paper circulated with much ado by a University of Alberta research team. The six-page document, *Oil sands development contributes elements toxic at low concentrations to the*

READY TO ROLL When the ERCB first went into action in the 1930s and '40s, the roles of its inspectors and engineers had a police look and feel. To impose order on the Turner Valley oilfield, the work ranged from midnight stakeouts of suspected wasteful wells to conspicuous patrolling that showed the ERCB's determination to be a force in the industry and community. *ERCB Library* 87.009 *no*004, *Corey Collection*

Athabasca River and its tributaries, was published in the Proceedings of the U.S. National Academy of Sciences and set off a barrage of negative publicity disparaging Alberta's water quality monitoring. In response, the provincial and federal governments agreed to work on a new water monitoring system but allowed oil sands plants to continue operating in the interim. The furor was a fight among experts over scientific methods. A risk had been exposed of miscounting emissions with incomplete or inconsistent pollution monitoring networks. But there was no emergency, even after 43 years of production growth in the Fort McMurray bitumen mining district. The research focused on 13 poisons, also known as priority pollutants, or PPEs, such as mercury and lead. The disapproving paper noted, "PPE concentrations in melted snow and in tributary and Athabasca River water did not exceed drinking water quality guidelines," which reassured all concerned.

TACKLING THE ENVIRONMENT MANDATE

With generations of measuring production efficiency under its belt, the ERCB was well equipped to fulfill its environmental mandate. Decades before greenhouse gases and climate change became global concerns, the ERCB's first ruling on the pioneer Fort McMurray bitumen mining and upgrading scheme included carbon emissions data. The 1960 decision calculated that the daily synthetic crude output of 31 500 barrels planned by the original Great Canadian Oil Sands (GCOS) project would vent 7.5 million cubic feet of carbon dioxide into the atmosphere.

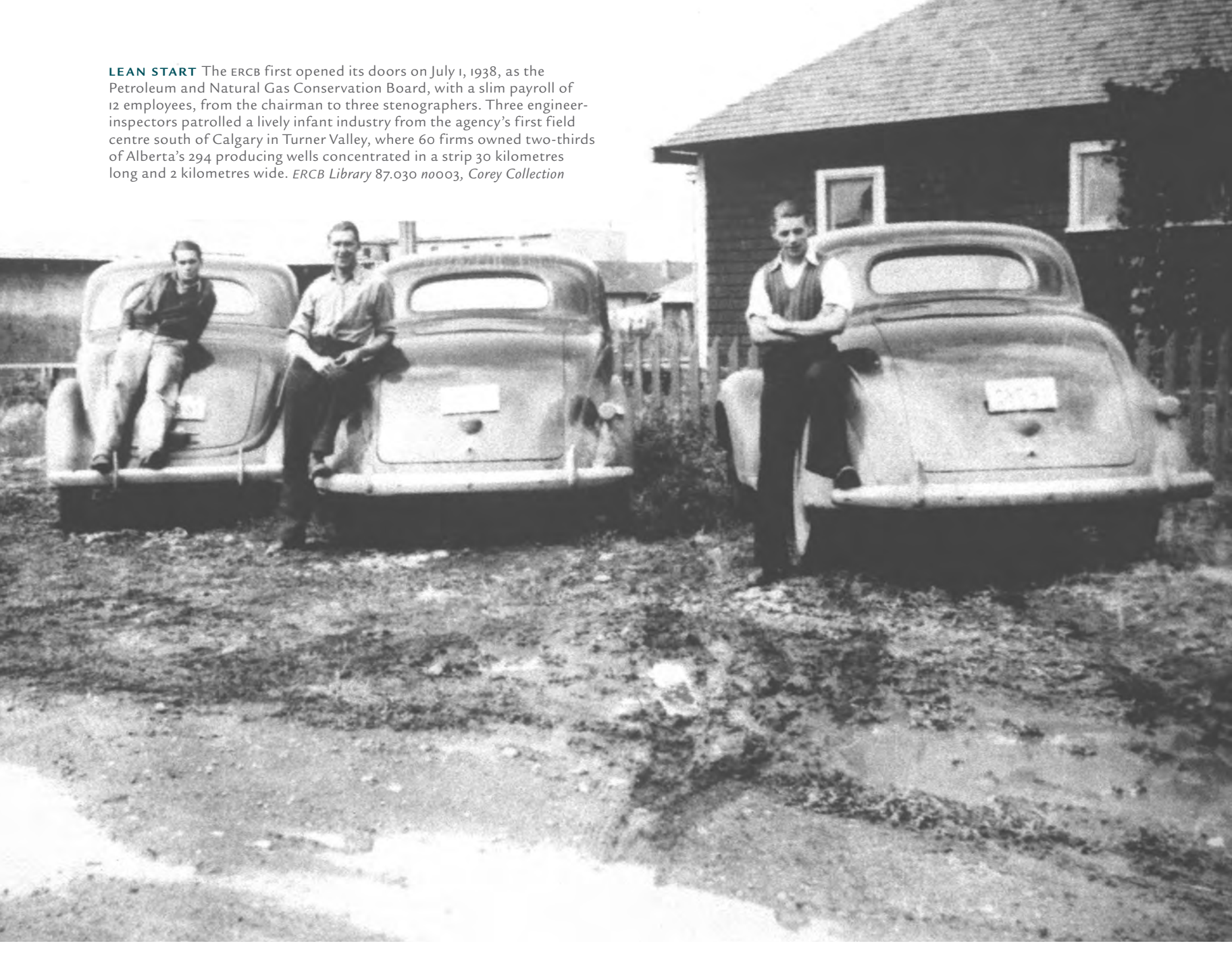
Tailings management and sulphur emissions control issues have also been around since the dawn of bitumen-belt industrialization. After interveners and ERCB staff questioned GCOS at hearings, the ERCB increased the project's total cost forecast by about 10 per cent to cover environmental expenses. "It was quite probable that anti-pollution requirements would likely become more stringent with time," the 1960 ruling explained, a nod to the ERCB's philosophy of the evolving nature of environmental standards. Approval for construction was postponed until the project could clear up "serious doubts" about its economic feasibility. Two years later, the green light was given when Sun Oil, with its deep pockets, agreed to back the initial sponsors.

In 1969, the ERCB's second big oil sands ruling — this time on Syncrude — once again proved that environmental accountability was a natural offshoot of the ERCB's original conservation mandate. On the Fort McMurray mining lease, approval conditions demanded a tidy operation. The project had to assure the ERCB that bitumen ore would not be left under tailings ponds or waste dumps that were too messy — and costly — to be cleaned up. The ruling also pertained

to conditions off the site: "Syncrude shall dispose of any liquid wastes . . . in a manner that ensures no oily or contaminative materials flow over the land or into any body of water."

As the ERCB's 75th birthday approaches, a green version of its conservation mandate has been bred into ERCB personnel. During a long day of tracking down potential orphan wells and facilities in southern Alberta, inspector Melinda Czibi drew no academic distinctions or bureaucratic fine lines between resource management, environmental protection, and community relations. If a problem falls into the bailiwick of another branch of government, she makes sure it's in the right hands before she walks away. Even so, it bothers her when she cannot take on a piece of the action. "I've had bad days when people made me cry. I feel for them. People complain to us about stuff that's not in our jurisdiction and we can't help them."

Czibi's work with the ERCB inspires intense feelings of purpose and loyalty. "They've had my heart and soul since I was 18," she said. "I'm so passionate about my job." The regulations that guide ERCB response to a public concern boil down to a simple, practical rule: "It's got to be real. It's got to be truthful."



LEAN START The ERCB first opened its doors on July 1, 1938, as the Petroleum and Natural Gas Conservation Board, with a slim payroll of 12 employees, from the chairman to three stenographers. Three engineer-inspectors patrolled a lively infant industry from the agency's first field centre south of Calgary in Turner Valley, where 60 firms owned two-thirds of Alberta's 294 producing wells concentrated in a strip 30 kilometres long and 2 kilometres wide. *ERCB Library* 87.030 *no*003, *Corey Collection*

FIVE
PEACEMAKER

When all else failed, Melissa Blake turned to Alberta's Energy Resources Conservation Board. "We were in dire circumstances," she said in an interview. As mayor of the Regional Municipality of Wood Buffalo — 68 454 square kilometres of northeastern Alberta that includes Fort McMurray — she was speaking for a community in a jam.

The "dire circumstances" Blake referred to came close on the heels of a rush of bitumen megaprojects, which fuelled an 8 per cent annual population increase in the region. Lineups formed for everything from coffee and doughnuts to motel rooms and library computers. In Fort McMurray, apartment rents and house prices topped the rest of Alberta by 70 per cent. Congestion strained local roads. Health, education, welfare, water, sewage, and recreation services were stretched to the max. About two-thirds of Blake's constituents worked in the oil sands, and most of the rest

MELISSA BLAKE, mayor of the Regional Municipality of Wood Buffalo, credited ERCB hearings with making "a huge difference" in establishing credibility for her northern community's case for help to cope with strain created by oil sands development. *Reprinted with permission of the Edmonton Journal*

earned their livelihoods providing goods and services to industry personnel. The majority wanted development to continue. But Blake could see the writing on the wall — without provincial support, continued unheeded growth would have a severe impact on the region.

With support from an oil sands industry coalition, Wood Buffalo developed a business case for the region to address the fallout of rapid industrialization. The book-length proposal estimated that, as of 2005, more than $800 million in new public infrastructure was needed to catch up to bitumen-belt industrialization, let alone get ahead of robust growth projections. Blake, accompanied by a team of Fort McMurray civic leaders and officials, travelled south and pitched the idea to political and civil service chiefs in Edmonton, making a direct appeal for exemptions from provincial budget formulas. The idea didn't sell.

The mayor did not give up. She refused to accept the provincial government's position that bending rules for Alberta's fastest-growing municipality would lead other municipalities to demand similar treatment. Blake returned home and began to canvass the settlements scattered across Wood Buffalo, a region of woods and muskeg almost as big as New Brunswick, seeking agreement on a political action mandate. She received the support she needed and, in 2006, the municipality filed an appeal with the ERCB as a directly and adversely affected intervener in three oil sands cases.

This was Blake's first time participating in the ERCB's courtroom-style hearings. As a novice at crafting written evidence, presenting oral summaries as a witness panel leader, and submitting to cross-examination by veteran masters of regulatory duelling, she was

nervous. "It's intimidating. It's not inhospitable. It's just not an easy environment to get into." Blake learned first-hand that the ERCB serves as judge, not advocate. "I have to call them neutral," Blake said. "We were met with skepticism. We were challenged on the validity of our case."

In the end, the ERCB did not grant Wood Buffalo's request to pause development nor did it agree to a special ERCB inquiry into northern conditions. However, the ERCB did find Blake's plea for assistance compelling and urged the province to listen. "Without proper attention to these issues, the potential exists for public infrastructure and services to be severely impacted," the ERCB said. "The time to take action is now," the decision declared. "This would minimize the impact on Wood Buffalo residents; further enhance the region as a place for business, workers and their families to locate; and increase the competitiveness of the region to attract and sustain oil sands investment."

The ERCB's observations gave Blake the break she needed, reminding the province that all Albertans had an interest in making bitumen-belt development sustainable. "The provincial government got our message. Industry got our message," said Blake. "Other parties were the ones that really needed to hear us."

After the ERCB's decision, the provincial government ordered a separate review of Blake's business case. Aid began to flow into the region. Provincial and corporate purses opened to the tune of $1.2 billion for improved public services in the bitumen belt. As Blake and her supporters predicted, supporting the community rewarded all concerned. Between 2005 and 2011, annual provincial royalties paid by rising oil sands production multiplied four-fold to $4.9 billion from $1.2 billion.

Still mayor five years after her first trial by fire with the ERCB, Blake faced population projections that saw Wood Buffalo's numbers on course to double a second time since the mid-1990s — this time to 200 000. She braced herself for further regulatory rigors. Experience had convinced her that all sides would be served by the ERCB's independent, quasi-judicial mandate and by its court-like approach to probing and resolving issues. "It makes a huge difference in how you're responded to. By being granted intervener status [in the 2006 proceedings] we had been accepted into the process." Constructive engagement with the regulatory arena fit naturally with her homespun philosophy. "You get a lot more done with honey than you do with vinegar," Blake said.

THE CONKLIN EXPERIENCE

About a 90-minute drive south of Fort McMurray, the Métis community at Conklin, located beside Christina Lake, a jewel of the northern landscape, took its turn at learning the regulatory ropes as the next generation of bitumen development formed around it.

The settlement was ringed by in situ or underground extraction projects, also known as drilled oil sands. The oil companies involved had collectively declared their intent to pump out a million or more barrels a day by steam heating ore that was too deep for mining.

"It was beautiful country before it was all oil," said Ernie Desjarlais, a leader of a Conklin resource development advisory committee. The group was not only dedicated to protecting Christina Lake and the community's Aboriginal identity, but also to helping the community adapt in the face of change brought about by those lured to the formerly remote outpost by its thick seams of black gold. "I wish it wasn't here," Desjarlais said. "We'd be left alone. But industry's here to stay probably for 60 years. So we have to make the best of it. We'll fight to the end."

Desjarlais's arsenal, supported by expert help, included ERCB personnel and the Aboriginal affairs conduct code. Desjarlais did not have to go to the same lengths as Blake. The regulatory process kicked in well before any costly hearings took place, which usually serve as a last resort when issues can't be resolved any other way. A 335-page regulatory bible, *Directive 056: Energy Development Applications and Schedules* opens with landowner and community relations commandments. These include early disclosures of plans, recognition of a project's effect off site, and efforts to obtain cooperation throughout a project's life span — all of which have become industry musts.

ERCB personnel are made available to guide opposing sides towards a meeting of the minds. "They help us," Desjarlais said. "but they've got to be in here more," he urged. Heir to a community legacy of feeling duped by industry, Desjarlais embraced the new model, which outlined ideas of fairness and served as a job-one manual for energy schemes of all types. "The developers came in and pushed us around," Desjarlais recalled. "Years ago they bought us lunch. They made us sign a paper to eat the lunch. We didn't know what we were signing. That was consultation." The modern code enabled Conklin to obtain a local benefits, training, and employment agreement in exchange for consenting to a company's growth plans. The deal was forecast to inject $40–$60 million over 40 years into the community — and that was from just one of the many projects poised to turn his hamlet into an industrial centre.

LAND CHALLENGE INITIATIVE

Money is not the only means to obtain the public consent that industry refers to as its "social licence to operate." Sometimes, candor is all that's needed. In the early 2000s, when the ERCB piloted the Land Challenge Initiative, it proved that honest and full disclosure can also succeed in achieving public buy-in. "It was amazing how it worked. I've never seen anything work so well," said Penny Archibald —

a Red Deer County farmer, municipal councillor, and renowned critic of the industry and the ERCB — who agreed to give the program a try.

Through the initiative, the ERCB set up a neutral arena for all business and community representatives to voice their concerns. The program responded to widespread anxiety and anger over Alberta's first generation of unconventional development outside the oil sands, which tapped coal seams for natural gas with thousands of wells and vast arrays of production hardware. "They scared us," Archibald recalled. By "they" she meant the mostly urban political and environmental critics of industry, who staged public meetings in rural and small-town Alberta with roving American veterans of older and less-regulated coal-seam gas drilling booms in Colorado, New Mexico, and Wyoming. "People came up here from the States and put the fear of God into Alberta farmers," said Archibald.

The ERCB program balanced that information with specific knowledge of Alberta's situation. An orderly forum invited all concerned to take turns speaking and listening. In Archibald's district, more than 100 landowners attended the first session and fired off 50 written questions to four companies. With ERCB envoys supervising committee meetings and open houses, the firms set aside the tradition of competitive oil- and gas-field secrecy. They revealed where and how they intended to create new production networks of wells, compressors, and pipelines. Discussions delved deeply into industry procedures, Alberta safety and environmental regulation, and the ERCB field inspection system. The results were remarkable. "It's the unknown that scares you. Communications can do wonders," Archibald said in an interview. The upshot of the meetings? Companies adopted rules such as keeping livestock gates closed and cleaning mobile equipment to prevent the spread of weed seeds. Access roads were realigned to avoid disrupting local walking trails, landmarks, and streams.

Unconventional gas development went ahead without further fuss. A grievance committee, appointed by the Land Challenge Initiative, never met. The ERCB worked to bring avowed opponents together. "It's meant to deal with some of the folks that are our biggest critics," said Tristan Goodman, a senior ERCB employee who played a lead role in the Land Challenge Initiative. "We say, 'Come in and understand us.' If somebody showed up and said, 'You guys are killing us,' we said, 'You should be on this committee,'" Goodman recalled in an interview. "You can't have thin skin. I got raked over the coals."

FACING INDUSTRY OPPOSITION

Hostilities between industry and landowners date back to the dawn of Alberta oil in Turner Valley, south of Calgary. Herb Bagnall, one of the ERCB's first employees in 1938, recalled an early resistance story in oral history memoirs preserved in the ERCB's library.

While on patrol as a field inspector, Bagnall witnessed little conflict in areas where drilling pioneers created rare Depression-era jobs and paid above-average wages of $6–$11 a day. "Where we saw it [conflict] was among ranchers who were outside Turner Valley and had seismic and geological crews going across their land. They weren't getting any money out of it and they were very independent people," he recalled. He understood their perspective after reading a short but eloquent note that an irate rancher had put into a hilltop cairn erected as a geological marker by an oil exploration field party. The missive said: "Get off. From this beautiful hill I can see seven stinking oil wells. So put an egg in your shoe and beat it."

More extensive opposition followed the far larger Leduc discovery in 1947. As wells, pipelines, and plants multiplied, economic and population growth changed communities. Prosperity and real estate development bred residential and recreational settlers who, like the original Turner Valley ranchers, gained little personally from oil and gas activity.

Dave Brown, renowned among ERCB staff and community activists as a pioneer of industrial peacekeeping, epitomized the transformation. Born on a northern Alberta homestead but educated in Calgary, he worked in the oil industry for 30 years. He returned to his roots when he retired, building a cattle and haying operation in the Caroline-Sundre area of central Alberta. "At one time the oil industry actually was considered a boon to the province and the rural community saw economic gain and advantages. Often, as a favour to farmers and ranchers, oil industry workers would clear fence lines, dig [water storage] dugouts, drill water wells, and do some clearing and brush piling," Brown recalled. "The relationship started breaking down because of the industry's cumulative impact."

In the 1980s, near Caroline, Alberta, simmering conflicts heated to a boil over a colossal sour-gas discovery, which was 35 per cent lethal hydrogen sulphide but rich in premium-value liquid by-products. The ERCB oversaw a months-long fight between industry and community factions over processing plant locations, safety precautions, and environmental protection. "I went to meetings where I saw big rough men cry because they were afraid of what would happen to their wives and kids. Those were real tears," said Brown.

"For all concerned when we came away from that hearing the general feeling was that it had been a lose-lose-win process. The community lost. Industry and the board lost. The lawyers won." Not wanting a repeat of the situation, Brown and kindred company

ROUGH RIDERS The Alberta drilling boom of the 1940s, '50s and early '60s was notoriously hard on men and machines. Oil and gas operations ran around the clock in remote locations, drawing ERCB personnel out for marathon inspection patrols in the toughest and plainest fleet vehicles available. The men outlasted the cars, which were traded in for new ones after taking about 25 000 miles (40 000 kilometres) of beatings from rudimentary roads and nasty weather. *ERCB Library* 87.012 *no*002*, H.W. Erkamp Collection*

spirits decided to take action. They formed a coalition of community, industry, and ERCB representatives called the Sundre Petroleum Operators Group and pioneered relationship-building methods that the Land Challenge Initiative codified. The Sundre group set the pattern for an ERCB-supported, province-wide network of similar local assemblies called Synergy Alberta.

Brown credits the ERCB's law court–like independence for fostering openness and impartiality. "I think we've got the best regulatory board in the world. I believe that. They have good people and a good handle on what's going on. I don't think that it's run totally by the government. As far as looking after the people and the environment, I think they're fair. It's not fractured. It's fairly reliable and consistent but also changing with the times. I've got a lot of respect for the people who run the board. In general I've also got a lot of respect for industry — but very little respect for politics. They play a game. When you get into politics everything changes."

