

OUR HEADS IN THE SANDS

by Barbara Bruederlin

They used to be called the tar sands. But as development in the Fort McMurray area of northern Alberta became frenzied with the reality of peak oil, and the world's attention became increasingly focused on the highly contentious extraction of this problematic resource, the public relations machine of the oil industry swung into action and quietly renamed them the oil sands.

It's a much prettier name, one that conjures up images of sweet clean fuel flowing effortlessly into our emission-controlled vehicles, rather than the thick, viscous, goeey mess that is the reality of bitumen.

With world oil production nearing its peak and with US oil production in decline since the 1970's, the scramble for the last of the world's oil is getting dirty. The political situation in OPEC countries is becoming increasingly touchy, particularly with Saudi Arabia, once the largest exporter of oil to the United States, now approaching the peak of its once seemingly endless oil reserves. Accordingly, the nation is becoming increasingly insular and could yet prove to be a flashpoint for a fundamentalist revolution. The United States, still the world's most ravenous consumer of oil, prefers to fulfill its

energy needs from more benign sources.

With the world's oil reserves becoming ever scarcer, the low-hanging fruit is getting picked-over. At one time, light crude gushed liberally from the ground, but now, as the petroleum age fades to black, most of the remaining oil reserves are being discovered either deep under the ocean or bound up in oil sands or shale. Both the accessibility and the quality of the world's remaining oil are diminishing, while demand continues to increase. And where once the Canadian oil sands were viewed as a poor return on investment, low provincial royalties, tax breaks for exploration and development, and a free trade agreement that favours exportation of oil to the U.S. has made the extraction of bitumen from Alberta's north irresistible to every major multi-national oil company. The oil sands are now heralded by many as the potential saviour of our petroleum-extravagant lifestyle.

Canada has replaced Saudi Arabia as the largest supplier of oil to the United States. Supporters of oil sands development maintain that exploitation of this resource will cement Canada's role as a global energy superpower, and they point to the oil sands as the largest economic engine driving the province of Alberta. You don't have to look far to find somebody whose livelihood is directly reliant on exploration and development in the oil sands.

One engineer, whose firm supplies the oil sands industry, cites the slowdown in the oil patch as a direct cause of the layoffs from which his firm is now reeling. Recently Petro-Canada announced the layoff of 200 people in their oil sands division, due primarily to cost overruns on projects brought on by softening oil prices. The slowing of oilpatch investment resulting from the current economic downturn has rippled through many sectors of the economy. Besides the oil companies themselves, the oil sands de-

velopment industry has a huge impact on transportation, equipment manufacturing, engineering, trade unions, housing, and food services.

It's not easy to wrestle bitumen from the ground. Only 20 percent of the bitumen can be reached by surface mining. In his book *Tar Sands: Dirty Oil and the Future of a Continent*, Andrew Nikiforuk describes the open pit mines that cover vast tracts of northern Alberta as "more hellish than an Appalachian coal field". During the surface mining process sizeable swaths of boreal forest are cleared, crucial wetlands (which comprise 40% of natural boreal forest) are drained, and tonnes of earth are excavated using machinery larger than some apartment buildings. All of that earth is then washed with billions of litres of freshwater sucked from the Athabasca River, in order to grapple the viscous tar from the sand that binds it. And that's just for the easy-to-reach bitumen.

The vast majority of bitumen lies so deeply buried and is so inextricably bound with sand and clay that it can only be recovered with in-situ techniques, such as steam-assisted gravity drainage. Because the natural state of bitumen more resembles a hockey puck than a liquid, it can't be pumped from these deep reserves. Instead, a series of horizontal wells are drilled and a spider web of pipes and pumps are used to continuously force steam deep into the ground until the bitumen become molten. If all the area available for in-situ extraction is developed, it will sprawl over an area the size of Florida, or forty times the mineable area.