BALANCING SCIENCE AND COMMUNITY INTEREST

The ERCB's role as judge of industry-community relations did not come easily, recalled ERCB veterans who were more at ease with a focus on technical issues. While protecting the physical environment was a natural extension of the ERCB's original resource conservation mandate, responding to human perceptions, feelings, hopes, and expectations was not. The new role added an entirely different dimension, said Harry Antonio, an engineer and information technology innovator whose career with the ERCB spanned four decades from the 1950s to the '80s. "Many of the people involved in hearings from the ERCB are basically technical or scientific persons. We tend to lean in the direction of making a scientific judgement based on fact," Antonio explained in his ERCB oral history memoirs. For instance, if a community proves that power transmission creates health hazards, "Then the board can act by asking that a line be placed somewhere else. But when there is no conclusive evidence, a scientific person tends towards a scientific type of conclusion: If there isn't some solid evidence to suggest that it is harmful, then it isn't. It's very difficult to weigh the emotional impacts," admitted Antonio.

In the 1970s, '80s, and '90s, as conflicts heated up, the ERCB had "a real difficulty" balancing provincial economic interests with local community interests, explained Antonio. "In some instances it is very difficult to judge whether creating a discomfort for someone is acceptable because you are creating a benefit for someone, someplace else." He added, "Although we as a board want to recognize the social impacts, we have very little in the way of measuring those and being able to understand them."

DIGITAL SENTRY

With vaults of digital information on energy, economic, environmental, and community roles, the ERCB is a natural target for virtual siege. For ***Jack Lough***, protecting Alberta's Energy Resources Conservation Board from becoming road kill on the information highway has grown into a career in technical and infrastructure support.

ERCB digital knowledge is measured in terabytes, an astronomical unit equal to the number of five-character words in about 322 000 copies of Leo Tolstoy's four-volume epic, *War and Peace*. Of the messages bombarding the ERCB's digital walls, only about one-fiftieth are useful, Lough said in an interview. Most are unwanted cyber-barrages, from nuisance sales pitches to dangerous computer viruses. "It used to come to your mail boxes as flyers. Now it comes to your e-mail as junk. The volume is so high that there is no way we could attempt to analyze it all." He stood on guard by continually updating the "performance metrics" that automate the job of letting in the valuable material and reflecting the waste back into virtual outer space.

In 2011, Lough is a thirty-three-year veteran of the ERCB who remembers when the mail arrived as truckloads of hard copy, computer scientist was not yet a common job description, and the specialty was taught as a special branch of mathematics. Five decades after a high school teacher enticed him into

electronic information technology, he is still thrilled with his field. "I just found it totally fascinating. I still do," he said. "It was tubes, tapes, flashing lights. It [a computer] took up floors of space rather than sat on your desktop. It was the stuff of science fiction. I'm still here because I enjoy it. The thing about technology is it's always changing."

As much as he loves the technology, "I'm not consumed by it," Lough said. He is equally compelled by the human dimension of his IT work. "You think of a computer person as kind of a propeller-head. But I enjoy interacting with board business, helping people understand the technology and how it can help them. I would rather be dealing with people. There's always a need to translate computers into something that real people can understand."

Compelling events drove the ERCB's quest for a strong community stewardship formula, Elmer Birlie recalled after wearing both ERCB and industry hats during a long career in sour-gas engineering. "The board has been the only public forum that has been available to the people of Alberta in the critical matter of environmental control related to new developments. That applies to petrochemical plants, power plants, coal mining operations, sour-gas plant applications, and the drilling of wells," Birlie observed in his contribution to the ERCB's oral history records. "The board has acted as a medium by which the concerns of the people could get registered. This put a tremendous added burden onto the board. Vern Millard went out of his way to hear our concerns."

VERN MILLARD, seated at far right, as ERCB chairman from 1978 to 1987 ushered Alberta energy regulation into the modern era of heightened public participation, safety precautions, and environmental sensitivity. *ERCB Library* 87.020 *no*010

After serving as ERCB chairman from 1978 to 1987, Millard reviewed the lessons he learned in a frank paper: *Recent Experience in Alberta with Public Involvement and Environmental Negotiation in the Energy Industry*. The stormy period confronted him with a question that critics of the ERCB made into a recurring regulatory version of the religious problem of evil. How can an impartial judge hear heartfelt popular fears and protests yet still approve projects?

"For those who support the concept that public involvement should be an essential component of regulatory decision-making processes, the Alberta legislative framework for the ERCB is both enlightened and unique," Millard wrote. "Unfortunately, the actual results are often less than fully satisfactory. Experience with the system demonstrates certain deficiencies. It is formal and adversarial, which frequently exacerbates conflict between the parties rather than resolving it. It does not provide for a full exchange of information or a forum to deal effectively with the concerns of the affected public. As a consequence, the concerns of the public frequently remain even after the process is complete and the decision rendered. It results in a win-lose situation with the public almost always a loser."

The answer, Millard urged, is "a negotiated approach." He wrote, "Experience demonstrates that a great deal can be done. For example, the board's field inspectors have been efficiently mediating disputes for several decades between land surface owners, usually

a farmer or rancher, and mineral owners, respecting the location of proposed wells and access roads. Their success ratio is high."

Millard recalled conflicts between large facilities and communities where, with strong encouragement from the ERCB, industry voluntarily chose the good-citizenship route. The approach paid off. When industry began to disclose industrial plans and participate in public engagement forums *before* formal construction applications were submitted, communities responded in kind. Hearings were eliminated or shortened into tightly focused reviews of clear issues. The corporate citizen approach led to significant breakthroughs. For example, community benefits and environmental agreements converted Fort MacKay, Wood Buffalo's Aboriginal capital, from a hotbed of resistance into a willing participant in oil sands development. As Millard's early forays into peacemaking matured, they heralded in the mandatory industrial conduct code in *Directive 056* and formed the backbone of services such as formal alternative dispute resolution and Synergy Alberta.

The quest for public consent stopped short of granting communities veto rights over development, but it did give them influence. This power was exercised by persuading firms to modify plans in early public consultations and by convincing the ERCB to incorporate local concerns into lengthy lists of conditions on project approvals. In cases of exceptionally high sensitivity, it became possible to stop industry in its tracks.

THE BATTLE OF WHALEBACK RIDGE

Community muscle proved its strength in the celebrated 1993–94 battle of Whaleback Ridge, a stretch of high country in the Eastern Slopes region of the Rocky Mountains 140 kilometres south of Calgary. In the Eastern Slopes land-use policy adopted by government in 1984, preservation of the area was declared a priority. The policy, coupled with the Special Places 2000 program, aimed to identify and protect stretches of the foothills that were rich in environmental features and historical legacies from Alberta's pioneer ranching era. In 1993, however, this prized landscape was the proposed drilling site for a potentially significant sour-gas target.

The ERCB does not select drilling and production sites. This task is the responsibility of a separate advisory group — the Crown Mineral Disposition Review Committee, with representatives from government authorities that have land-use and environmental responsibilities. The committee screens locations that have been nominated by industry to be posted for sale at twice-monthly auctions of provincial petroleum and natural gas leases. In the Whaleback case, a mineral rights package had been sold beneath the scenic area years earlier, when the provincial protection policy was in the early stages of its evolution.

In 1993, anticipating the community's wishes, the ERCB distributed an information circular, directing industry to take special care with foothills oil and gas

prospects. The circular advised companies to "place particular emphasis on public consultation" and "to address environmental and social issues in a manner which best reflected the potential sensitivity of the various regions along the Eastern Slopes."

The Whaleback drilling plan set off a months-long saga of popular opposition. Concerned groups lined up to intervene, voicing their resistance to any risk of damaging scenic ranches and the natural terrain, which was studded with 575-year-old trees and warmed by frequent Chinook winds that created a winter refuge for elk, wolves, cougars, and bears. The ERCB turned down the drilling application, saying "The Whaleback area represents a truly unique and valuable Alberta ecosystem with extremely high recreational, aesthetic, and wildlife values." The ruling added that the ERCB "accepts the position of some interveners that the area is a primary candidate for protection under the provincial Special Places 2000 program."

POWER-LINE HEARINGS

The Whaleback case was straightforward compared to some complex entanglements the ERCB had to sort out. As the province's population increased, so too did its expectations of industry, causing regulatory mine fields to proliferate. During his tenure as chairman of the board, Millard identified a persistent predicament that eventually boiled over into a conflict that bruised the ERCB 20 years after he retired. Despite all peacemaking efforts, Millard observed, "The ERCB continued to find itself embroiled in acrimonious and difficult public hearings. For a time the board assumed that in these cases the applicant failed to conduct an effective consultation program." But beware of easy answers, he warned: "Such a conclusion was far too simplistic. Evidence indicates that public objections to some proposed energy facilities are often based on concerns about the soundness of government standards to protect public health and the environment. A proponent of an energy facility designs the proposal to meet government standards. If the public does not believe that these standards are sufficiently stringent, then the problem will not be resolved when that proponent initiates a community consultation program."

The dilemma described by Millard caught up with the ERCB in 2007, when popular distrust of provincial electricity policy erupted into an uproar during Edmonton-to-Calgary power-line hearings. The battle hit the ERCB at a tough time: in the midst of structural reorganization and in between chairmen, following the retirement of Neil McCrank that March.

On April 12, the government announced Alberta's resource conservation and public utilities agencies would return to their earlier status as separate entities, ending a marriage of cost-cutting convenience that had combined them as the Alberta Energy and

Utilities Board (EUB) in 1994. Four days later, in a crowded hotel meeting room, tempers boiled over at the power-line hearings. A scuffle broke out amid jeers, cheers, and disparaging protest chants led by a chorus of elderly women called the Singing Grannies.

After a recess, the hearings were rescheduled and moved to a courthouse. In the interim, the ERCB's two-man internal security unit took precautions, which included hiring a private investigation firm, to ensure the hijinks of the earlier session would not be repeated. With an ERCB official's consent, an undercover employee of the security contractor accepted an invitation to participate in an intervener group's conference call and report back on potential threats to the hearings that would resume in May. The intervener group learned about the eavesdropper and fired off protest news releases.

The ensuing publicity furor prompted the government to order two inquiries and appoint a senior Calgary lawyer, William Tilleman, as a troubleshooter chairman of the board. He led a unanimous vote to discard all the power-line proceedings — an intricate case involving numerous hearings and rulings that had been going on since 2004 — as a mistrial. Government professionals took over the security role. Three board members retired.

Industry and the government heeded the findings of an inquiry led by retired Alberta Court of Queen's Bench Justice Delmar Perras. He described the affair as a symptom of the overly complex legal and economic tapestry woven by power deregulation policy since 1996. "The various pieces of legislation and how they are intertwined, and the panel's rulings from time to time on the application, have contributed to confusion, frustration, discontent, and anger, particularly among the landowners [along the proposed power-line route]," the judge wrote. He recommended simplification. He urged the power transmission grid's manager, the Alberta Electric System Operator, to "undertake and devise a public education program to enlighten the general public having regard to the various issues relating to the provision of a safe and reliable electrical system."

In response, the government eliminated a lengthy regulatory stage — a technical "need application" for modifying the power grid — by enacting legislation that authorized the Edmonton-Calgary line. A reincarnation of the project resumed, with expanded community relations programs and construction options, seeking approval from the revived Alberta Utilities Commission. An additional, independent review affirmed the need for new power transmission capacity.

TILLEMAN TAKES THE REINS

In 2009, Tilleman moved on into a federal appointment as a Justice of the Alberta Court of Queen's Bench. In a 2012 interview, Tilleman said, "The ERCB is Alberta's greatest board and one of Canada's top five." He awarded the provincial energy watchdog a spot among the nation's elite regulatory agencies, which included the Canadian Radio-television Telecommunications Commission, the nation's technology czar; the Canadian Transportation Agency, national supervisor of airlines, railways, and long-haul trucking; the Immigration and Refugee Board, a conscience of the nation as well as a factor in its cultural diversity and economy; the Canadian Food Inspection Agency, with life-or-death responsibilities in guarding public health; and the nation's industrial peacekeepers, the federal and provincial labour relations boards. A helmet, which Tilleman wore when visiting industry sites with ERCB field inspectors, occupies a prominent niche in the Calgary judge's chambers, along with mementos of other professional highpoints, such as an autographed photo of his chat with a United States chief justice.

When Tilleman took over the ERCB reins, he quickly learned the grain of truth to inside jokes among energy board chairmen: "You'll sleep like a baby — wake up every two hours and cry." In another version, a new chairman confides in an ERCB veteran about the startlingly heavy workload. The experienced hand replies, "Don't worry about not sleeping well because that way you can work more."

At home, it wasn't long before Tilleman was asked to explain the 12- to 13-hour workdays that soon included Saturdays and threatened to spill over onto Sundays. "Everyone was at my door," he said. On his very first day on the job, he had to deal with 14 issues: ethics, communications, energy supplies, environmental protection, wellbore cementing, abandoned wells, corrosion, geology, mapping, infrastructure development, utilities, economics, public service rate-setting, and community outreach. At the same time that he was shepherding the EUB through the power-line crisis, he supervised the plan for dividing it back into two agencies: the restored Energy Resources Conservation Board would be responsible for oil, gas, coal, and their by-products, and the revived Alberta Utilities Commission (AUC) would be in charge of electricity and consumer aspects of other public services.

Both the ERCB and the AUC learned a valuable lesson from the eavesdropping incident and the ensuing political fracas and inquiries. The importance of the fair and equal treatment of everyone involved in energy conflicts and of due process standards that respect the rights of even rude protestors was etched into the regulatory consciousness. "That became the hallmark of that year and those hearings," Tilleman said. "Ten years before people would have responded differently. It was a new time and a new Alberta public."

SORTING THE POWER-LINE LEGACY

In the end, the power-line affair clarified the community accountability code that Millard introduced when he was at the ERCB helm in the 1970s. By the standards of his time, Millard started bold reforms by inviting citizen participation in the almost exclusively technical and engineering arena of ERCB proceedings. "It took a tenacious effort on his part," retired chairman Gerry DeSorcy recalled in an ERCB oral history interview. "He was very brave. He didn't have a lot of support to begin with, including within the organization."

DeSorcy, an engineer, admitted, "Many of us, and I include myself, liked that old world we lived in very much. I was a bit shocked and ticked off that these people in the public thought the board wasn't doing its job. I was inclined to give them the back of my hand. But Mr. Millard was saying we can't do that. They are not going to go away. They are going to grow more involved. If we gave them the back of our hand these few — even though they may be extremists — will be able to gather all kinds of support from non-extremists. He recognized that wasn't going to succeed on the part of the board or on the part of industry. He convinced us. He convinced many senior people in industry."

The Edmonton-Calgary transmission line case tested the regulatory regime's adaptability on two fronts: provincial economic policy and community relations. When he was appointed EUB chairman in 1998, McCrank faced the daunting task of sorting out the tangled legacy of power deregulation. The policy was a foray into a new energy frontier. In retirement, he remembered that time as his most challenging at the helm. His mandate from the provincial cabinet was, "Go make it work."

The power-line project was just one facet of the assignment. The deregulation policy encouraged competitive services by splintering the two existing regulated utility conglomerates into nearly 100 transmission, distribution, and generation companies working under an array of new and untried fairness rules. In electricity as in petroleum — and especially sour-gas development — McCrank said, "There was no doubt we had a suspicious public. We do good work but nobody knows it. People either had no knowledge of the board or had only heard of mistakes."

Reversing early-1990s budget and staff cuts that had been brought on by provincial austerity proved key to improving the situation. After raising fresh funds with government-matched industry levies, McCrank led a revival of safety, environment, community, and communications programs. "We were able to stop the bleeding," he said. "There was no question that industry knew the effectiveness of an independent regulator."

EAGLE EYE

When ***Tito Panei*** graduated from university in 1994, his "green science" credentials in ecology and geography were a definite asset. Despite an economic slump that froze company and government hiring, he landed a job at the ERCB. Initially, he worked for information services, procuring energy sector information and learning the ways of the ERCB and its varied business scenes. He rose through data entry, well testing, and audit and now completes a more detailed regulatory review in what is called nonroutine applications. These applications can make up about 10 per cent of industry requests and represent projects that may pose increased risk, arouse public objections (which could trigger dispute resolution and/or hearing processes), raise technical questions, or propose new equipment and processes.

"Every application's different," Panei said in an interview. The ERCB application system and its competent nonroutine staff address technical "anomalies," deficiencies, and other concerns buried in the tens of thousands of routine industry applications received each year. For example, a seemingly routine request for a licence to drill "sweet" natural gas can catch the Alberta regulatory eye if the proposed location is surrounded by wells of similar design producing "sour" natural gas. In response, the ERCB sends a pointed request to the applicant: prove to us that the company is not discounting the possibility that this proposed well could also produce sour natural gas.

At times, the applications dragnet puts in motion the ERCB tradition of pioneering energy technology.

For instance, new pipeline technology can trigger a nonroutine application process, such as when industry proposed using new composite materials in the building of pipelines as cost-cutting and corrosion-proof alternatives to steel. An engineering gap had to be filled before the use of such pipe could be considered on a larger scale. The Canadian Standards Association did not have a yardstick for measuring safe operating design for this new pipe material. Through extensive lab work by industry and monitoring field trials, the ERCB was able to accept this new type of pipe.

"We encourage companies to innovate, but also to engage our expert groups before submitting applications," Panei said. "The variety of applications is what I like, but most of all it's the people that make me go. We have open lines of communication within our group, consisting of co-workers with a wide range of regulatory expertise."

APPROPRIATE DISPUTE RESOLUTION

Business confidence in the ERCB grew after one of its senior engineers, Bill Remmer, spearheaded a program for improving community relations. In 1998, while he was presiding over a contested hearing on a project that aroused local resistance, he made a startling discovery: "The first time the decision-makers in the company had ever met the landowner was at the hearing. I said, 'There's got to be a better way.'" Remmer suggested that informal, voluntary conflict settlements could be facilitated by ERCB staff, and formal mediation could be facilitated by specially trained employees and ERCB-recommended independent professionals. By 2001, Remmer's proposal formed the backbone of a service called appropriate dispute resolution (ADR). Remmer said that his idea grew into an ERCB program because, in addition to enlisting ERCB board member Arden Berg as its champion, he secured support from the Canadian Association of Petroleum Producers.

This trade group, whose members account for more than nine-tenths of the nation's oil and gas output, donated expertise, time, and cash to hire consultants who crafted a 107-page blueprint for industrial peacekeeping. For the program to succeed, this corporate participation was a must, Remmer said. "We didn't want to impose mediation. You have to have their support to make it work. You have to have regulations that make sense and are feasible—and that most companies realize are the right things to do."

Only 4 to 5 per cent of ERCB cases are contested after companies comply with requirements for early public notice and consultation. Specialists in the ERCB's head office keep the peace by enforcing compliance with directives that lay out community relations blueprints. The ERCB guides sponsors in developing successful project plans by encouraging them to pay attention to the concerns of landowners, residents, and municipal governments.

The Alberta energy industry is so active that even the tiny minority of disputed schemes keeps a seven-member ADR team busy. During the program's first decade (2001–10), the ERCB dealt with 390 787 applications, received 14 616 written objections, and completed 1527 ADR files. Peacekeeping work ranged from half-day information meetings to weeks-long negotiations involving multiple issues, citizens, companies, and experts. The voluntary settlements were credited with averting 195 public hearings and shortening many others.

Not everyone is suited to be a conflict manager, said Anna Rose, a thirty-year ERCB veteran who started as a records clerk and rose through the ranks. Along with professional training, the role requires patience, a genuine interest in people, an open mind, a knack for identifying mutual interests, a desire to help resolve disputes, and the ability to avoid taking criticism personally or becoming defensive, she said in an interview. Because issues often churn up a lot of

emotion, a key part of the job is learning how to cool tempers and alleviate fears. Rose's soft-spoken yet firm manner make her a perfect fit for the job. "We create an agenda. We pin it down to what are the issues. Is it, for instance, flaring? Is it water concerns? And so on. We break it down into resolvable issues. You can't just come to this meeting to rant and rave."