Not only does this process drain enormous quantities of freshwater from the nearby Athabasca River or from underground aquifers, but the water must then be superheated to produce sufficient steam to melt the bitumen. And this is where the story becomes rather surreal. The fuel used to heat this

water is primarily natural gas. Natural gas is a relatively clean burning form of energy, in that it produces little particulate matter. It is also a finite and a shrinking resource. Andrew Nikiforuk writes that “the tar sands industry burns enough natural gas every day to heat four million homes. At this rate of consumption, the project could severely compromise the nation’s natural gas supplies by 2030.” Energy analysts estimate that it takes one barrel of energy to produce between 20 and 60 barrels of oil from conventional drilling; figures cited for oil produced in the oil sands range from between two and five barrels per one barrel of energy expended. And that’s not factoring in the environmental cost.

As bitumen extraction shifts increasingly toward the deepest reserves, the energy expended on the operations can only increase. Recently, the Canadian Association of Petroleum Producers issued a statement on the development of technology aimed at reducing energy inputs, in which CAPP president David Collyer alluded to research into finding substitutes for steam, such as the use of solvents or electrical currents. Requests made to the CAPP for clarification on these technologies have been cheerfully met with promises of information, which have never materialized.

Simon Dyer, Oil Sands Program Director with the Pembina Institute, dismisses these public relations battles in which the oil companies are embroiled, as distractions from the way in which “the oil sands are be-

ing horribly mismanaged”. He points out that “CAPP is keen to present technology as the solution to oil sands environmental woes, but many of the cumulative impacts of oil sands development require solutions in the form of policies and limits that protect the environment. Despite some per barrel improvements in oil sands impacts, virtually every environmental indicator is getting worse, not better, as per barrel improvements are outstripped by increases in production. Incremental technical improvements are not going to deal with any of these problems.”

The Pembina Institute recently voiced objections to an Alberta Government policy draft that would allow oil sands companies to switch from burning natural gas to burning more carbon intensive fuels, such as raw bitumen or petroleum coke and asphaltene, which are waste products from the bitumen upgrading process. “Compared with conventional oil production, in-situ oil sands production produces four times the greenhouse gas pollution per barrel when burning relatively cleaner natural gas,” their statement reads. “In-situ oil sands operations burning petroleum coke without any mitigation would produce 66 per cent more greenhouse gas pollution than if the same operation were to burn natural gas.”

But if the figures for greenhouse gas emissions are alarming, the rate of water consumption and subsequent production of liquid tailings is staggering. Bitumen extraction, and the upgrading which is then required to make it fluid, guzzles a lot of

water. The amount of water used in extraction and upgrading fluctuates with the process; figures vary from between two and four and a half barrels of water being required to make one barrel of oil from oil sands mining, and about one barrel of water per barrel of oil for in-situ.

The Athabasca River, from which the majority of water for use in the oil sands mining industry is withdrawn, lies in the southern portion of the MacKenzie River Basin, the supplier of about one-fifth of Canada’s fresh water. Water levels in the Athabasca River fluctuate with the seasons. The continued withdrawal of water during the naturally low winter flows have raised alarm bells in the environmental and First Nations communities, who fear irreparable damage to aquatic ecosystems. The water that is withdrawn for oil sands operations cannot be returned after use. Heavy metals and hydrocarbons from the extraction process accumulate in a toxic stew known as tailings. As of last June, 720 cubic metres of tailings were contained in open lakes covering an area of 130 square kms, an area the size of the City of Vancouver. These tailings wastes must be stored until somebody can figure out what to do about them.

Tailings lakes, euphemistically referred to as “ponds”, are death traps for migratory waterfowl. They mistake the vast expanses of liquid tailings for lakes of open water, land in large numbers and die in large numbers. When Syncrude Canada upgraded the number of ducks who died on one of



their tailings ponds last spring from 500 to 1606, most people were stunned. Others, who have been following activities in the oil sands, were less so. "It was not surprising at all," Andrew Nikiforuk told the CBC shortly after the news broke. "I was always suspicious."

Wildlife consultant Guy Monty recognizes that public demand for petroleum products is what ultimately allows the lax regulations responsible for the existence of tailings ponds in the first place. "Although blame should certainly fall on the people responsible for creating these death traps, it should also be applied to each and every stockholder of the companies responsible, and every human that consumes the end product of this industry," he declares. "Beyond anything else, though, the government officials who approved these projects and this way of dealing with waste should be prosecuted for the deaths of these birds."