WORKING WITH TRADITIONAL SOCIETIES

In 2011, inspired by its success as a peacekeeper, the ERCB created the Stakeholder Engagement Office with a mandate to spread cooperative spirit. Veteran relationship builder Tom McGee, a former Drayton Valley mayor and oilfield services entrepreneur, managed the office using methods that ranged from traditional town hall meetings to modern community-relations computer software.

Through his work, McGee learned that Aboriginal issues needed to be front and centre in energy development. Bruce Gladue, a Métis, took on the stakeholder office's Aboriginal affairs portfolio. "Everybody talks to one another now," he said in an interview. "All the First Nations and chiefs in Canada are strategizing about how to use the duty to consult. Oil and gas activity has brought them together, in terms of how to deal with its impact." The phrase "duty to consult" refers to the national obligation placed on government and industry by 1980s constitutional reform that set off decades of efforts to put its principles into practice.

"We all need each other now," said Tom McDonald, a veteran Aboriginal relations worker who serves both his own Aseniwuche Winewak Nation and a coal mine near Grande Cache. The town is an outpost of economic expansion into his native community's traditional territory which runs from Jasper National Park north to the Beaverlodge area west of Grande Prairie. The Cree name means Rocky Mountain People. Rich oil and gas deposits make the peaks, valleys, foothills, and forests a hotbed of industry.

In 2007, a high in the Alberta drilling cycle kept McDonald's Aseniwuche bureau hopping, with more than 5000 notices or files submitted by about 150 firms. Consultation arts include picking significant developments, worth extended review time, out of the industrial routine of minor additions or changes to established operations. "The ERCB is very nice to have in the process," he said in an interview. "It makes companies behave. When a proponent [project sponsor] knows somebody's watching they behave differently."

McDonald appreciates Gladue's role, seeing it as a step in the right direction for the ERCB. "Once you gather factual information — not opinions — you will understand why we react the way we do," he said. ERCB and industry expectations can make obtaining consent to drill for oil or build a pipeline difficult for even the most well-intentioned consultation specialist. For

Aboriginal communities, the situation is exacerbated by additional paperwork that the Canadian government requires of traditional societies.

Not long ago, the Aseniwuche Winewak lived as a network of roving family or kinship circles, recalled McDonald. "People moved around and chose where they wanted to live. As a boy I had to go get water, gather wood, and top up the fuel lantern. Drinking water came from a small creek. We always took an axe to chop the ice. There were some cattle and gardens. Trapping was unregulated. You could go into any house. Everybody was very supportive of each other. You had to work together to survive. You had to work as a team. You couldn't be adversarial."

McDonald's 1960s and '70s youth coincided with the creation of the modern Mountain Cree structure of non-profit cooperatives and enterprises, run by official managers on defined settlement sites. As an adult, his work involves supporting communities to adapt to larger hierarchical organizations using methods such as scheduled monthly meetings and standardized approval procedures. The shift in perspective is significant: "Our governance was very different from the Euro-Canadian style. Some were recognized as community leaders with special gifts. People looked up to them because they had certain qualities." No boss chiefs barked out orders. "Traditionally, to make a decision if it affected the entire community, the leader would always seek an agreement."

FACE-TO-FACE
A landowner affected by a specific energy development project meets with industry and ERCB representatives to discuss concerns through the appropriate dispute resolution (ADR) process.
Photo by Chris Beeger

As with their counterparts in the oil sand region of northeastern Alberta, the Aseniwuche Winewak in the northwest are realistic, McDonald observed. "It's very difficult for us to live off the land any more. Money is a necessary thing," he added. In his experience, native communities did not automatically oppose all industry. "Our culture's not static. It changes and evolves." Aseniwuche Winewak entrepreneurs responded to industrial expansion with new businesses ranging from environmental services to fabricating steel oilfield equipment. "Having those ERCB people is valuable, even just to bounce ideas off and share information. They are open." McDonald said. "I looked at it as a sandbox. I just wanted to play nice."

RISK AND REWARD

Like the civil courts, the ERCB relies on citizens to clearly articulate their desires and grievances, support their requests with evidence, and answer questions by other parties. When opposing factions "play nice" the Alberta regulatory regime succeeds. When they don't, trouble erupts. The modern ERCB record reveals striking examples of its failures and successes: a pair of nationally celebrated sour-gas cases highlight, on one hand, the risks of refusing to participate in the process and, on the other, the rewards of following the rules.

In 2000, the ERCB rejected an appeal for an inquiry into industry activity made by a religious commune, the Trickle Creek Farm, and its leader Wiebo Ludwig. The Grande Prairie–area group's tactics gave the ERCB no choice. Years of friction and fruitless mediation efforts included a futile attempt to provide Trickle Creek with an inquiry two years earlier. In 1998, the ERCB and three companies paid Trickle Creek's expenses to retain a lawyer, choose a neutral facilitator, hire an environmental consultant, and set up an orderly process for reviewing its grievances. About 60 community, business, and government representatives attended a meeting to start the ball rolling. The commune's leaders, including Ludwig, arrived late, refused to participate, and marched out early after reading a statement claiming the session was an inappropriate forum for airing their concerns.

Trickle Creek's unsuccessful request for an inquiry occurred with Ludwig at the height of protester infamy. He served a penitentiary term after being convicted of criminal offenses arising from bombings at sour-gas installations. A teenage girl was shot and killed while riding in a pickup truck with other youths on a counter-protest in a country lane near the commune. The homicide remains unsolved.

In central Alberta, a much different case emphasized the high provincial standards for industry in populated areas. After a contested hearing, the ERCB rejected a drilling application for an exploration well at a potentially rich sour-gas formation near Rocky Mountain House. The ERCB ruled that even though the plan might rate as adequately safe by purely technical standards, it fell short of satisfying requirements for public consent.

The company "significantly underestimated the concerns of the area residents" and "made a number of errors in the early stages of its consultation program," the ERCB found. One of its biggest mistakes was taking cooperation for granted in a district where, for 36 years, industry had tapped gas that was 36 per cent lethal hydrogen sulphide. The errors "included assuming that the presence of regional oil and gas development meant that public concerns about new development would be reduced," the ERCB said.

The case centred on the proposed emergency response plan for coping with the worst-case scenario

of a blowout, a requirement for hazardous sour-gas drilling since the 1982 Lodgepole disaster. Community representatives argued that the industry-standard emergency plan did not adequately address the local geography, residential layout, and land-use patterns. The landscape around the proposed well included a steep-sided river valley that posed obstacles against evacuating the danger zone in a blowout. "This is compounded by other local area features including a large number of transient [tourism and recreational] users particularly during the summer months, the nearby presence of high-traffic roads, and the presence of a number of hypersensitive residents in proximity to the well," the ruling said. The company acknowledged its mistakes, moved on to other drilling targets, and vowed to improve its community relations operation.

INDUSTRY AND COMMUNITY INTERTWINED

The vast tract of northwestern Alberta patrolled by the ERCB's Grande Prairie field centre is studded with examples of constructive engagement between industry and communities. For example, 80 kilometres west of Grande Prairie, in the hamlet of Demmitt, stands the Demmitt Cultural Centre, an environmental showpiece supported by community and industry alike. The centre stands out as a foray into sustainable community development and draws capacity crowds that are treated to roving entertainers and artists in a mixed landscape of farms, wooded hills, and sour-gas production facilities.

Peter von Tiesenhausen led the centre's fund-raising campaign and local building bee. As a sculptor, painter, and environmentalist of international stature, von Tiesenhausen is no toady to the oil and gas industry. He kept wells, compressors, and pipelines off his three square kilometres of trees and meadows by studding his property with sculptures and installations that allowed him to legally copyright his property as a work of art and demand premium compensation for intrusions. But as a descendant of northwest Alberta homesteaders and a former bulldozer operator, von Tiesenhausen also understood the intertwined roots of the province's communities and energy industry. "We are part of this whole system," he said. "It's the reality of this economy."

Von Tiesenhausen describes the relationship between community and industry as a "shotgun marriage," an image that is captured in the Demmitt Cultural Centre's construction. Steel sucker rods, scavenged from old oilfield pumps, hold together a structure made from trees killed by the northern pine beetle infestation, insulated with straw bales, and heated by an ultra-efficient modern wood-burning contraption that is a cross between a fireplace, a furnace, and an oven.

When seeking contributions to build the centre, von Tiesenhausen and his committee did not hesitate

to seek support from industry. Donors listed on the entrance sign include oil and gas developers, their supply and service contractors, and the local power company. "Most of the people around here work in the oil patch. When we needed money we went to the places that had it," von Tiesenhausen said. He chose not to worry about whether the donors were motivated less by conscience than by "green-washing," the desire for a public image tinged with fashionable sustainability. "It's the people that matter," he said. "An oil company's a machine. It's when you have people that are passionate that things happen."

There is "absolutely" a love-hate relationship between northern communities and industry, says Marilyn Skinner, an amiable but fiercely independent widow who raised five children on her own after her husband died. "Open fields, trees — that's what I love — space. I hate going to town even to do shopping." In a kitchen interview over a cup of tea, she credits sensitive ERCB staff with preventing a years-long pollution case on her poultry farm near Wembley, about 20 kilometres west of Grande Prairie, from blowing up into a battle.

After Alberta Environment confirmed that Skinner's ducklings and goslings were dying from swimming and drinking in contaminated rain puddles, oil and cleanup technicians arrived on the scene and set up about two dozen monitoring devices. The devices tracked down a toxic stew of diesel fuel and brine that was slowly leaking across her property from a drained, deserted oil well and old, crude earth "sumps" or pits for storing and discarding drilling materials. The ERCB traced the site's long, complicated industrial pedigree and discovered that the old well and pits had changed hands five times in corporate asset transactions. The current owner did not cause the mess but accepted responsibility. But the $1 million–plus repair job became as disruptive to Skinner and her family as the original pollution.

"They had to learn that it is very emotional for people to suddenly have their whole life ripped apart," Skinner said. "We had a workshop in our farmyard that had to be knocked down because it was on top of a sump. It really upset my son. His dad died when he was nine years old. Their time together was in that shop. Emotionally this kind of thing can be quite devastating. When they were knocking down the shop my son said, 'That was my dad's — look what they're doing to my dad's stuff.'"

ERCB personnel, in particular Grande Prairie office leader Candace MacDonald, listened carefully to Skinner's concerns and arranged meetings between her and representatives from the oil company, the cleanup contractor, and Alberta Environment. "With the ERCB I never felt I was asking a stupid question. They were so good about making sure I understood what was going on. For Candace there was never, ever a stupid question. She kept me informed."

DIPLOMAT

As Alberta's top regulator, the ERCB fields calls from one and all — from property owners concerned about industrial projects to oilfield contractors with questions about standards. Many callers reached ***Beverly Nylen***, assistant to the chair of the ERCB. "I redirect them to the right place," Nylen said in an interview. "I do it simply because I'm representing the chairman. If someone's calling him, they're going to get proper service."

For the most part, Nylen simply pointed callers in the right direction. "Usually it's only people trying to find out who they should talk to," Nylen said. "They've just taken the chairman's name and telephone number off the ERCB website." She did not need to be familiar with all of the ERCB's technical ins and outs.

As assistant to the chair, Nylen worked out of her own office, a perk otherwise reserved for bosses in the open-concept layout of ERCB headquarters. She understood the responsibilities of the expert executive managers, who are one organizational step under the provincially-appointed board members. As well, she appreciated the sensitivity required at the top decision-making level. Like court judges, ERCB board members cannot talk to those involved in hearings or cases once they are under way.

Diplomacy was only one of her arts. She was also a skilled organizer, managing the chair's busy calendar and materials such as files or reports. She particularly enjoyed working for chair Dan McFayden, an engineer with industry as well as government experience

including a stint as Alberta's deputy energy minister, who was appointed in 2008. "It's a fabulous job," Nylen said. "He's the best person I ever worked with. It's just a respectful, professional environment."

Nylen paid dues that prepared her well for her role at the ERCB. Raised in a newspaper family, she was only the sixth female apprentice to qualify as a printer in her native British Columbia. It was a breakthrough into a male bastion akin to the band of brothers that ran Alberta drilling rigs. Before joining the ERCB in 2006, she also worked in purchasing and inventory control at a packaging industry warehouse. Her breadth of experience instilled an attitude needed in an agency that deals with a human spectrum from farmers and roughnecks to scientists and politicians. On the job, she said, "I'm conversing with the person — not with the title or the rank."

The ERCB's peacekeeping activities allowed industry to keep a friend who did not let her troubles make her forget its northern contributions. "Up here people worked on farms in the summer and in winter on the oil derricks. They saved all that money and now have their own farms. I can point out many, many people that did that," Skinner said. "My attitude is, if you're dead set against that industry why do you drive? If you don't like the oil companies you're not going to drive. You're not going to farm. We need them."

On a farm 200 kilometres away from Skinner's, in a Peace River region that settlers call Three Creeks, but that oil sands developers renamed Seal after their target geological formation, Karen Dziengielewski handed down the same verdict on industry "I don't want them out. I don't want to shut them down. It's our future," said Dziengielewski. "But they can clean up. Maybe they can have better training."

When Dziengielewski decided to call provincial authorities about vapours that were wafting her way from the Seal fields, she did so only after careful consideration. "I don't believe in hanging off a bridge or chaining myself to a fence — that's not me," she said, referring to publicity stunts by protest movements. Self-reliance and a strong work ethic are instilled into locals like Dziengielewski by ancestors who homesteaded the area in the mid-twentieth century. The legacy shows in local sayings, such as "a rock has babies," and memories of picking stones and pulling out tree stumps to prepare fields for ploughing. "It helped to have a few kids," she recalled.

But when her husband, Henry, began to experience spells of uncontrollable coughing when exposed to potent vapours from oilfield leaks, Dziengielewski knew she had to act. An unintended by-product of Seal bitumen triggered her husband's asthma. In the right temperature and wind conditions, Dziengielewski detected a telltale odour that she described as akin to fresh roof tar or road pavement. The odour could be traced to concentrated emissions flowing into farmyards and houses via landscape channels such as creek beds, gullies, and ditches.

Initially, when Seal production was relatively small, Dziengielewski reported her concerns directly to the company. Leaks were often fixed quickly and simply, for instance, by closing a valve accidentally left open on a storage tank. She recalled being thanked by a company for spotting slipups.

However, as production increased, the personal approach no longer worked. "There are so many companies out there now you don't know who to call. So you phone the ERCB. It's their job to put their foot down and make sure things are running right," Dziengielewski said. ERCB representatives respond around the clock, she reported. "If they weren't here and didn't do anything out there we'd be dead or we'd move because we wouldn't be able to stand it

health-wise," added her husband. With the ERCB's encouragement, representatives from the community and the Seal oilfield formed the Three Creeks Emissions Working Group, providing a forum for complaints, follow-ups, suggestions, and mutual education. "The ERCB's got their work cut out for them, I know that—just keeping those guys on their toes," she said. Like Skinner, Dziengielewski emphasized that the Alberta public needs a sensitive regulatory agency, with a clear understanding of local conditions which may seem like minor issues to roving or urban industrial and government personnel. "This is my sanctuary. This is my home. This is where I want to put up my feet and not be coughing or wondering what's in the air."

The Woodland Cree First Nation, a community of hunters, trappers, and industrial workers in the sparsely populated woods northeast of Peace River around Cadotte Lake, also reached out to the ERCB for its reliable, impartial expertise. "Who do you believe? Who do you trust nowadays?" said Isaac Ausinis (Little Stone) Laboucan-Avirom, a band councillor with the Woodland Cree. Concerns radiated across the region following a pipeline rupture that spilled an estimated 28 000 barrels (4.5 million litres) of oil into the north end of the community as the snow was melting and runoff water was flowing in the spring of 2011.

The "sweet" crude that was leaking into the community did not contain any lethal impurities, such as hydrogen sulphide. With ERCB sentinels on the scene observing every move, the pipeline was swiftly shut down, the leak stopped, and the cleanup begun. For four months, operations ceased while the ERCB investigated the spill's causes, and pipeline personnel hunted down other potential weak spots, made repairs, and improved its emergency response capabilities.

The incident added a dimension to oilfield supervision that Laboucan-Avirom described as a modern necessity. Communications specialists, dispatched to the spill from ERCB headquarters in Calgary, spotted and temporarily filled a gap in pipeline personnel's conduct. "They informed us about what was going on." The ERCB directed the company to devise, without delay, its own communications program. Candor about mishaps, effects, and cleanups provides comfort that everyone needs, Laboucan-Avirom said.

In an age that is hypersensitive to the link between safety and environment, fear can spread quickly, especially when broadcast and digital networks hum with information and disinformation. Aboriginal and farm families, who live on intimate terms with nature and industry alike, are straddling old and new worlds, says Laboucan-Avirom. He pointed to himself as a model case.

When Laboucan-Avirom worked as an industrial mechanic, or millwright, in the oil and gas industry, he was glued to the latest touch-screen digital communicator. But his skills included wilderness hiking

and subarctic winter camping. As a boy, he didn't run errands at the supermarket. His chores included activities like collecting firewood while out on moose hunts with relatives who drank untreated water from the streams and followed ancient game trails. "We used to walk for hours, for days, everywhere. My native life was the best times," he recalled. "That's an awesome life." He thumped his chest, saying, "You feel it right here." Even though the pipeline leak was "clean," the implications were potentially disastrous. "Once you lose trust in the water, that's huge because people don't want to go out in the bush anymore," said Laboucan-Avirom.

"Without the board there would be no one to turn to," said Everett McDonald, reeve of Grande Prairie County, where 3400 oil and gas industry sites share a 5570-square-kilometre landscape — an area the size of Prince Edward Island — with forests, crops, and parks. As a third-generation farmer, whose grandfather hiked for 30 days up the pre-railway Edson Trail in 1911 to start the family homestead, McDonald is plenty familiar with the northern pattern of constant interaction and frequent friction between community, environmental, and industrial concerns. In an interview, he recalled resorting to the ERCB on issues from weed control to pipelines.

"The ERCB is the balancing factor," McDonald said. "You need to have some regulatory body that is just and fair. It needs to be a judiciary-like body that can make a decision without regard to personality. It has to be made on law and fairness." As "Now Hiring" signs went up at industrial sites across his county in 2012, he predicted "there's always going to be a need." He added that, thanks to the ERCB's notice and consultation rules for oil and gas developers, "They're being much more amenable to landowners' requests than in the past."

THE NEW NORMAL

Working effectively with communities, industry, and government is a cornerstone of the ERCB's vision: to be the best non-conventional oil and gas regulator in the world. Dan McFadyen set the goal for 2013, the ERCB's 75th anniversary year, after his appointment as chairman in 2008. The term non-conventional here refers to the how of regulation, but it also alludes to a what — namely, unconventional resources.

This terminology describes a new version of normal for Alberta that emerged when McFadyen took the helm. In the energy sector, the term unconventional does not describe personal dress or behaviour. The term is used alongside other business hot-button phrases like "resource plays" and "technology frontier." The board chairman made adapting to industry evolution a priority by focusing ERCB efforts on devising an approach called the Unconventional Regulatory Framework for the new operating methods as they spread beyond the oil sands.

The jargon refers to the departure from geological targets and production techniques common in the fortune-hunting era — namely, targeting dispersed formations of porous rock that have sufficient porosity and permeability that oil and gas freely flow when drill bits puncture them. Unconventional methods are more like manufacturing. The raw materials are resources that were previously beyond economic reach. Companies obtain large packages or "plays" of rights to deposits embedded in sand or dense rock. Production lasts for years. Projects create the porosity and permeability required for oil and gas flow with potent technology, primarily by fracturing the rock with high-pressure bursts of fluids as powerful as dynamite blasts via multiple deep horizontal wells.

The new regulatory approach, termed play- and risk-based by McFadyen, went far beyond approving and policing only drilling or just enforcing standards on one well at a time. The scheme was crafted to identify and manage the full range of unconventional project sizes and hazards over their life spans.

Community aspects focus on the heightened scope and intensity of development. The agenda includes providing early and thorough disclosure of industry plans, explaining the technology and the ERCB's role, anticipating land-surface effects such as traffic and noise, taking safety and environmental precautions, and adapting operations to local conditions.

From 2007 to 2010, as unconventional oil and gas operations evolved rapidly, performance suggested that the ERCB was on the right track. Compared to the total number of new wells, pipelines, and other facilities, the number of public hearings dealing with unresolved disputes remained tiny.

The ERCB received 111 996 applications during the three-year period, showed records collected by board member Alex Bolton. Of these, only 36 hearings were held on community objections: 99.97 per cent of the files were cleared without using the regulatory system's last resort. Negotiations achieved peace in two-thirds of the worst fights. In 70 of 106 disputed cases where the ERCB initially granted hearings, the battles were cancelled as a result of settlements.

In 2011, as a guest of the energy and commerce committee of the U.S. House of Representatives in Washington, D.C., McFadyen described the ERCB's approach to achieving the Alberta ideal of civilized industry. "We look at three criteria to determine if a project is in the public interest: environmental protection including cumulative effects, societal impacts, and economic impacts," said the ERCB chairman. "Our regulatory regime is not static; it is based on continuous learning and continuous improvement."

OPEN ACCESS
All comers are admitted to the ERCB Core Research Centre in northwest Calgary, which industry veterans describe as a resource exploration counterpart to the legendary gold vault of Fort Knox. Along with rock cores, visitors scour matching drill-bit cuttings and drilling rig "tour reports," logs that preserve memories of all wells that have searched for Alberta oil and gas.
ERCB Library 87.022 *no*326

SIX
MENTOR

Clues to the location of Alberta's buried treasure awaited fortune hunters who were lured to the province by the Leduc gusher in 1947. All they had to do was knock on the door at the Energy Resources Conservation Board to find all the hints they needed. "They were brilliant for that," recalled Ned Gilbert, referring to the ERCB's open-door policy regarding knowledge and artifacts. In the 1940s and '50s, Gilbert, whose long career in the oil industry earned him a spot in the Canadian Petroleum Hall of Fame, used that open record to grab a rewarding share of the drilling pie for a corporate grandee from the United States. After checking into a Calgary hotel, his first stop was the industry's public knowledge warehouse—the ERCB Core Research Centre.

By American industry standards, Gilbert had a fearsome assignment. Identify and buy likely oil and gas targets in a province that, at 661 848 square kilometres,

SUBTERRANEAN SIGNPOSTS Earth scientists prize core samples as trail markers for maps of underground formations. Since the dawn of Alberta drilling, the province has required that samples from every well be kept on file and made available to all who have the geological know-how to use them for finding buried natural treasure. *ERCB Library* 87.022 *no*028, *Bohme Collection*

was 95 per cent the size of Texas. As he perused the centre's open records, his confidence in accomplishing the task grew quickly. One of his early acquisitions included an oil sands lease that still stands out as a mainstay of production growth by the first Fort McMurray bitumen mining and upgrading complex.

As a Wisconsin-born geologist, Gilbert was not accustomed to Alberta's way of doing business. Back home, he groped through the veils of secrecy that cloaked American privately owned mineral rights where "lots of data was kept confidential," he said. "The ERCB was the first place that actually had a collection of everything," he added. "Everything" included oil and gas exploration artifacts, which have been stored by the ERCB since before the 1930 transfer of Alberta mineral rights to the province from the federal government, and records of industry activity, which have been preserved by the ERCB since its inception in 1911.

Then, as today, all manner of ERCB-collected material was available to the public: core samples from wells, cuttings from drill bits, and rig tour reports (the drilling counterpart to ship captains' logs). While ERCB staff did not draw Gilbert a map, mark it with an X, and show him where to drill, they did provide him with the resources he needed to make his decisions. "They were a great help to me when I first started. They told me how to find information in their files. I made maps with well data," he said.

During the heyday of exploration drilling that followed the Leduc discovery, Gilbert had plenty of company in the ERCB's sample lab, which was in the basement of the Calgary headquarters. "There was billions of dollars' worth of data," recalled Jim Gray, another hall-of-famer and an avid user of the lab. "When we started Canadian Hunter we talked about the enormous asset the ERCB was," Gray said, referring to the celebrated firm that he and fellow geologist John Masters built from scratch. "There was no way we could have launched Canadian Hunter if we hadn't had access to that data. . . . We gathered that stuff up like a sponge," he said. His time was well spent. In the 1970s, Canadian Hunter found one of the world's biggest gas fields in northwest Alberta and in 2001 fetched $3.3 billion for the operation in a takeover by a Texas company.

The fortune hunters never had any doubt about who was in charge of enforcing publicly acceptable standards of behaviour in oil and gas fields. "We tried to leave every place better than we found it. We were totally subject to the board. They had the big hammer. We were there at the pleasure of Alberta. They represented the pleasure of the people of Alberta," Gray recalled.

For the industry's youthful explorer-era geologists, the ERCB basement "was like a second home," explained Gray. "There was an intimacy and fun about it. The ERCB was an integral part of this industry. We spent weeks, weeks, and weeks going over there. It was just a wonderful library. Access was great and it was so well organized." ERCB personnel played an important role, Gray said. "They were kind of like our mentors — our family. They were like our partners."

ROOM TO GROW

As drilling proliferated across Alberta, the ERCB overflowed with knowledge. It was heavy stuff — literally. By 1962, the geological record had outgrown its basement home. The contents were moved to two barn-sized sheds in the Manchester industrial district of southeast Calgary, where tall racks were crammed with rock samples and paper files. The ERCB recruited Art Shepard, whose expertise as manager of aircraft storage and maintenance hangars was put to good use, to build the ERCB's modern research centre near the University of Calgary. The project responded to popular demand from the industry.

A little-known mishap confirmed the need for Shepard's expertise. "The first time I went out to see those sheds, all of a sudden I heard a creak, kind of a moan," he recalled in oral history memoirs retained in the ERCB library. "I scrounged around and found an old piece of string and a nail, and I made a plumb bob and hung it up. Sure enough those racks were a good inch-and-a-half to two inches (four to five centimetres) out of plumb. Just as I was looking, it gave another groan and the core rack leaned over visibly."

Shepard immediately hustled four geologists who were doing research in the shed out the door. "There were some threats about who they were going to see in the board. But they did go. I got out of the building and closed the door. Their car was maybe 20 yards away. Before they got to it, the building gave a great big groan and the whole thing keeled over. Collapsed," Shepard said.

"The thing I remember most vividly was that it rained roofing nails all over their car, all over us. As the building went over, the nails popped out. They went straight up in the air and came down like rain. There was no bracing on the building. North winds had kept pushing it a little bit, and pushing it a little bit. And the racks had been overloaded. They were never properly designed."

The episode inspired lively stress tests of the racks that suppliers were peddling to Shepard for the new building. His largest employee climbed sample structures and jumped up and down on them to test their strength. At least one rack resembled a pretzel by the end.

CORE RESEARCH CENTRE

Half a century later, the ERCB Core Research Centre housed 1.3 million boxes of well cores, each weighing 14 to 18 kilograms. By heft, the rock archives gathered from Alberta's oil and gas fields dwarfed the 225-tonne Statue of Liberty. The 18 000-square-metre building also held 18.5 million vials of drill-bit cuttings and nearly 400 000 rig tour reports.

Manager Kevin Kardelis, a thirty-year veteran of the centre who started as a core handler manning a forklift, described the building as "an engineering feat," altogether unlike the sheds that it replaced. The foundations were pounded deep into the bedrock beneath the swampy horse pasture that eventually became the U of C research park, a compound filled with laboratories and technical services. "When I started here, staff used to open a back door and feed ducks," Kardelis recalled in an interview. When it was time to construct an addition, "They were driving pilings for weeks."

Inside, 10-metre-tall shelves run for kilometres, showing no signs of strain or misuse. When fetching core samples for researchers, the centre's 30 employees travel the aisles on forklifts guided by an electronic control grid embedded in the floor. Their hands-free trek ensures no wear and tear is inflicted on the shelves by unnecessary bumping. Once retrieved, the requested materials are loaded onto conveyor belts and carts and relayed to desks with built-in features that ensure convenient and safe handling. The researchers pay modest user fees to help cover costs of the centre, which is also supported by industry and government contributions.

"Legwork gets done here. A geologist who spends a couple of thousand dollars on core work significantly

reduces drilling risk," said Kardelis. Construction of a single, accessible, and specially designed knowledge depot served all concerned. "It gave everybody a level playing field, from the smallest operators up to the biggest."

As well as a one-stop research shop, the centre provides industry groups, government agencies, academic institutions, and learned professional societies with the perfect venue for hosting seminars, courses, workshops, and displays. Visitors from every oil-producing country on the planet have visited the centre, from Brunei and China to Russia and Thailand.

BREADTH OF EXPERIENCE

Like Shepard, Kardelis was neither an earth scientist nor a petroleum engineer. But he did know a lot about construction, transportation, and oilfield tools. "I know the weight of the metal," he said.

For the ERCB and industry alike, the tradition of hiring managers from outside the science-based professions is viewed as one more research centre asset.

HEAVY KNOWLEDGE The ERCB's Core Research Centre is an engineering feat the size of an aircraft hangar. Located near the University of Calgary since the 1960s, the 18 000-square-metre building houses stone archives that date back to the dawn of Alberta drilling before the First World War — more than 1.3 million boxes of well cores that weigh 14–18 kilograms apiece. On demand from earth scientists, centre employees retrieve the files using forklifts that travel along an electronic grid embedded in the floor and reach to the top of 30-metre shelves. *ERCB Library* 87.022 *no*335

"At any given time, the scientists tend to want to emphasize collecting and keeping particular types of materials," Kardelis explained. "But the fields of emphasis change. There was a push not long ago to remove shale samples from the shelves, for instance." As he spoke, a geologist working nearby scrutinized shale drill-bit cuttings using a high-powered microscope and attached camera. The pictures would be analyzed further to determine the suitability of a formation for new-wave production with "unconventional" techniques of horizontal drilling and formation fracturing.

"What's of no value today becomes tomorrow's hot commodity," Kardelis observed. His view echoes the compulsive-collector philosophy that Shepard embraced in his years as the centre's manager: "If there was any single core out in that building that I knew for certain would never be looked at, I would destroy it today." But of course he has no such knowledge, so such a step has never been taken. If an older core were destroyed, "It wouldn't be there to go back and take a second look at in the light of new technologies or knowledge" Shepard said. "Over 50 per cent of the core that's brought out is what you would term older. It's coming out of the very old section of the building. That's because we're going back and looking at reservoirs in light of different production techniques and financial situations."

When Canadian oil entrepreneurs tried their luck south of the border, they missed having access to information. "What we're used to in Alberta puts us at a terrible disadvantage when you start operating generally in the United States," said R.H. (Bob) Brown, an engineer who left the ERCB for industry and led drilling campaigns in Ohio, West Virginia, Pennsylvania, Texas, Oklahoma, and Kentucky. "Texas and Oklahoma are probably as good as you'll find in the States — and even there, there were only rudiments of the information that we could get up here," Brown recalled in oral history memoirs.

Promoters lured Canadian expeditions into the United States by assembling privately-owned mineral deposits and selling drilling rights packages for bargain prices of $10–$15 an acre and royalties that, at 12.5 per cent, were only a fraction of Canadian rates. During the "energy-crisis" period of the 1970s and early '80s, "They were able to farm out this land all over the States and Canada. They did very well," Brown said.

The U.S. oil land rush soon petered out. Drilling ventures went under after attempts to navigate in the geological dark failed. "These things looked good to start with — the wells came in at fairly good rates — but because of low permeability [flow channels in the rock] they dropped in productivity very rapidly," Brown recalled. Only the promoters got rich: "They didn't really want information availability because they could do far better by word-of-mouth and rumours."

KNOWLEDGE BROKER

An IT investor needed to know the rules for converting a dormant pipeline into a fibre-optic cable conduit. A community relations agent wanted to obtain a transcript of radio news comments made by a country landowner about a drilling program. The ERCB Fort McMurray bureau sought a copy of a European article on the oil sands. All called ***Teresa Lewis***, an information specialist at the ERCB's library in Calgary's head office.

"There is a misconception that the library is a very quiet place and that we're just checking books out," Lewis said in an interview. But the open-door policy at the ERCB means the library is anything but quiet. As well as ERCB employees, regular visitors include oil company and law office research personnel; property owners; students; environmentalists; and engineering, earth sciences, and economics consultants. "We deal with the public all the time," said Lewis.

The library is packed with information ranging from paper records reaching back to the tumultuous 1930s Alberta oil pioneer era to modern-day digital data banks. The range of materials and visitors is matched by an equally interesting range of duties for library staff. One moment Lewis was an investigator, burrowing into dusty archives for obscure material sought by a historical researcher. The next she was a deal-maker, bartering with her peers on behalf of senior ERCB personnel for speedy and free access to up-to-the-minute, costly technical reports. Not the least of her roles was to learn her way around

the corridors of specialized knowledge and make friends who were capable of opening doors. A talent for collegial, professional networking was a must. When the job goes well, "Everybody helps everybody," Lewis said.

The ERCB library has a reputation as a cooperative environment, providing service that is the mirror opposite of the legendary government run-around. "We try to excel at customer service," Lewis said. "We are the front line. If we let someone down, the ERCB lets someone down." She comes by her customer-service focus honestly. Before she took technical training in library operations, clothing and shoes were her stock in trade. "Compared to retail, the customer service aspect is very similar. But you sure have to know a lot here at the ERCB. There's a huge learning curve."

ALBERTA GEOLOGICAL SURVEY

While the Core Research Centre stores the evidence, the Alberta Geological Survey (AGS), another public knowledge treasury preserved by the ERCB, provides an understanding of Alberta's resource endowment. The survey is an information warehouse of monumental scale, with a research mandate that covers all of the province's resource endowment, from sand and gravel to diamonds, uranium, salt, and water. One of the province's oldest institutions, the roots of the AGS date back to 1912, and it was formally established in 1920, when it submitted its first annual report to the provincial legislature. In that inaugural publication, founder John Allan reported on 18 different minerals that existed in the province on a large scale.

The AGS's research priority, however, has always been oil and gas. In the second annual report, Allan observed, "At possibly no time in the history of the world has such a persistent search ever been made for natural reservoirs of petroleum in many countries throughout the world." At the time, the first mass-produced car, Henry Ford's Model T, was just a dozen years old. Paved roads and petroleum-based synthetic materials were novelties. The United States was a major oil exporter. Alberta's first modest commercial discovery at Turner Valley was only six years old. But Allan saw the oil hunt coming. "With ever increasing uses for petroleum as liquid fuel for motive power on the land, the sea and in the air, for illuminating purposes, for power and lubrication in industry, for chemical manufactures, for preservatives and for road-making, the demand is fast exceeding the production, and what is more serious, the known supply of petroleum in reserve," wrote Alberta's top geologist.

In the 1921 report, Allan infused the province with an early vision of prospering from its resource endowment. "Canada is today one of the most promising unproven and largely unprospected countries in the world for petroleum. The possibilities of finding extensive reservoirs of petroleum are greater in western Canada, and especially in Alberta, than in any other field in Canada where the known geological structure is suitable for petroliferous accumulations."

After close to a century's worth of delving for ever-more-refined portraits of subterranean Alberta, survey scientists continue to instil visitors with the feeling that they are exploring knowledge frontiers. "The kinds of questions we want answered today are different from the ones we wanted answered 50 or 100 years ago," said Laurence Andriashek, an earth scientist with more than four decades of experience in the field. "Thirty years ago I was doing cross-sections on paper with a pen," he recalled. "My audience would have been another geophysicist. The world says that's not good enough any more. Now you have to translate that data into knowledge and wisdom." Like doctors explaining X-rays to their patients, earth scientists

need to ensure their research can be understood by a wide audience. When the math, physics, and chemistry of a survey result are condensed into detailed maps and plain language, "we're providing a common platform of knowledge for everybody, Andriashek said. "We don't make strategic decisions. But we provide the knowledge that enables them to be made."

Among examples of science harnessed for practical use, a groundwater study provided unprecedented levels of detail regarding deposits and flows to guide new conservation policy. Reports on locations, structures, and the organic contents of shale layers helped planners of unconventional drilling for previously unreachable "tight" oil and gas. A review of oil sands deposits guided ERCB conservation decisions, ensuring the protection of bitumen reserves against damage by natural gas drilling.

As well, the AGS showed that carbon capture and storage (CCS) schemes could be used to contain up to 10.3 billion tonnes of greenhouse gases in porous rock reservoirs that had been tapped by Alberta oil and gas wells. Stefan Bachu, the agency's resident expert on the emissions cleanup technique and the lead author of the report for the United Nations International Panel on Climate Change, shared the Nobel Peace Prize in 2007 for his efforts. He also identified gaps in environmental law that needed to be addressed in order to use CCS. Provincial legislation closed the loopholes in 2010 by clarifying ownership of sedimentary rock pore space and liability for potential leaks from carbon dioxide storage sites.

"Everything we do is really good, useful stuff," said Dean Rokosh, who combined a dozen years in industry with a PhD that qualified him to work on resource assessment with the AGS. When working for industry, he learned that he was less interested in money than in knowledge sharing. "There's a lot that's the same as in industry. We use the same data. [But] we don't run economics or take business risks. We don't determine reserves by factoring in prices and recovery factors. We determine resources," said Rokosh. In the corporate sector, earth scientists keep their best results secret, using them as competitive advantages. As a provincial scientist, however, "we don't hold anything back as confidential," he added.

Rokosh's work with the survey is a fine example of the agency's marriage of science and practicality. His scholarly knowledge of climate change, landscape evolution, windblown dust or loess, and shale formation provides resource explorers and developers with a multifaceted outline of the subterranean environment.

FROM FIELD TO DESK

Twenty-first century AGS geologists spend more time with their computers than with rock outcrops, hammers, hiking boots, pack horses, canoes, and bush planes. Field expeditions that were undertaken to collect the millions of data bits that are now a part of the digital systems are vivid memories — happy ones, mostly.

Andre Lytviak remembered those days in the field clearly. At the AGS base in Edmonton, he sported the rugged physique, thorn-proof pants, and flannel shirt of his professional youth as a northern explorer during the 1970s. "My love for camping and the outdoors outweighed everything," he recalled. To carry out assignments, like mapping Alberta fresh water resources, Lytviak became a bush pilot. He was also a voyageur, embarking on formidable outings such as an 11-day freighter canoe trip across the northeast corner of the province, from Fort Chipewyan to Fort Vermilion.

In bear country, high up in the Rocky Mountains and far out in subarctic woods, Lytviak carried a First World War rifle, with the intent of firing into the air to scare off grizzlies rather than shooting them. He traversed boreal forests in rickety Korean War–vintage helicopters, all but brushing the trees to land at fuel caches in small clearings. Despite close calls, "We never lost any geologists using helicopters." On his journeys, Lytviak experimented with novel uses of resources, such as building a campfire on an outcrop of oil sands ore. "It burned enough to get smoky, black, and stinking, but not enough to keep going," he recalled. "Those were good days. I remember them fondly."

Indoors at AGS headquarters, Lytviak the explorer became Lytviak the computer pioneer, laying the foundation of modern data and interpretation services on relics built with reel-to-reel tapes and cathode ray tubes. Geologists have good reason for their reputations as eager early adopters of information technology (IT). Before digital aids came along, they spent long, tedious hours chained to drawing boards, turning data from their field parties into hand-drawn maps. "Computers off-loaded a lot of the drudge work," Lytviak said. New tools of the trade did not change the survey scientist's explorer role, said Matt Grobe, who, in 2010, was appointed John Allan's heir as Alberta Provincial Geologist. "In a province like Alberta that is so crucially affected by what is beneath our feet, it all starts with an understanding of what we have there."

Earth scientists and the AGS have only scraped the surface of IT's potential, Grobe added. Casting his eye a few decades down the road, he envisions a future that includes an accurate, three-dimensional, "basin-scale" portrait of the entire province. This ideal model or map will show all the rock structure; the capacity of spongy sedimentary layers to store material in their pores and be permeable or allow flows via cracks;

the oil, gas, water, and other contents; and changes over time, including those caused by the effects of drilling, production, and the resulting alterations of underground pressure.

Grobe's vision is not a pipe dream. "We need to have a big-picture understanding of the system," he said. "This is maybe 15 or 20 years down the road. Industry does small versions of it for particular projects. On the much larger geological survey scale, three-dimensional modelling is where GIS [geographic information systems] was 20 years ago."