Syncrude, for its part, has been working to dispel the negative image that these bird deaths have cast on its operations, by enlisting extra personnel and noise makers to discourage birds from landing on the open tailings lakes, and by sponsoring research into dealing with the mess that bitumen extraction and processing makes. "We're actually the only oil sands company with a dedicated research facility," Cheryl Robb, Syncrude Media Relations Advisor, tells me. "We at Syncrude actually pioneered [low energy extraction] technology in the oil sands". By reducing the water temperature used in washing bitumen out of the sand and clay from 80C to 35-40C, Syncrude estimates that it has reduced greenhouse gas emissions per barrel by 14% between 1990 and 2004. "85% of our water is recycled," Robb explains, with water being recycled up to 18 times. Still, according to Simon Dyer, overall increases in production throughout the industry have effectively negated those reductions in both per barrel greenhouse gas emissions and in water usage. It's simply a matter of math.

And then there is still the issue of what to do with existing tailings. "Our challenge is the mature fine tailings (MFT), which are clay particles suspended in water," Cheryl Robb explains. Research into end-use for this dense mixture, which settles to the bottom of tailings ponds after surface water is extracted for re-use, is being ramped up at Syncrude's research facility. Proposals include water capping (in which MFT are permanently disposed of in a mine pit and eventually covered in water), composite tails (in which gypsum is added to MFT as a stabilizer and then covered with soil), and

thickened tailings (in which MFT are centrifuged to produce a solid cake).

Simon Dyer, however, expresses his concern about placing too much trust in these unproven technologies, insisting that "without the policy direction to prohibit the creation of liquid tailings or absolute reductions in GHG [greenhouse gas] emissions, there is not a strong enough incentive for the step-wise change in environmental performance that is required. This is why the tailings problem has gotten worse over the past 40 years (despite R&D) and why the oil sands are the fastest growing source of GHG emissions in Canada."

Gradek Energy, meanwhile, hopes to begin pilot testing of reusable polymer beads to which bitumen and heavy metals will adsorb and be recovered from tailings ponds, and CBR Inc is developing an in-situ technique which they speculate will eliminate the production of tailings ponds. Part of the problem is the prolonged time it takes for research and development of new technologies. The time-frame from lab bench to mine site is protracted, as each step must be tested and proven in incrementally larger tests and settings. To date, 104 hectares, containing Syncrude overburden and topsoil, have been certified as reclaimed. And there will always be concern over whether these technologies are indeed safe, complete, and reliable.

In the interim, environmental groups are calling for a halt to the expansion of tailings facilities, to give technology a chance to catch up. In a recent letter to Alberta Environment, the Oil Sands Environmental Coalition (a group of environmental organizations, including the Pembina Institute) reveals that many oil sands operations are failing to meet their "original approved tailings volume targets". In fact, they point out, an application by Syncrude Canada to increase the elevation of one of

their tailings facilities will actually increase the volume of tailings being stored. With approximately 1.5 barrels of MFT being produced for every barrel of bitumen and with the Alberta Government estimating a doubling of production based on existing approvals alone, this presents a grave concern.

Simon Dyer emphasizes that "the biggest problems facing the oil sands are based on absence of regulation of cumulative impacts". The Pembina Institute has recommended that the Alberta and Federal Governments establish meaningful GHG emission reduction targets, halt approval for development of additional tailings ponds, establish transparent reclamation standards, halt water withdrawals on the Athabasca River during low flow periods, and complete an Alberta land use plan prior to granting new approvals.

There is no question that the oil sands will continue to be exploited. Far too much of our lifestyle depends upon petroleum. Reducing our personal reliance upon petroleum products will stretch out the life span of world oil reserves, but eventually they will run out. But going slowly in the oil sands, by insisting on careful stewardship, we can buy some time to develop alternate technology, without destroying everything in the process. ☹

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