COLLECTING AND SHARING ECONOMIC INFORMATION

The economics of supply and demand and outlooks for oil, bitumen, natural gas, coal, sulphur, and electricity are outlined in the annual ERCB publication *ST98: Alberta's Energy Reserves & Supply/Demand Outlook,* an encyclopedia of concise summaries and a virtual Everest of digital statistics. "It was what I would consider my bible," said Carol Crowfoot, referring to the role the report played during her two decades as an industry consultant. When she contributed to independent audits of exploration and production companies' assets, "this resource was vital," she said in an interview. For her, the public record provided in *ST98* was "an astounding feat" of performance records on every energy resource pool in Alberta.

Later, as coordinator of the *ST98* publication team and the ERCB's economics manager, she viewed the publication from a different angle, recognizing it as a must for fulfilling its conservation mandate. "How can you regulate your resources if you don't know what you have?" Crowfoot pointed out. "You're not talking widgets in a manufacturing plant. This is truly high-risk, uncertain recovery of resources under the ground. If you don't know how much is in the ground and don't understand it you could potentially allow industry to produce it poorly."

Like the geological survey, the ERCB economics bureau is enthusiastic about sharing its knowledge. "We're all about finding things out and telling people about it," Crowfoot said. "Everyone here prides themselves on making sure we're getting the accurate stuff. We take it very seriously that we're getting things right. It is the people's resources."

About 200 of the ERCB's 900 employees contribute to the report on Alberta's reserves of crude oil, sulphur, bitumen, coal, electricity generating capacity, and natural gas and its prized liquid by-products, estimates veteran ERCB geologist Rick Marsh. Crews of experts in the Calgary head office compile and mine immense banks of continuously updated data that have been collected as independent indicators of industry performance since the birth of the agency in 1938.


Helped Find Leduc Field
Seismology Aids In Locating Oil
By George Lawrence
Edmonton Bulletin
Phone 26121
EDMONTON, ALBERTA, THURSDAY, MARCH 20, 1947
CORE DRILLING:
Cuts Long Cylinders of Rock
Core Drilling Valuable Fea
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It Really Isn't Childish
Mud Is Important In Drilling for Oil
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DRILLING FOR OIL:
Resourceful Experts Always on Alert
Drilling Oil Well Proves Lusty, Steady, 24-Hour-a-Day Operation
By GEORGE LAWRENCE
When New Well
Conservation
Almost Immedia
By George Lawrence
rom Air And Ground
ogists Use Plane, Horse
Search for Oil in Alberta

DATA COLLECTION IN THE EARLY YEARS

The ERCB's founding crew of four engineers, stationed in Turner Valley, took their conservation assignment seriously. Field personnel provided data collected from production gauges and ensured instruments worked properly. Their reports enabled the engineers to calculate how much the wells could and should produce. The files primed the ERCB with reliable, independent profiles of industry operations that could then be used for making regulatory orders and resolving disputes.

In 1941, the ERCB reinforced its foundation by creating a geology department. Earth scientists supported the engineer's work on conservation by using well data to define pools of underground resources and evaluate production networks. The records grew into detailed portraits of oil and gas fields, painted with an array of technical information, such as electronic reports of the geological layers that were penetrated on the way to target zones, subterranean pressures and potential blowout risks encountered, practices followed in completing successful wells, pool production performance profiles, and information on incidents or accidents.

SPREADING THE WORD In the weeks following the 1947 Leduc breakthrough, the ERCB attained new prominence as the media tapped experts and veterans to spread understanding of the oil and gas industry. Coverage highlighted ERCB roles in preventing waste by enforcing resource conservation rules and in encouraging discoveries by providing access to its Core Research Centre—the geological knowledge equivalent of the legendary gold storage vaults of Fort Knox. *Glenbow Archives ip-6g-1a*

Its swelling data banks made the ERCB a natural pioneer of digital information technology, with personnel trying out a myriad of electronic memory and calculating devices. By 1960, European-trained engineer Eliador Stoian launched the data processing department with a bulky mainframe computer. Early IT evolved swiftly, Stoian recalled in an ERCB oral history interview. "The policy of the board was that we should be capable of understanding what the industry is doing and to interact with them intelligently, and not fall behind to a point where we will never be able to catch up," he said. "Board members attended a lot of courses and seminars and studies for long periods of time."

Alberta-based branches of global oil giants adopted IT at a formidable pace, he added. "They wanted to intimidate us by saying, 'Our research in Tulsa or our research in that . . .' — and we would just smile. We were not intimidated. We knew what they were talking about and most of the time we could find a lot of holes in what they presented to us. It was just a delight that this was possible," Stoian said.

The ERCB's knowledge advantage relies on independently gathered information that is managed by advanced IT. "Our regulatory people don't need to ask industry for a number. We give it. Unlike other jurisdictions, we collect the raw data to use for our own purposes," Marsh said in an interview.

The ERCB's open-door policy also sets it apart. Making facts available for constructive agendas trumps the potential misuse of material for political or financial purposes. "Putting records into the public domain has on balance been highly beneficial to this province," Marsh said. "We want to make sure good decisions are made with good information. We know that if we put it on the table, better things will happen than if we don't. Better decisions are made with better information."

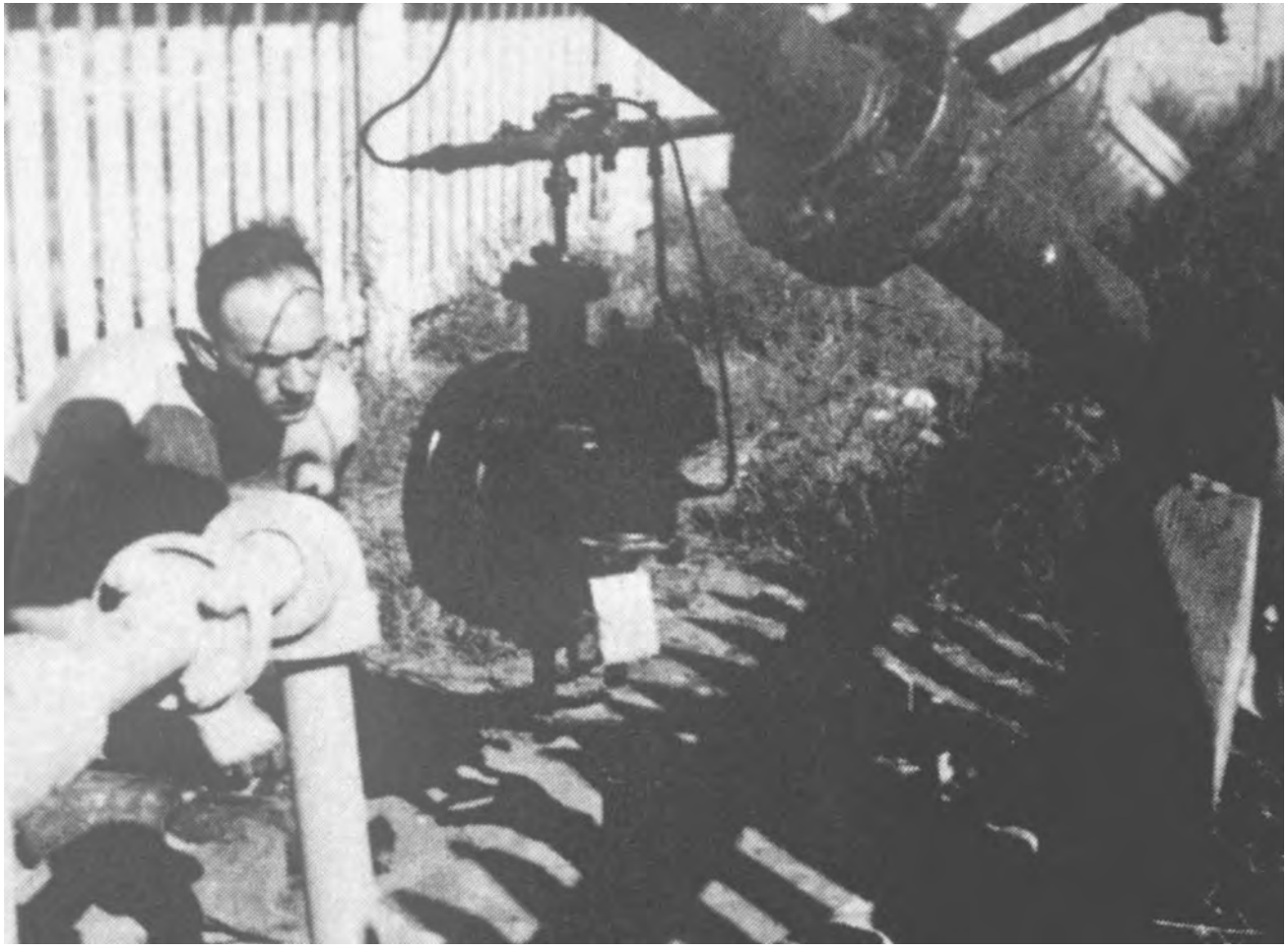
The ERCB has empowered generations of government and industry leaders to plan ahead. In 1972, senior ERCB personnel Vic Bohme, P.D. Larbalestier, Nolan Blades, and D. McLeod contributed to a multi-department preview of bitumen-belt growth issues for the new Conservative provincial cabinet entitled *Alberta Conservation and Utilization Committee: Fort McMurray Athabasca Tar Sands Development Strategy*. The paper anticipated and inspired a variety of policies including land reclamation legislation, tailings pond regulation, government-supported participation by small Alberta investors, technology advancement partnerships between government and industry, expansion of technical training, highway improvements, and adaptation to strains on the province's labour force, consumer prices, and public services.

The 81-page document foreshadowed twenty-first century concerns: "Alberta's primary objective should be to regulate, guide, and control bituminous tar sands development in order to meet growing socio-economic needs of Albertans as well as Canadians." The report authors recommended an orderly approach, with controlled construction taking place at a moderate pace of one new plant every four years.

With bitumen mines and upgraders predicted to produce one million barrels per day, environmental and community concerns topped the priority list. Alberta's permanent population was projected to grow by 80 000. Land disturbance was expected to average 2.4 hectares a day, with the "denuded area" expanding to 81 square kilometres before reclamation could offset its growth. "The volume of waste being disposed to the tailings areas will be in the order of two million cubic yards [1.5 million cubic metres] daily, or an amount equivalent to about 17 Legislative Buildings," the report warned.

When tumultuous energy prices and policies slowed oil sands development in the 1980s and '90s, the spectres raised by the 1972 cabinet paper faded but did not die. Concerns were addressed through increasingly complex development approvals and environmental permits. As well, more than $1 billion in provincially supported technology research laid foundations for less disturbing in situ or underground bitumen extraction that reduces effects on the ground surface by using wells instead of open pits. The ERCB took the changes in stride, adapting regulations to reflect the evolution in production methods.

EARLY ADOPTER Digital information technology arrived at the ERCB's head office in Calgary in the 1950s and '60s, when electronic data storage and calculating machines were "mainframe" monsters of spinning tape reels, flashing lights, and vacuum tubes with nicknames like MANIAC (Mathematical Analyzer, Numerical Integrator, and Computer) and UNIVAC (Universal Automatic Computer). The board set high IT goals: stay ahead of technology-minded corporate giants and manage memory, calculating, and communications requirements for millions of official records on all aspects of Alberta energy development. (Ilse Pezzi in photo, taken 1969.) *ERCB Library* 87.018 *no*010



CLOSE WATCH From the moment the ERCB started up in 1938, ERCB inspectors checked well meters and gauges to make sure production complied with rules against wasteful practices. The board swiftly entrenched its custom, which still prevails, of making sure that its experts are at least as knowledgeable and steeped in potential tricks of the trade as industry personnel. (Nate Goodman in photo.) *ERCB Library* 87.016 *no*003

NATURAL GAS KNOWLEDGE BROKER

On the natural gas scene, a fast-paced drama unfolded, with the ERCB cast in the lead role of energy industry knowledge broker. Four months after replacing the Social Credit government, Peter Lougheed's Conservatives embarked on a crusade to increase the value of Alberta resources in central Canadian oil and gas markets, a move that eventually earned them the nickname Blue-Eyed Sheiks. For their opening gambit, in January 1972, the provincial cabinet enlisted the ERCB, ordering an inquiry into natural gas prices. In August, the ERCB produced a report that tapped into the knowledge preserved in more than 1400 sales contracts between producers and long-distance pipelines that delivered four-fifths of Alberta's natural gas output to destinations across Canada and the United States. The inquiry described a lopsided buyers' market that stunted gas prices and drilling.

At the time, pipeline companies had dual monopolies. As well as holding territorial delivery franchises, they owned the gas moving through their systems. Essentially, they were exclusive middlemen between suppliers and consumers. Federal export controls impaired the ability of producers to shop around, even among the handful of pipeline customers.

The ERCB report documented the grim effects of the current system. Contracts were difficult to obtain and typically harnessed producers for 20 to 25 years to support bank and bond financing of pipeline construction. Gas fetched an average of 16.5 cents per thousand cubic feet (about 94 cents when converted to twenty-first century currency), but ranged as low as 13 cents (70 cents today). Stated as an energy content value, Alberta gas only fetched the equivalent of $1 a barrel for oil ($5.41 today) — just half the 1972 annual average oil price of $1.90 ($10.28 today). The long gas contracts had price escalation clauses. But the annual raises were typically a tiny one-fourth of 1 per cent or only 1.25 cents (5 cents today) every five years. At that snail's pace, it would take until 1990 for the average natural gas price to reach 21 cents.

The ERCB instructed the Conservative cabinet to use its gas supply veto — its power to withhold "removal permits" required for out-of-province deliveries — as a lever to command a better deal. As a minimum, the ERCB recommended an immediate 10-cent price increase to raise annual gas revenues by $224 million ($1.2 billion today), including $25 million in royalties ($135 million today). The inquiry report also recommended annual price escalations of 3 to 4 per cent and frequent contract overhauls to maintain fair value on changing natural gas markets. Three months later, the government acted — adopting a policy that followed the ERCB's script. By early 1975, natural gas prices topped $1 per thousand cubic feet after rising more than six-fold in about two years.

REAPING THE BENEFITS OF NATURAL GAS LIQUIDS

Four decades later, the ERCB led another gas inquiry. This time, vice-chairman Brad McManus took the reins, relying once again on the ERCB's independently acquired expert knowledge and showing the high stakes involved in technical matters. The case dealt with natural gas by-products such as propane, butane, and condensate (also known as natural gasoline). The liquids occur in a vaporous state in geological reservoirs, often as thin mists that can only be condensed into a commercially usable state using advanced technology. Immense chilling plants straddle the gas pipelines, condensing out these bonus contents in scores of thousands of barrels per day.

The inquiry focused on interpreting long-standing transaction and pipeline tariff rules, known as the "current convention," to see who should reap the benefits of gas liquids and determining whether or not these old rules were fair. Traditionally, the straddle plants acquired the liquids, while producers received compensation known as "shrinkage," a term that refers to the lower worth of volume reductions caused to gas shipments by stripping out the vapours.

After a 20-month review that included lengthy public hearings, McManus's panel recommended that the rules be changed to recognize producers' rights to full value for their output. The new regime was called NEXT, short for natural gas liquids extraction. The inquiry ended up being the ERCB's parting shot on tariff rules. As the complex case proceeded, the provincial government agreed to transfer jurisdiction over the Alberta gas pipeline network to the National Energy Board (NEB).

The switch from provincial to federal responsibility enabled the pipeline delivery system to address the issue of far-flung supply sources by building extensions beyond Alberta's boundaries. As well, NEXT became part of the change as the NEB ran with McManus's recommendation. As of 2010, producer and provincial royalty revenues were projected to increase by $1 billion a year. As an environmental bonus, NEXT was expected to reduce the number of liquids extraction sites in gas fields, which was becoming industry's way of breaking free of the old regime that favoured pipeline straddle plants.

THE B.C. MODEL

By building the cornerstones for significant policy changes, ERCB-led inquiries enhanced the ERCB's reputation as a model worth following. In the 1990s, for example, when northern British Columbia was still a largely unexplored area that industry referred to as its "near frontier," the provincial government in Victoria turned to Alberta for guidance.

B.C. leaders knew their province was notorious for making industry jump through numerous and often

frustrating political, administrative, and economic hoops. Obtaining project approvals was a long, uncertain, and expensive exercise that involved winning the consent of four Victoria-based agencies, all of which viewed northern development through a different policy lens. It was a standing joke among Alberta energy business executives that "B.C." stood for "bring cash."

"We basically took the ERCB model," recalled Robert McManus, who brought an industry perspective to B.C.'s new oil and gas regulatory apparatus. When B.C. premier, Glenn Clark, travelled to Calgary to learn about Alberta's approach to conducting industry business, McManus was there. "We said he had two options: start over or try to fix the existing system. He said, 'I like big deals. We're going to blow it up and start from scratch,'" McManus recalled in an interview. To make the new beginning, "We took everything we thought was the best from the Alberta model."

Calgary expertise was put to good use. Premier Clark hired retired ERCB chairman Gerald DeSorcy as a consultant to design the organizational structure of the B.C. Oil and Gas Commission. McManus was recruited for a four-year term (1998–2001) as the commission's chairman from the Canadian Association of Petroleum Producers, where he was manager of environment and safety.

Appointed as an ERCB board member in 2010, McManus had on-the-job training in the modern regulatory art of fostering connections between industry, communities, and the environment. His background illustrated an emerging trend in energy sector personnel. His academic credentials were not in engineering but in psychology and environmental design. As a student, he spent time with Vern Millard, the ERCB chairman who led the board's transition from its technical era into the contemporary times of environmental and community issues. While a rising executive, McManus served on the business side of 1980s and '90s regulatory contests and evolution.

As practiced by McManus and reflected in the ERCB and B.C. codes, responsible development is rooted in a philosophy that recognizes and values the human element in industry. He recited a rule that he named "Craig's Law" after an admired professor: "The more adamant our opinions are about any particular topic, the less we actually know." McManus said, "The more I learn, the more I realize how complicated these issues are. Things that are simple get fixed. The problems are not really simple and easy to fix."

Listening and learning are job one under Craig's Law: "In sorting out issues, so much of it is common courtesy and common sense," McManus said. "Albertans are way more accommodating than we should ever have expected them to be, when you think about the scale of industry activity and the small number of complaints we actually get. Lots of companies do this really well. They think about, 'How does this play to our neighbours?'"

SHARING KNOWLEDGE ACROSS BORDERS

Alberta's approach to civilized industry has spread across the international energy scene from Asia to the Middle East. In the 1980s, ERCB board member Norm Strom helped Kuwait design its regulatory system. McManus worked on a World Bank project, crafting an oil-and-gas blueprint for China. Board member Jim Dilay's responsibilities included playing host to numerous foreign delegations and travelling to international conferences.

Hosting foreign government and industry leaders is just part of the routine at the ERCB. Its open-door policy and 75 years of experience make the ERCB an international regulatory resource. From 2005 to 2010 alone, 120 foreign groups paid extended calls, with staff focusing their presentations on topics that most interested the visitors. The delegations represented universities, training institutes, news media, energy, and environment land ministries from 61 countries, including Bolivia, Ireland, Rwanda, Turkey, and the United States. "This has been going on for decades," said Dilay. "In the same way we went to the U.S. for help when the board was new in the 1930s, others come to us now."

Alberta has much to teach even the biggest fish in the global oil pond, a visiting Siberian industry representative explained when visiting the ERCB headquarters in Calgary. "The current Russia is a young country only about 20 years old," Tomskneft OJSC executive Evgeny Diachenko said, referring to the 1991 dissolution of the Soviet Union and ensuing privatization of formerly state-owned Russian industries. "We are very excited about this opportunity to learn from your seventy-five-year experience. We would like to make sure we can leave some of our resources for our children to come by conserving them," he added. His group learned about the ERCB's role, structure, and functions in a short course delivered, through a translator, by ERCB field operations manager Greg Gilbertson.

Operating in western Siberia, Tomskneft's combined oil and natural gas production is equivalent to 244 000 barrels per day, on scale with the top 10 Canadian petroleum companies. Owned by oil colossus Rosneft and natural gas giant Gazprom, the half-century-old company is a mainstay of the Russian industry that, in 2009, jumped to the top of the oil world by producing an average 9.9 million barrels per day, leapfrogging over Saudi Arabia's 9.7 million. Diachenko said Tomskneft was intrigued by the ERCB and liked what it saw. Russia had no counterpart to Alberta's independent oilfield watchdog agency, he reported. In Siberia, industry deals with multiple state branches, such as separate authorities for well licences and operations inspections. "We find the way this organization here [in Alberta] looks to be the most rational," he added. While waiting times for Siberian

project approvals are confidential, he could disclose that "they are a lot longer" than the businesslike processes applied to the majority of Alberta gas- and oilfield work described by Gilbertson.

High praise followed a visit by a 10-member delegation from Nigeria's environment and petroleum ministries. On a tour of Alberta to learn about oil- and gas-field waste management, the group met ERCB vice-chairman Brad McManus, regulatory development manager Cal Hill, and waste storage team leader Susan Halla. The visit grew out of a cleanup project that was beginning in notoriously polluted Niger Delta oilfields.

"We want to broaden our knowledge," said Mohammed Bashar, the Nigerian Federal Ministry of Environment's permanent secretary, whose rank is equivalent to a Canadian deputy minister. Alberta was well known in senior Nigerian government circles as a result of previous contacts, said Bashar and environment ministry deputy director Solomon Adesanya. Bashar described oilfield waste as "effectively managed" in Alberta. In Nigeria, "These operations have not lived up to expectations and our regulators have to confront the issues," the permanent secretary said. "We are just trying to grapple with this." The province has earned an international reputation that stands up well against barrages of critical publicity against the oil sands, the Nigerian officials agreed. "We see Alberta as one of the major centres that is doing things the right way — the way they are supposed to be done," Adesanya said.

EPILOGUE

BORN AGAIN, BIGGER

With a growing industry calling for swifter project approvals and alarmed environmentalists clamouring for increased sensitivity to effects on the land, water, air, and wildlife, Alberta's elected leaders reached out to the Energy Resources Conservation Board. A pressing question was asked: Could both demands be satisfied? On the strength of three-quarters of a century of performance, the provincial government decided the answer could be yes — if the regulator expanded to meet the needs.

Exit the ERCB, enter an enlarged successor wearing a new brand intended to express a widened role as a single authority for supervising all industrial and environmental aspects of oil, natural gas, oil sands, and coal development: the Alberta Energy Regulator (AER). With a 61-member majority in the 87-seat provincial

legislature, the Conservative government introduced the name change and began a planned overhaul of the regulatory regime on a two-year schedule by passing the *Responsible Energy Development Act* in the fall of 2012, over political objections by opposition parties that the measure concentrated too much power in one agency.

Energy Minister Ken Hughes called the reform bill a historic turning point: "This is a once-in-a-generation opportunity to revolutionize the way we regulate industry" by enlarging the duties of an agency with "a very long, honourable, and colourful history," he told a news conference.

Diana McQueen, Minister of Environment and Sustainable Resource Development, joined Hughes for the announcement in a spartan room full of pipes, valves, and gauges. They teamed up to unveil the ERCB's next incarnation in a Calgary oilfield trades training centre as a symbolic starting point on Alberta's new path. The choice of location aimed to show that the change was grounded in realities of Alberta livelihoods and their consequences for the natural environment. McQueen emphasized that the initiative was about resource industry conduct and reputation as much as production, revenues, and cost-competitiveness: "This is a made-in-Alberta approach that we know will stand up to international scrutiny," she said. "We know the world is watching to see the environmental outcomes we achieve."

The legislation took shape over three years of government consultations with business, environmental, and community representatives. To make the AER the go-to authority on oil, gas, coal, and oil sands development from cradle to grave, the 120-page regulatory reform bill amended a score of other provincial statutes that govern fields from water and air quality to public lands management and reclamation of industrial sites at the end of their useful lives.

One exception to AER jurisdiction will be the technical field of calculating fair compensation for private landowners whose property is touched by industrial development. This legal and financial specialty of working out changes in the value and operating costs of property assets caused by resource exploration, production, processing, and transportation facilities will remain with the separate Alberta Surface Rights Board, where it has been since the Leduc discovery launched the modern petroleum industry in 1947.

In the area of community relations, the reform bill empowered the AER to firm up its peacekeeping role. Provisions included a new, voluntary registry where private property owners can file copies of resource access agreements and give the regulator the power to enforce the agreements if lapses occur. Authority was also bestowed upon the enlarged regulator to increase the use of the appropriate dispute resolution (ADR) programs for settling conflicts between landowners and energy firms, an option that has become standard

practice in other Alberta arenas such as small claims courts and landlord-tenant relations.

A recurring, contested national native rights issue was declared off-limits for cases before the AER. The reform bill specified that the provincial energy regulator can no longer be asked to rule on the adequacy of compliance by any level of government with a 1982 constitutional reform commitment to consult aboriginal communities on development which touches their reserves or affects claims to land and traditional uses of surrounding territories.

In anticipation of the need to clarify this new brew of industrial and environmental authority, the reform bill gave the energy minister and cabinet added power. Both obtained rights to enact rules that override the AER's pooled legacy of multiple regulations from parallel government branches. A policy management office was also created, initially to assemble an inventory of this complicated heritage and potentially to contribute to clarifications or changes. The added government powers were accompanied with a political commitment by McQueen to create "an enhanced public engagement process" for devising environmental and energy regulation.

To run the AER, a board of directors was created with three members appointed by the cabinet. The judge-like role of ruling on applications and disputes stayed in the hands of cabinet-appointed senior specialists, who were given a new title of hearing commissioner. The reform bill retained industry and public rights to appeal regulatory decisions to the courts in cases that raise contested questions of law or jurisdiction. The agency's enforcement arm of inspectors and their powers remained intact, with Hughes and McQueen saying the patrol force was liable to grow in size and strength.

The reform bill repealed a catch-all clause in the old ERCB mandate that directed the agency to always consider "the public interest." But the old standing order, to keep in mind big economic and environmental pictures, remained in force as a provision of all the acts that the new AER took over responsibility for upholding.

The government set targets for the AER to be ready to receive all-in-one project applications as of June 2013, then to be capable of handling them within a fully unified industrial and environmental regulatory structure as of June 2014. Hughes did not specify time-saving goals for the AER. But he predicted, "In larger applications it could save more than months. In smaller applications it could save months."

Like the energy minister, industry set no firm objectives for reducing the duration of cases. But business leaders agreed that the unified approach to industrial and environmental supervision looked like a formula for efficiency. "There is certainly that potential," said Brad Herald, Alberta operations manager in the Canadian Association of Petroleum Producers.

The new structure will pare the number of applications required for big developments such as oil sands projects down to one from as many as 200 permit requests under the previous regime, Hughes said. Herald said, "They're building a platform for the next quarter-century." Work began on transferring government functions and eventually personnel into the AER while the legislature was still debating the reform bill.

By giving the AER a leading role in crafting practical aspects of new management for Alberta's industrial and environmental landscape, Hughes and McQueen relied on the core of strength in the ERCB heritage. Peter Lougheed concentrated the formula for the agency's longevity into a single word: "evolution." Regulatory professionals preserve, as a favourite portrait of talent needed to live up to Lougheed's vision of adaptability, a job description that Roland Priddle provided as a retired chairman of the National Energy Board.

Priddle was an heir to the Alberta style because the NEB was steeped in the province's regulatory culture from its birth in 1959. For the national agency's founding chairman, the federal cabinet borrowed Ian McKinnon from Alberta. He went to Ottawa on a three-year leave of absence from his career as chairman of the provincial energy board.

Priddle described the regulator role in an address to a conference of the Canadian Petroleum Law Foundation in the Alberta mountain resort of Jasper on the 40th anniversary of the NEB in 1999. The speech, originally published by the Alberta Law Review, has been widely distributed.

"I confess to some ambivalence about the role of administrative tribunals in our economy and society," Priddle said. "This is largely because of the scope they have in Canada for arbitrary decision-making without the control of Parliament [or provincial legislatures], or, except of course in matters of law and jurisdiction, the courts which supervise them. Because of this scope, the most important thing that governments can do for the sector that is regulated is to appoint good members to the board. Good members must be capable people, but they must also have the humility to recognize the extent of the powers conferred on them and resolve always to make only prudent and moderate use of those powers."

As an engineering professor, ERCB chairman, and Alberta's first deputy energy minister, George Govier cultivated a talent for translating woolly numbers into clear ideas. The legacy of his 30 years in public service spanning 1948–78 includes an image that stands out as a memorable measure of the mammoth scale of energy development that has become the province's stock in trade.

"Figures for liquid hydrocarbons are given in billions of barrels. A billion — 1 000 000 000 — is so large as to be difficult to visualize," Govier acknowledged in the Society for Chemical Industry's annual Le Sueur Lecture in Montreal during the spring of 1974.

He used the occasion to explain why petrochemical manufacturers, including international mainstays of the sector, were lining up at the time to build big plants in Alberta.

"Think of a billion barrels as the contents of a tank about three-eighths of a mile in diameter and three-eighths of a mile high," Govier suggested. That would be a colossal ring with both a height and distance across of 600 metres (1980 feet), a towering giant even by the standards of the Manhattan skyline. The Empire State Building would fit inside a billion-barrel oil tank with room to spare above the skyscraper office building's 443-metre (1453-foot) spire. The tank's lid would also easily fit over the top of Toronto's 553-metre (1815-foot) CN Tower.

When Alberta's energy development agency was born in 1938, the province had 165 producing wells: 61 pumping out oil, 104 flowing natural gas, none tapping the oil sands, and no bitumen mining operations. Given the oil output at the time, about 17 000 barrels per day, it would have taken 161 years to fill one of Govier's colossal tanks.

As of year-end 2011, the number of producing wells in Alberta had multiplied 836-fold to about 138 000 — including 33 000 for oil, 95 000 for gas and 10 000 in the oil sands — and four bitumen mines were operating. The province's 2011 oil output of 2.3 million barrels daily would have filled one of Govier's jumbo tanks in 435 days, or every 14 months.

More production was on the horizon, with industry and the regulatory agency disagreeing only on details of growth expectations. The Alberta oil output anticipated for 2010, 3.8 million barrels per day, would fill a billion-barrel tank in 263 days, or less than 9 months. By 2030, two of Govier's gargantuan tanks would be needed to store a single year of Alberta's forecast oil output of 5.5 million barrels per day, or one billion barrels every six months.

As Alberta matured into an urban, industrialized province, the population grew too, with economists estimating that energy development drove up to half of all activity. When the AER's ancestor opened its doors in 1938, the province had 796 169 residents who mostly eked out modest livings on Depression-era farms or ranches and in small towns. By mid-2012 the number of Albertans more than quadrupled to 3 645 257 who mostly lived in cities or suburbs that were spreading out into areas that were formerly remote oil and gas frontiers.

The demands this rapid growth put on Alberta were recorded by an environmental knowledge project that ran parallel to the regulatory reform program. Retired energy board chairman Neil McCrank had a hand in the green effort — a new independent air, land, water, and biodiversity monitoring agency — as a member of a group that crafted plans for the initiative.

"Rising national and international demand for hydrocarbon products has attracted international

investment to Alberta. As a politically secure jurisdiction and stable energy producer, the province has undergone sustained economic growth and development," the group's report observed.

"Perhaps not surprisingly, this has many concerned about broader aspects of environmental integrity and quality. In short, the economic development of Alberta intersects with issues relating to economics, capital investments, and broad social and environmental matters that have risen to the level of national and indeed international importance," the report said.

Maturing at age 75 into the new AER, the provincial resource steward was busier than ever, preparing to keep on managing traffic at the bustling intersection of Alberta's growing energy, economic, and environmental interests.

APPENDICES

CHAIRS

W.F. Knode

1938 – 1939

C.W. Dingman

(Deputy Chair) 1939 – 1940

R.E. Allen

1940 – 1941

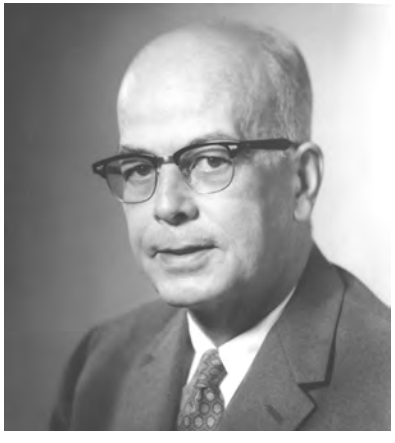
J.J. Frawley

(Interim Chair) 1942 – 1943

Dr. E.H. Boomer

1943 – 1945

A.G. Bailey



1946 – 1947

D.P. Goodall

(Acting Chair) 1947 – 1948

I.N. McKinnon

1948 – 1962[1]

Dr. G.W. Govier

1962 – 1978[2]

D.R. Craig

(Co-Chair) 1975 – 1977

V. Millard

(Chair) 1978 – 1987
(Co-Chair) 1975 – 1977

G.J. DeSorcy

1987 – 1994[3]

1 Took a leave of absence from 1959 to 1962.

2 1975 – 77 served as Alberta's chief deputy energy minister while on sabbatical as ERCB chairman.

3 Took a leave of absence from 1991 to 1993.

F.J. Mink

(Co-Chair) 1991 – 1993, 1995

J.P. Prince

(Co-Chair) 1991 – 1993, 1995

C. Bélanger

1995 – 1998

M.N. McCrank

1998 – 2007

B. McManus

(Acting Chair) 2007

W. Tilleman

2007 – 2008

D. McFadyen

2008 – 2012

CHRONOLOGY

1719

Cree traveller Wa-Pa-Sun shows a sample of bitumen from the Athabasca oil sands to Hudson's Bay Co. agent Henry Kelsey.

1778

Fur trader Peter Pond sees the oil sands near the future site of Fort McMurray.

1792

Hudson's Bay surveyor Peter Fidler discovers coal and warm Chinook winds in southern Alberta.

1858

Oil Springs, located in the Sarnia region of southwestern Ontario, becomes the site of North America's first commercial oil well. The discovery is made a year before Pennsylvania's more famous Drake well kick starts the industry in the United States.

1874

Frontiersman John (Kootenai) Brown commissions Stoney Indians to hunt for oil seeps in the southern foothills of the Rocky Mountains.

1882

The Geological Survey of Canada explores the Athabasca oil sands region and describes its development potential.

Alberta's first large coal mines open in Lethbridge and Edmonton.

1883

When digging for water at Langevin, just west of Medicine Hat, Canadian Pacific Railway workers unintentionally make Alberta's first natural gas discovery. The unexpected gas flow catches fire and incinerates the railway workers' wooden water-well drilling rig.

1887

A federal government decision halts subsurface rights transfers to homesteaders and businesses, reserving minerals for the Crown and creating a heritage of public ownership for 81 per cent (537 000 square kilometres) of the natural resources beneath the future Alberta.

1889

Electric lamps are used to light up Calgary streets.

1891

Edmonton's first electricity generating station is built.

1894

The Geological Survey of Canada inaugurates Alberta exploration drilling with a well that probes in vain for a light oil pool mistakenly believed to lie beneath the Athabasca bitumen deposit.

1901

The Spindletop gusher launches the Texas oil industry.

1902

Alberta's first successful oil well is drilled in scenic southwestern Alberta. The ensuing boomtown, Oil City, flourishes briefly, but further drilling fails and the deserted site is absorbed into Waterton National Park.

The city-owned Edmonton Electric Light & Power Company, precursor of Edmonton's Epcor, is born in a municipal takeover of the fledgling electricity grid.

1904

Calgary builds its own electric plant, ancestor to the city-owned ENMAX, to operate local electricity service.

The Medicine Hat gas fields, containing 1.8 trillion cubic feet of natural gas, are discovered and become the cornerstone of a city-owned utility that continues to this day.

1905

The provinces of Alberta and Saskatchewan are carved out of the original Northwest Territories. The Liberal party, led by Alexander Rutherford, forms Alberta's first government.

1906

The first automobile trip is made between Edmonton and Calgary. The journey takes two days on rudimentary roads, with speed limits of 10 miles (16 kilometres) an hour in towns and 20 miles (30 kilometres) an hour in the country.

1909

Bow Island No. 1, the biggest gas well in Canada at the time, roars into existence as Alberta's first large natural gas production field. The drillers who made the spectacular discovery dub the well Old Glory.

1912

The province's first long-distance natural gas pipeline joins Bow Island with Lethbridge (110 kilometres west) and Calgary (240 kilometres northwest).

1914

Dingman No. 1 well ignites a drilling boom when naphtha, a gasoline-like fluid mid-way between natural gas and oil, is discovered 815 metres beneath Turner Valley.

At Turner Valley, producers burn off gas as a waste by-product, lighting up the skies and igniting popular campaigns for resource conservation. The towering flares can even be seen in Calgary, 50 kilometres away.

The Viking gas field is discovered near Wainwright, southeast of Edmonton.

1915

Alberta Board of Public Utility Commissioners (ancestor of the Alberta Utilities Commission) is created — the province's first public utility regulator. The watchdog agency is responsible for a number of activities, including utility costs and standards of services.

1920

The Alberta Geological Survey (AGS) is created and gives a glowing report to the legislature regarding the province's mineral potential.

A subarctic discovery at Norman Wells, beside the Mackenzie River, teaches geologists to look for oil in fossil tropical reefs beneath frosty western Canada. The research is based on ideas about continental drift across global climate zones, a theory only eight years old at the time and little understood or believed.

1921

The United Farmers of Alberta, led by Henry Wise Wood, forms the provincial government after defeating the Liberals.

1923

A 130-kilometre pipeline connects the Viking gas fields to Edmonton, enabling the city to switch from coal to natural gas for heating, lighting, and cooking.

1924

The discovery of a fresh gusher of "wet" or liquids-rich gas sets off a second Turner Valley boom and increases wasteful flaring.

1925

Alberta's first oil pipeline is built from Turner Valley to a Calgary refinery.

Edmonton's coal boom peters out after an inquiry reports that mine shafts built under city streets pose cave-in hazards.

1926

The *Alberta Oil and Gas Wells Act* grants the province authority to develop conservation regulations for designated areas, but no action is taken.

Drilling, discoveries, and development begin in the Lloydminster heavy-oil district.

The AGS completes the first geological map of Alberta. It becomes a best seller at 75 cents a copy.

1929

Edmonton scientist Karl Clark and the Alberta Research Council patent a hot-water process for extracting bitumen from the oil sands.

1930

The federal *Natural Resources Transfer Act* turns over ownership of all Crown minerals within their borders to Alberta, Saskatchewan, and Manitoba.

1931

Alberta levies its first petroleum royalties at the rate of 5 per cent.

The issue of natural gas waste heats to a boil when the City of Calgary asks the provincial utilities board to cut the cost of household service by increasing access to supplies from Turner Valley.

1932

The Alberta legislature creates the Turner Valley Gas Conservation Board, with a mandate to control wasteful flaring.

1933

The Supreme Court of Canada rules that the province cannot regulate gas waste on wells leased before 1930. The federal government rejects a request for an amendment to the *Natural Resources Transfer Act* that would bypass the decision.

1934

Alberta exports natural gas to Montana via a short international pipeline.

1935

The Social Credit Party, led by William "Bible Bill" Aberhart, sweeps into power in Alberta, doubles royalties to 10 per cent to offset the effects of the Great Depression, and enacts a 2 per cent retail sales tax after defaulting on provincial savings bonds.

1936

The third and biggest Turner Valley boom is triggered by a find in a geological reservoir that is estimated to contain 1.3 billion barrels of oil.

First oil well in Saudi Arabia begins tapping the world's largest reserves.

1938

With the federal natural resource transfer act now amended, Alberta creates the Petroleum and Natural Gas Conservation Board, which has since undergone several name changes: Oil and Gas Conservation Board (1957 – 1971), Energy Resources Conservation Board (1971 – 1995), Alberta Energy and Utilities Board (1995 – 2007), and once again Energy Resources Conservation Board (2008 – present).

1939

William F. Knode, the first chairman of the Petroleum and Natural Gas Conservation Board, travels to England with an Alberta delegation, seeking financial support to expand oil markets by building a pipeline to Ontario. The delegation returns home empty-handed.

Knode and the fledgling agency earn a reputation for rigorously enforcing conservation on even the most fiercely independent oil entrepreneurs.

1940

Alberta Supreme Court Justice Alexander McGillivray leads an inquiry that defuses popular suspicion of price fixing by oil firms, rejects demands for government ownership of the industry, and urges the ERCB to maintain a public data bank of energy and resource knowledge.

1941

The ERCB protests when the federal government commands accelerated oil production in the Turner Valley as a Second World War emergency measure.

1942

U.S. army engineers and civilian labourers build the 900-kilometre Canol Pipeline from Norman Wells, Northwest Territories, to Whitehorse, Yukon. Recruitment posters for the wartime rush job warn prospective workers: "This is no picnic."

1943

The ERCB shuts in strained Turner Valley wells for exceeding production limits.

1944

The Jumping Pound natural gas field is discovered west of Calgary.

1945

The ERCB supervises the first "unitization" agreement, overseeing the orderly and fair sharing or pooling of large discoveries made by multiple companies at Jumping Pound.

1946

As the Turner Valley fields run out of the gas that served as the pressure driver of oil-well flows, production falls by 16 per cent to 16 267 barrels a day, or less than western Canadian consumption.

The ERCB orders the closure of several leaking gas wells in Medicine Hat.

1947

After drilling 133 dry holes, the Leduc gusher is hit at a drilling depth of about 1.6 kilometres. The 330-million-barrel oilfield, located 40 kilometres southwest of Edmonton, gives the industry a new geological formation to target across the province.

1948

The ERCB takes over the Atlantic No. 3 oil well near Leduc, stopping a spectacular blowout and fire and calling worldwide attention to Alberta's emerging large-scale production potential.

The 780-million-barrel Redwater oilfield is discovered northeast of Edmonton.

A mountain in Kananaskis Country, west of Calgary, is named after AGS founder John Allan.

During the provincial election, citizens are asked to weigh in on an electricity referendum. The proposed public ownership takeover of all Alberta power supplies is rejected by a small majority of voters (50.03 per cent vs. 49.97 per cent).

1949

The 285-million-barrel Golden Spike oilfield is discovered southwest of Edmonton.

The Cessford field, containing 1.4 trillion cubic feet of natural gas, is discovered east of Calgary.

Robert J. Dinning leads a public inquiry and finds no available gas surplus for out-of-province sales and no shortage of popular opposition against allowing gas supplies to ever leave Alberta.

Following a special session of the legislature, the ERCB's role is expanded to include granting or denying "removal permits" for out-of-province sales under a new *Gas Resources Preservation Act,* approving pipeline construction within the province's borders, and setting oil production levels.

1950

The Interprovincial Pipe Line (now Enbridge) is built to take oil from Edmonton to central Canada and the United States.

The ERCB begins making monthly orders on "pro-rationing," or market sharing, for production capacity that is about double the delivery ability of the pipelines.

The Alberta government publishes a report intended to lure industry into the oil sands by portraying them as a commercially feasible supply source that is competitive with conventional wells.

1951

Alberta raises royalties to 16.6 per cent.

Canadian Chemical Co. (later Celanese Canada) builds the first plant in a multicompany chain of petrochemical sites in the Edmonton and Red Deer areas.

The ERCB rejects all gas export applications, except for a contract with a Montana mine supplying Korean War materials.

1952

The 424-million-barrel Bonnie Glen oil discovery is made south of Edmonton.

The Social Credit party is re-elected in a campaign dominated by gas export issues as the ERCB and the government show signs of starting to allow controlled, limited out-of-province sales.

1953

The Pembina discovery — Alberta's biggest single conventional oil pool, at 1.7 billion barrels — is made southwest of Edmonton.

The Trans Mountain Pipe Line (now Kinder Morgan Canada) carries oil from Edmonton to Vancouver.

The ERCB orders the shutdown of hundreds of Leduc-area wells for excessive flaring. The decision opens a new era of recovering "solution gas," which is embedded in oil like the bubbles in carbonated soft drinks.

1954

When conducting a natural gas supply review, the ERCB concludes that the rapidly growing industry's surplus should be made available for out-of-province sales but casts doubt on the economic viability of current proposals to build a natural gas pipeline to Ontario and Quebec.

The Alberta Gas Trunk Line Co. (AGTL), created by legislature charter, is mandated to build a natural gas pipeline network that will link production fields with long-distance national and international systems. AGTL later becomes Nova Corp. and now TransCanada Corp.

1955

Rival Alberta-to-Ontario gas pipeline projects merge and obtain support from the ERCB and the Alberta and federal governments.

The Alberta legislature passes the *Bituminous Sands Act,* which permits the government to exempt oil sands projects from the market-sharing pro-rationing regime that is in place for conventional wells.

The AGS begins Alberta groundwater research and mapping programs that continue to this day.

1956

After tumultuous parliamentary debate about routing and federal government assistance, the TransCanada pipeline is built to carry gas from Alberta to central Canada and the United States.

Egypt nationalizes the Suez Canal, provoking an international crisis that disrupts tanker traffic, drives up oil prices, and increases demand for Alberta oil.

1957

The 926-million-barrel Swan Hills oil discovery is made northwest of Edmonton.

The Crossfield field, containing 1.7 trillion cubic feet of natural gas, is discovered north of Calgary.

1958

A federal royal commission led by Henry Borden recommends creating a national energy policy and a regulatory agency, echoing a 1957 report of another inquiry led by Walter Gordon.

Project Cauldron, an American proposal to boil the oil sands into flowing by detonating underground atomic bomb blasts, garners public notoriety and technical interest in Alberta. The proposal is shelved, however, because it violates national policy that prohibits nuclear weapons in Canada.

The AGS begins decades-long research on the mineral potential of the province's Precambrian bedrock.

1959

The National Energy Board (NEB) is created. Ian McKinnon takes a two-year leave of absence from his position as head of the ERCB to become the NEB's first chairman.

The 880-million-barrel Judy Creek and Swan Hills South oil discoveries are made north of Edmonton.

1960

The Organization of Petroleum Exporting Countries (OPEC) is formed with an initial mandate to stop international oil companies from cutting prices after the spikes caused by the Suez crisis subside and a world supply glut drives markets down to US$1.80 a barrel.

1961

Canada west of the Ottawa Valley becomes a premium market for Alberta oil when the National Oil Policy bans discount-priced imports into Ontario.

Pacific Gas Transmission opens an Alberta-to-California natural gas pipeline.

1962

The ERCB approves construction of the Great Canadian Oil Sands (GCOS, now Suncor Energy Inc.), the first Fort McMurray bitumen mining and upgrading complex.

Over vigorous resistance by conventional producers, whose wells remain restricted to pumping below capacity by pro-rationing, a new provincial policy grants the oil sands a 5 per cent share of the market for Alberta crude.

The ERCB opens the Core Research Centre in Calgary. The centre, a prized reference library for earth scientists, houses well core samples from every well drilled in the province.

The Edson field, containing 1.8 trillion cubic feet of gas, is discovered west of Edmonton.

1963

The ERCB defers approval of two additional Fort McMurray projects, with planned production of 100 000 barrels per day each, because production will exceed the provincial 5 per cent market quota for the oil sands.

1964

GCOS obtains ERCB consent to raise its planned output by 43 per cent to 45 000 barrels per day, and the provincial cabinet grants final approval for construction. At the government's request, the project sells $12.5 million worth of debentures to Albertans that can later be converted into ownership shares.

1965

The 500-million-barrel Rainbow oil discovery is made northwest of Edmonton.

Aspiring oil sands developers form the Syncrude Canada consortium to press ahead on long-range planning to build one of the deferred Fort McMurray megaprojects.

1966

Annual petroleum industry revenues in Alberta top $1 billion for the first time.

The first annual Calgary Petroleum Show draws capacity crowds.

The last Lethbridge coal mine shuts down.

1967

Oil and railway companies team up to build Calgary's famous landmark, the 165-metre Calgary Tower.

GCOS starts production as the first commercial oil sands plant.

Egypt, Iraq, Kuwait, and Saudi Arabia block the Suez Canal and halt oil deliveries to the United States and United Kingdom in retaliation for their support of Israel during the Six-Day War. Alberta lends a hand, with export pipelines running flat out.

1968

The ERCB defers approval of a scaled-down, 50 000 barrels per day version of the Syncrude oil sands project until the extent and market effects of the mammoth Prudhoe Bay discovery in Alaska can be assessed.

1969

Six companies form Mackenzie Valley Pipe Line Research Ltd. to work on plans for a Canadian route to Arctic oil markets.

The Prudhoe Bay gusher ignites a US$900-million Alaskan drilling rights sale that sets a world industry record.

1970

Following pipeline ruptures, the ERCB leads industry in developing a non-profit network of cleanup equipment and training depots, Western Canadian Spill Services Ltd.

AGTL unveils plans for a mammoth Arctic pipeline network to carry both Prudhoe Bay and Mackenzie Delta natural gas to markets across the United States and Canada via Alberta.

1971

The ERCB approves an expanded, 125 000 barrels per day version of the Syncrude oil sands project, after Alaska production and pipeline schemes run into long delays.

The ERCB toughens sulphur emission guidelines for sour-gas processing plants.

Alberta establishes Canada's first environment ministry. The ERCB retains responsibility for the effects of oil and gas activity on land, air, and water.

Peter Lougheed leads Alberta's Conservative party to victory, ending 36 years of Social Credit rule.

OPEC achieves its first organized world oil price increase.

The AGS adopts a new agenda that emphasizes environmental topics such as Edmonton urban geology, the Peace-Athabasca Delta, and mine reclamation.

1972

After an ERCB inquiry reveals that Alberta natural gas is undervalued by, on average, 50 per cent, the government demands price increases for out-of-province sales contracts.

Despite industry protests, the new Conservative government raises provincial oil and gas royalties from 15 per cent to a range of 19 – 23 per cent.

1973

After the October War in the Middle East, OPEC quadruples oil prices to US$10.84 a barrel.

The federal government freezes Canadian oil prices, imposes an export tax on Alberta deliveries to the United States, and sets a policy goal of national energy self-sufficiency.

Alberta's conventional oil production peaks at 1.4 million barrels per day.

1974

The first in a series of 1970s federal-provincial oil compromise agreements raises Canadian prices, but leaves them below world levels.

The federal budget withdraws the practice that allowed industry to deduct provincial royalty payments from corporate taxes. The change provokes lengthy battles over energy revenue distribution and resource development jurisdiction.

1975

The ERCB grants four petrochemical development permits, triggering the construction of a chain of plants that make synthetic materials from liquid by-products of natural gas, a manufacturing scheme encouraged by the province's economic diversification policy.

Alberta Energy Co. is established as an investor-owned vehicle that enables Albertans to own interests in oil and gas development. After public sale of 51 per cent of the shares, the government retains 49 per cent and a supportive policy role.

Petro-Canada is established as a Crown corporation, with a mandate to be Ottawa's window on the industry. The move inaugurates a fourteen-year, $5-billion string of "Canadianization"— corporate takeovers partly financed by a national surtax on gasoline. The head office is located in Calgary.

The first ERCB hearing on a contested well licence ushers in the modern era of heightened public sensitivity about drilling for sour gas, which is laced with hazardous hydrogen sulphide. The fight over drilling at Quirk Creek, south of Calgary, ends in relocation of the well and a review of emergency warning and evacuation procedures.

1976

The ERCB approves construction of an oil pipeline to connect the Syncrude project to Edmonton and markets beyond.

The Alberta Heritage Savings Trust Fund is created to storehouse oil and gas revenue surpluses. The fund can be used for economic diversification initiatives, special capital projects, and investments such as government shares of Alberta Energy Co.

1977

A northern pipeline inquiry, led by British Columbia law court judge Thomas Berger, recommends a ten-year development moratorium to allow Aboriginal communities time to settle land claims and prepare to participate in industry.

1978

The 11-company Alsands consortium applies to the ERCB to build a third oil sands megamine.

Syncrude, the second oil sands plant, starts production. The plant is later completed with federal and provincial aid that includes 30 per cent ownership by the Alberta, federal, and Ontario governments after construction costs double to $2.3 billion and an industry partner drops out.

1979

The ERCB approves the Cold Lake oil sands project, the first in situ, underground bitumen extraction development of deposits too deep for conventional mining.

The ERCB grants approval in principle to the Alsands development.

The ERCB reviews the guidelines for provincial stockpiles of natural gas and deems that a twenty-five-year supply (rather than thirty-year supply) comprises an adequate surplus.

The world oil price doubles to US$32 a barrel after the Iranian Revolution.

The Hibernia oilfield is discovered on the Grand Banks of Newfoundland and Labrador.

1980

The National Energy Program implements price controls, restricts exports, raises taxes, and provides incentive grants to redirect drilling to Arctic and offshore frontiers.

Alberta resists the NEP move by cutting production and suspending oil sands project approvals.

The ERCB tightens regulations on sour gas emissions by raising sulphur recovery requirements to an average of 98 per cent.

The AGS undertakes a series of oil sands and heavy crude studies, making discoveries such as a bitumen deposit beneath Edmonton.

1981

A federal-provincial compromise agreement amends NEP details but does not overturn the policy. The Alberta drilling and real estate booms end.

1982

A sour-gas blowout at Lodgepole, southwest of Edmonton, kills two well-control crewmen, injures 16 others, burns for 68 days, and triggers an ERCB inquiry. The blowout's telltale rotten-egg odour drifts as far as Winnipeg, 1500 kilometres east of the accident site.

The Foothills Pipe Lines is constructed to carry Alberta gas exports to California and the U.S. Midwest. The venture is an official, internationally agreed upon "prebuild" of the southern legs of the proposed Alaska megaproject.

All 84 hands aboard the Ocean Ranger, a Grand Banks drilling rig, perish when a storm sinks the rig.

1983

The ERCB leads safety and environmental inquiries that establish guidelines for addressing the needs of oil and gas activity and urban growth in west Edmonton, northeast Calgary, and Okotoks.

OPEC unity cracks and the world oil price falls nearly 25 per cent to US$29 a barrel.

To adapt to deteriorating market conditions, the ERCB approves an economy model of the Cold Lake oil sands project. The approval advises construction in modest stages at a slowed pace.

The AGS completes a seventeen-year research project that compiles an inventory of all significant Alberta mineral resources.

1984

The ERCB's Lodgepole inquiry report finds that faulty equipment and human error caused the blowout. An overhaul of safety standards and regulatory clampdowns on sour-gas drilling follow.

The ERCB approves additions to Fort McMurray, Cold Lake, and Peace River oil sands projects.

1985

Amid supply gluts and softening prices, the federal and Alberta governments carry out an agreement to stop controlling the price of oil. The agreement, called the Western Accord on Energy, scraps the NEP and ushers in oil and gas free trade with the United States.

The federal inquiry into the sinking of the Ocean Ranger recommends improvements in three areas: offshore drilling safety regulation, rescue services, and weather forecasting.

1986

OPEC unity crumbles, oil crashes to US$10 a barrel, gas prices deteriorate, annual Alberta oil and gas sales drop by $10 billion or 50 per cent, and a growth spurt started by the Western Accord slumps with an estimated 62 000 jobs lost.

The ERCB implements a computer system for managing pipeline applications.

1987

The ERCB and the provincial utilities board further reduce the mandatory reserves of natural gas, this time to a fifteen-year supply for a "core market" of residential and small business consumers.

The ERCB amends pro-rationing rules to permit increased oil sales. The move is made possible by the Western Accord and additional pipeline capacity.

The ERCB implements a community involvement policy that requires field staff to help resolve conflicts between industry and the public.

1988

The ERCB adopts noise guidelines, directing industry to turn down the volume. New facilities are required to hit a nighttime sound target as low as 40 decibels — equivalent to the near-silence of quiet offices, living rooms, and libraries.

An ERCB inquiry generates a new provincial policy that requires petrochemical and oil industries to share supplies of ethane, a prized natural gas by-product.

Improved emission regulations for sulphur recovery are expanded to include sour-gas plants of all sizes, including formerly exempt small sites.

The AGS leads government, industry, and academic teams in studying the resource-rich northern Peace River Arch region. Their work leads to the monumental 1994 publication *Geological Atlas of the Western Canada Sedimentary Basin*.

CHRONOLOGY (cont'd)

1989

ERCB policy aims to reduce gas plant proliferation by encouraging industry to make maximum use of established processing sites.

TransCanada PipeLines moves its 700-employee head office from Toronto to Calgary.

1990

After hotly contested hearings, the ERCB approves construction of a new plant at Caroline. The plant will produce high volumes of gas, liquid by-products, and sulphur from the richest discovery in a decade.

"Privatization" sales of federal government shares in Petro-Canada begin.

The world oil price spikes to US$40 a barrel after Iraq invades Kuwait and sets off a global supply scare.

1991

In response to environmental concerns regarding greenhouse gas emissions from burning fossil fuels, the ERCB inaugurates carbon dioxide emissions forecasting.

The ERCB approves the first Alberta trials for collecting unconventional natural gas by tapping the methane in coal seams.

As United Nations forces campaign to drive Iraq out of Kuwait by eliminating the air power threat to Middle East production, the world oil price takes its biggest one-day tumble, plunging by 40 per cent from US$32 a barrel to US$19.25 a barrel.

The National Energy Board moves from Ottawa to Calgary.

1992

The ERCB completes inquiry reports on three issues: potential natural gas supplies, competing California gas export pipeline proposals, and additions to Alberta's Nova pipeline grid as guidance for industry and government decisions.

1993

The ERCB approves Syncrude's application for increased oil sands production.

New ERCB regulations improve drilling-waste management and disposal standards.

The province sells its shares in Alberta Energy Co. (now Encana and Cenovus), ending 18 years of government and investor joint ownership.

1994

Following prolonged public hearings, the ERCB turns down an application for a sour-gas well near Whaleback Ridge, a prized wildlife habitat in the beautiful Rocky Mountain foothills of southwestern Alberta.

Oil pro-rationing is eliminated as part of "regulatory streamlining." Other changes range from reducing public notice requirements for industry projects to paring down ERCB staff.

The ERCB institutes an industry levy to clean up orphan wells — sites deserted by former owners.

1995

The ERCB and the provincial Public Utilities Board merge, forming the Alberta Energy and Utilities Board (EUB).

The Alberta government sells its 11.7 per cent share in the Syncrude plant.

1996

A record-breaking 10 396 wells are drilled in Alberta, powered by a 10-fold increase in the oil sands, where 2149 wells are drilled.

A federal-provincial agreement on oil sands royalty and tax incentives sets off a development wave that rapidly swells into a $60-billion lineup of projects.

Trading opens on the electricity exchange, the Power Pool of Alberta, created by provincial deregulation.

The AGS becomes an arm of the ERCB. Within two years, the survey is providing expert advice for regulatory reviews of oil sands projects and resources.

1997

Drilling records are set again with 13 212 wells drilled in the province, including 2700 in the oil sands. A surge in natural gas activity and a growing in situ underground bitumen extraction are behind the record-breaking numbers.

1998

The EUB expands oil sands reporting to cover all reserves within reach of surface mining.

The EUB completes the first in a series of technical inquiries into the effects of natural gas drilling on the eventual production of bitumen deposits that are too deep to be mined using conventional methods.

The AGS starts work on an inventory of potential geological disposal sites for carbon dioxide as a way to reduce industrial greenhouse gas emissions.

In a $15-billion deal, TransCanada PipeLines and Nova (formerly AGTL) amalgamate, setting a size record for Canadian energy sector mergers.

1999

The EUB launches the appropriate dispute resolution (ADR) program, a peacekeeping initiative for companies and landowners.

The EUB focuses its attention on reducing small waste-gas flares at oil wells and starts a review of sour-gas safety with a public advisory committee.

After receiving EUB approval, the Athabasca Oil Sands Project consortium begins building Alberta's third bitumen mining and upgrading complex.

2000

The EUB orders the shut-in of 146 natural gas wells. The move aims to protect oil sands deposits against the loss of underground pressure needed for future bitumen production.

Alliance Pipeline delivers natural gas from northern Alberta and British Columbia to an international trading hub in Chicago.

The orphan well program expands to include pipelines, processing facilities, and land reclamation at old industry sites.

The EUB boots up an integrated application registry (IAR), providing swift access to its processes via the digital information highway.

Alberta's conventional natural gas production peaks at 14 billion cubic feet per day.

With conventional natural gas reserves in decline, the production of coalbed methane begins.

2001

The EUB begins implementing the 87 recommendations made by the sour-gas safety public advisory committee by overhauling emergency response plans.

The EUB approves Suncor's application for adding Firebag in situ production to its oil sands complex and helps create the Cumulative Environmental Management Association and Wood Buffalo Environmental Association for Alberta's northern bitumen belt.

The EUB approves additions to three electricity projects, increasing Alberta's power grid generating capacity by nearly 2000 megawatts or 20 per cent.

Dormant Arctic production and pipeline plans are revived as the MacKenzie Gas Project.

2003

The Athabasca Oil Sands Project starts production.

The EUB embarks on expansion of its seventeen-year-old Fort McMurray regional office.

The EUB commissions the AGS to study the relationship between natural gas extraction and bitumen reserves after ordering more well shut-ins to preserve underground pressure as a driver for future production.

The EUB and the federal Canadian Environmental Assessment Agency team up to scrutinize the Horizon Oil Sands Project and the Athabasca consortium expansion plans.

The EUB announces a new bitumen conservation policy. Up to 938 gas wells are shut in and lengthy technical hearings ensue.

Acting on a World Bank request, the EUB helps Algeria, Angola, Cameroon, Chad, Indonesia, and Nigeria devise oilfield flaring and venting reduction programs.

The orphan well fund is tapped for a five-million-dollar cleanup that seals the notorious "Old Salty," a Peace River blowout that had been leaking brine and gas since 1916.

The AGS estimates that up to 500 trillion cubic feet of natural gas await production in Alberta coal seams.

The annual average oil price hits US$31 a barrel, the highest price in two decades.

2004

Oil prices soar to more than US$55 a barrel and natural gas prices climb. More than 44 000 industry applications set a workload record for EUB.

An EUB ruling shuts in 280 billion cubic feet of gas to protect, for future production, 500 times more energy in 25.5 billion barrels of bitumen deposits.

Imperial Oil — the granddaddy of Canadian petroleum companies, discoverer of Leduc, and a bitumen development leader — moves its head office from Toronto to Calgary.

The EUB's utilities side regulates electricity service by city-owned power companies in Edmonton and Calgary.

2005

The EUB rules that a new 500-kilovolt power transmission line is needed between Edmonton and Calgary. The stage is set for project development and route hearings.

The EUB temporarily suspends well conservation rules, increasing Alberta oil production in response to the International Energy Agency appeal for emergency replacement of U.S. output that has been significantly affected by Hurricane Katrina in the Gulf of Mexico.

The AGS begins geo-hazard research, identifying at-risk areas for dangers such as earthquakes and landslides.

Growing Alberta oil sands production hits one million barrels per day, accounting for 58 per cent of total crude output.

2006

Surging industry activity sets an EUB workload record of 60 125 applications: 1842 are denied for falling short of Alberta standards and 1572 are voluntarily withdrawn.

The EUB approves four oil sands megaprojects — Voyageur Upgrader, the North Steepbank, Muskeg River, and Kearl mines.

The EUB's new environmental rules enhance water protection in areas of shallow gas and coalbed methane development.

2007

The Alberta government announces the breakup of the EUB. The Energy Resources Conservation Board (ERCB) and the Alberta Utilities Commission (AUC) will return to their original status as separate, independent agencies effective January 2008.

The EUB grants final approval to two new oil sands projects: the Kearl mine north of Fort McMurray and the North West bitumen upgrader near Edmonton.

The EUB completes a seven-year overhaul of sour-gas safety, addressing the last of 87 advisory committee recommendations. Initiatives ranged from a public call centre to upgraded mobile air quality monitoring equipment.

The Calgary-Edmonton power line project starts over from scratch when the EUB declares a mistrial after protesters disrupt approval hearings and provincial inquiries fault the EUB's security department for calling in a private investigation firm.

AGS unconventional gas studies expand to include shale deposits as well as coalbed methane.

Over fierce industry resistance, the Alberta government adopts a "new royalty framework" that raises maximum rates for periods of high oil and natural gas prices. The framework is scheduled to be implemented in 2009.

2008

When migrating ducks die after landing in a liquid waste storage pond at the Syncrude plant, the ERCB issues a draft directive for bitumen mine tailings management.

The ERCB implements stricter operational standards for oil sands production sites and more than triples inspections at Fort McMurray bitumen mining and upgrading complexes.

Propelled by global bubble-and-bust finances, the price of oil soars to US$147.27 a barrel then dives to US$30.28. Resulting economic uncertainty prompts oil sands project deferrals and changes.

2009

The oil sands tailings pond directive establishes standards, disclosure rules, and reclamation requirements.

Alberta consents to transferring jurisdiction of the Nova gas pipeline network to the National Energy Board, enabling the project to extend beyond Alberta's borders.

Global financial ills, shifting oil price patterns, and changing industry strategies put a stop to the "upgrader alley" lineup of bitumen processing projects northeast of Edmonton.

Together with Alberta Environment, the AGS completes the first in a planned series of airborne groundwater surveys.

2010

The ERCB approves industry commitments to oil sands tailings pond management and cleanups.

Syncrude pays $3 million in federal and provincial fines for its 2008 tailings pond duck deaths. A creative sentencing agreement divides the money among governments, native groups, and environmental organizations.

After a "competitiveness review," the Alberta government reduces maximum oil and natural gas royalties, adopts incentives for new and unconventional production, and pledges to simplify the provincial regulatory regime.

The ERCB adopts an expedited procedure for reviewing, approving, and managing the safety, environmental, and resource conservation risks of energy technology innovations.

2011

The AGS publishes *Edmonton-Calgary Corridor Groundwater Atlas,* a cornerstone of a provincial conservation strategy called Water for Life.

About 95 kilometres north of Peace River, the biggest Alberta pipeline leak in three decades spills 28 000 barrels of oil. The ERCB shuts down the line for four months. During that time, investigations, repairs, inspections, and operational improvements are conducted, including community consultation and communications programs.

A 30-month IT epic, involving more than 100 people, is wrapped up, converting 78 million ERCB microfiche files recording the evolution of Alberta oil and gas fields into digital form. The cost, $2.3 million, is $1.7 million (42 per cent) under budget.

2012

Provincial government legislation, the *Responsible Energy Development Act,* expands and renames the ERCB as the Alberta Energy Regulator, with added duties to approve and supervise all environmental aspects of oil, natural gas, coal, and oil sands projects from cradle to grave.

AGS releases a report that maps potentially productive Alberta shale formations and estimates their total contents in astronomical numbers: 3424 trillion cubic feet of natural gas, 423.6 billion barrels of oil and 58.6 billion barrels of liquid by-products of gas.

STATISTICS

ALBERTA OIL AND GAS REVENUES (million $)

YEAR	(Nominal) TOTAL SALES	(Inflation-Adjusted to 2011 Dollars) TOTAL SALES
1947	20.3	230.8
1948	37.6	374.6
1949	61.6	609.1
1950	85.4	810.5
1951	121.4	1,038.0
1952	148.0	1,265.7
1953	202.7	1,733.9
1954	239.5	2,033.7
1955	289.3	2,456.9
1956	371.7	3,112.7
1957	379.1	3,048.1
1958	312.8	2,465.9
1959	345.1	2,685.2
1960	362.5	2,042.2
1961	452.3	3,474.4
1962	505.1	3,830.9
1963	592.0	4,406.9
1964	652.4	4,768.1
1965	704.3	5,025.7
1966	791.9	5,426.4
1967	911.8	6,008.7
1968	1,026.8	6,517.6
1969	1,131.6	6,858.0
1970	1,304.5	7,711.6
1971	1,529.0	8,739.4
1972	1,841.7	9,959.9
1973	2,627.7	13,149.2
1974	4,287.6	19,294.0
1975	5,323.4	21,689.4
1976	6,399.8	24,502.2
1977	7,994.9	28,192.5
1978	9,191.8	29,879.7
1979	11,767.1	34,867.7
1980	14,892.4	39,911.5
1981	15,923.6	37,877.5
1982	19,161.0	41,338.4
1983	22,077.1	45,357.7
1984	24,401.3	48,321.9
1985	25,408.9	48,333.0
1986	15,453.8	28,238.3
1987	16,661.4	29,121.1
1988	14,300.4	24,019.9
1989	15,608.8	24,899.7
1990	18,354.4	28,090.7
1991	15,676.8	22,751.1
1992	16,440.8	23,548.3
1993	18,163.5	25,560.3
1994	20,364.8	28,591.3
1995	20,556.6	28,236.1
1996	25,433.7	34,425.4
1997	25,917.7	34,499.8
1998	21,095.1	27,895.4
1999	28,768.4	37,067.0
2000	49,850.6	62,559.6
2001	49,342.2	60,351.7
2002	42,855.0	51,222.1
2003	57,223.8	66,936.9
2004	65,227.8	74,918.8
2005	82,356.9	91,625.8
2006	79,632.8	87,946.1
2007	80,417.6	86,669.9
2008	107,951.8	112,523.7
2009	64,967.5	68,309.3
2010	74,623.1	76,985.0
2011	89,569.1	89,569.1

SOURCE
Canadian Association of Petroleum Producers, Statistical Handbook 2012 (Tables 04-19A and 04-19B) Reproduced with permission

ALBERTA PROVINCIAL OIL AND GAS ROYALTIES (million $)

SOURCE
Canadian Association of Petroleum Producers, Statistical Handbook 2012 (Tables 04-03A, 04-03B, 04-16A, and 04-16B) Reproduced with permission

YEAR	(Nominal) OIL SANDS ROYALTIES	OIL & GAS ROYALTIES	TOTAL	(Inflation-Adjusted to 2011 Dollars) TOTAL
1947		1.5	1.5	17.07
1948		2.0	2.0	19.93
1949		5.0	5.0	49.43
1950		6.5	6.5	61.72
1951		11.5	11.5	98.36
1952		15.5	15.5	132.57
1953		20.0	20.0	171.06
1954		25.0	25.0	212.32
1955		31.0	31.0	263.28
1956		41.0	41.0	343.38
1957		40.0	40.0	321.60
1958		30.0	30.0	236.47
1959		33.5	33.5	260.65
1960		35.0	35.0	272.32
1961		55.0	55.0	422.48
1962		66.0	66.0	500.60
1963		73.0	73.0	543.44
1964		80.0	80.0	584.73
1965		79.3	79.3	565.89
1966		91.3	91.3	625.61
1967	0.1	107.4	107.5	708.44
1968	1.1	125.6	126.7	804.21
1969	2.0	136.3	138.3	838.14
1970	1.4	154.0	155.4	918.69
1971	1.8	190.4	192.2	1098.55
1972	3.6	226.0	229.6	1241.69
1973	8.1	422.6	430.7	2155.29
1974	21.0	1107.2	1128.2	5076.90
1975	24.5	1477.7	1502.2	6120.45
1976	31.5	1974.1	2005.6	7678.58
1977	52.5	2398.9	2451.4	8644.41
1978	59.5	3054.9	3114.4	10123.90
1979	56.0	3623.3	3679.3	10902.30

ALBERTA PROVINCIAL OIL AND GAS ROYALTIES (cont'd)

YEAR	(Nominal) OIL SANDS ROYALTIES	OIL & GAS ROYALTIES	TOTAL	(Inflation-Adjusted to 2011 Dollars) TOTAL
1980	248.0	4248.0	4496.0	12049.28
1981	238.0	4496.7	4734.7	11262.42
1982	273.5	5098.1	5371.6	11588.82
1983	395.8	5467.2	5863.0	12045.62
1984	179.0	5958.1	6137.1	12153.27
1985	221.0	5784.4	6005.4	11423.52
1986	12.0	3361.7	3373.7	6164.67
1987	23.0	2625.5	2648.5	4629.12
1988	19.0	2456.9	2475.9	4158.68
1989	27.7	2527.3	2555.0	4075.83
1990	47.0	3085.0	3132.0	4793.39
1991	27.0	2625.0	2652.0	3848.75
1992	46.4	2686.1	2732.5	3913.77
1993	82.7	2504.7	2587.4	3641.08
1994	185.2	2857.9	3043.1	4272.38
1995	298.3	2437.1	2735.4	3757.28
1996	518.0	3473.9	3991.9	5403.18
1997	269.6	3610.2	3879.8	5164.50
1998	67.4	2731.4	2798.8	3701.04
1999	269.2	4040.2	4309.4	5552.50
2000	815.9	8886.0	9701.9	12175.33
2001	265.0	9795.2	10060.2	12304.87
2002	182.0	6084.6	6266.6	7490.11
2003	274.0	7757.8	8031.8	9395.10
2004	769.0	8789.9	9558.9	10979.08
2005	819.0	11796.3	12615.3	14035.10
2006	2187.0	9198.1	11385.1	12573.65
2007	2716.0	8071.0	10787.0	11625.67
2008	3545.0	10667.1	14212.1	14814.00
2009	2110.0	3885.1	5995.1	6303.48
2010	3747.0	3502.3	7249.3	7478.75
2011	4467.0	4546.0	9013.0	9013.00

STATISTICS

CRUDE OIL PRICES 1861–2011 (US dollars per barrel)

SOURCE
BP Statistical Review of World Energy 2012
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YEAR	$ MONEY OF THE DAY	$ 2011
1861	0.49	12.22
1862	1.05	23.56
1863	3.15	57.31
1864	8.06	115.45
1865	6.59	96.45
1866	3.74	57.22
1867	2.41	38.63
1868	3.63	61.09
1869	3.64	61.26
1870	3.86	68.38
1871	4.34	81.16
1872	3.64	68.07
1873	1.83	34.22
1874	1.17	23.17
1875	1.35	27.54
1876	2.56	53.86
1877	2.42	50.91
1878	1.19	27.62
1879	0.86	20.68
1880	0.95	22.05
1881	0.86	19.96
1882	0.78	18.11
1883	1.00	24.04
1884	0.84	20.94
1885	0.88	21.94
1886	0.71	17.70
1887	0.67	16.71
1888	0.88	21.94
1889	0.94	23.44
1890	0.87	21.69
1891	0.67	16.71
1892	0.56	13.96
1893	0.64	15.96
1894	0.84	21.75
1895	1.36	36.62
1896	1.18	31.78
1897	0.79	21.27
1898	0.91	24.50
1899	1.29	34.74
1900	1.19	32.04
1901	0.96	25.85
1902	0.80	20.71
1903	0.94	23.44
1904	0.86	21.44
1905	0.62	15.46
1906	0.73	18.20
1907	0.72	17.31
1908	0.72	17.95
1909	0.70	17.45
1910	0.61	14.67
1911	0.61	14.67
1912	0.74	17.18
1913	0.95	21.53
1914	0.81	18.11
1915	0.64	14.17
1916	1.10	22.65
1917	1.56	27.35
1918	1.98	29.55
1919	2.01	26.13
1920	3.07	34.45
1921	1.73	21.73
1922	1.61	21.59
1923	1.34	17.65
1924	1.43	18.80
1925	1.68	21.54
1926	1.88	23.88
1927	1.30	16.83
1928	1.17	15.35
1929	1.27	16.66
1930	1.19	16.02
1931	0.65	9.60
1932	0.87	14.32
1933	0.67	11.62
1934	1.00	16.79
1935	0.97	15.89

CRUDE OIL PRICES 1861–2011 (cont'd)

1936	1.09	17.69
1937	1.18	18.48
1938	1.13	18.03
1939	1.02	16.51
1940	1.02	16.35
1941	1.14	17.41
1942	1.19	16.41
1943	1.20	15.60
1944	1.21	15.46
1945	1.05	13.11
1946	1.12	12.89
1947	1.90	19.12
1948	1.99	18.58
1949	1.78	16.79
1950	1.71	15.97
1951	1.71	14.79
1952	1.71	14.48
1953	1.93	16.21
1954	1.93	16.14
1955	1.93	16.20
1956	1.93	15.97
1957	1.90	15.17
1958	2.08	16.17
1959	2.08	16.03
1960	1.90	14.42
1961	1.80	13.52
1962	1.80	13.38
1963	1.80	13.22
1964	1.80	13.04
1965	1.80	12.82
1966	1.80	12.47
1967	1.80	12.12
1968	1.80	11.63
1969	1.80	11.04
1970	1.80	10.42
1971	2.24	12.43
1972	2.48	13.34
1973	3.29	16.66
1974	11.58	52.85
1975	11.53	48.21
1976	12.80	50.59
1977	13.92	51.63
1978	14.02	48.37
1979	31.61	97.94
1980	36.83	100.54
1981	35.93	88.91
1982	32.97	76.85
1983	29.55	66.74
1984	28.78	62.31
1985	27.56	57.61
1986	14.43	29.62
1987	18.44	36.50
1988	14.92	28.38
1989	18.23	33.06
1990	23.73	40.83
1991	20.00	33.04
1992	19.32	30.98
1993	16.97	26.42
1994	15.82	24.01
1995	17.02	25.12
1996	20.67	29.63
1997	19.09	26.76
1998	12.72	17.55
1999	17.97	24.26
2000	28.50	37.22
2001	24.44	31.05
2002	25.02	31.29
2003	28.83	35.25
2004	38.27	45.57
2005	54.52	62.80
2006	65.14	72.69
2007	72.39	78.53
2008	97.26	101.61
2009	61.67	64.66
2010	79.50	82.00
2011	111.26	111.26

ALBERTA POPULATION HISTORY

SOURCE
Statistics Canada, Censuses of Population, 1851 to 2011

YEAR	TOTAL
1901	73,022
1911	374,295
1921	588,454
1931	731,605
1941	796,169
1951	939,501
1956	1,123,116
1961	1,331,944
1966	1,463,203
1971	1,627,875
1976	1,838,035
1981	2,237,724
1986	2,365,830
1991	2,545,553
1996	2,696,826
2001	2,974,807
2006	3,290,350
2011	3,645,257

STATISTICS

ALBERTA POPULATION CHANGE DUE TO MIGRATION

YEAR	INTER-PROVINCIAL MIGRATION	INTER-NATIONAL MIGRATION	TOTAL
1971/1972	4190	5198	9388
1972/1973	5498	6506	12004
1973/1974	2911	7796	10707
1974/1975	23155	11257	34412
1975/1976	26579	11721	38300
1976/1977	34710	10284	44994
1977/1978	32543	7052	39595
1978/1979	33426	5254	38680
1979/1980	41435	15427	56862
1980/1981	44250	16995	61245
1981/1982	36562	16836	53398
1982/1983	-11650	8374	-3276
1983/1984	-31986	5903	-26083
1984/1985	-20771	6116	-14655
1985/1986	-3831	6939	3108
1986/1987	-29998	9532	-20466
1987/1988	-23223	12481	-10742
1988/1989	-1528	15035	13507
1989/1990	5593	15500	21093
1990/1991	8983	8325	17308
1991/1992	2983	7437	10420
1992/1993	-1181	8043	6862
1993/1994	-1630	8903	7273
1994/1995	-556	9391	8835
1995/1996	7656	8951	16607
1996/1997	26282	8139	34421
1997/1998	43089	5895	48984
1998/1999	25191	7461	32652
1999/2000	22674	8368	31042
2000/2001	20457	12805	33262
2001/2002	26235	14898	41133
2002/2003	11903	12227	24130
2003/2004	10606	14034	24640
2004/2005	34423	16477	50900
2005/2006	45795	21279	67074
2006/2007	33809	30080	63889
2007/2008	15317	34596	49913
2008/2009	13184	37085	50269
2009/2010	-3271	24100	20829
2010/2011	8443	16703	25146

SOURCE
Statistics Canada (CANSIM tables 051-0011 and 051-0018)

ABOUT THE AUTHOR

GORDON JAREMKO has worked as a reporter and editor for newspapers, magazines, and wire services since 1972 in Calgary, Edmonton, and Ottawa, with occasional forays into books and broadcasting. His primary beats have been government and economic affairs.