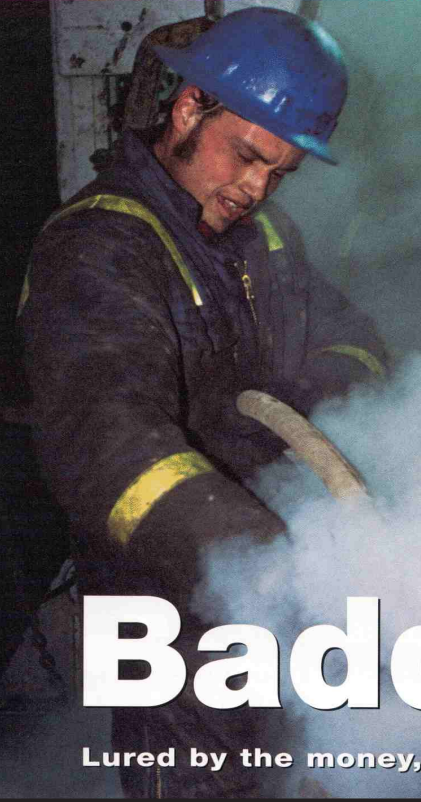


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CANADA'S OIL & GAS AUTHORITY **MAGAZINE**



The Baddest

Lured by the money, hooked by the life



Andes terrain formidable

EXTREME PIPELINING

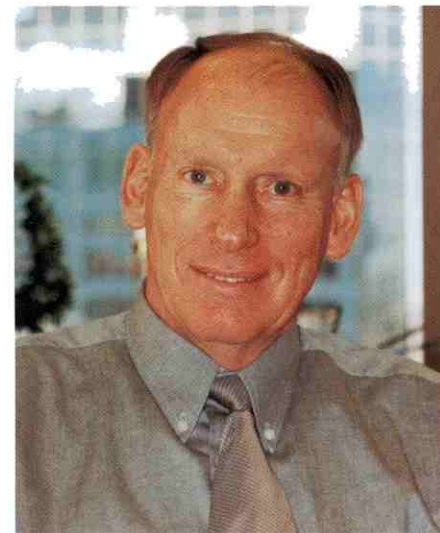
In the Andes, the height of the GasAtacama pipeline between northern Argentina and Chile made an impression on even a fit cyclist accustomed to exercise at Calgary's 1,000-metre elevation and in nearby foothills taller than Rogers Pass. Reports Wil Veldman, president of Hydroconsult EN3 Services Ltd.: "Even at 4,000 metres," or five Calgary Towersworth of height below the project's summit, "when you're walking around you feel it. I had people get sick their first time up if they went up quickly. I use a tape recorder to keep notes. When I listened later to transcribe them, I could tell I was talking differently. I was speaking more slowly."

While Hydroconsult only has a staff of six, it has earned an international clientele in its specialty of working in, under and beside rivers. The EN3 in the company's name stands for the triple repetition of the two letters in its motto: engineering environmental enhancement. Raised on a

southern Manitoba farm, Veldman cut his professional teeth as a civil engineer with graduate training in water resources on hydroelectric dams. He entered the petroleum industry by working in 1973-76 on construction of TAPS, the Trans Alaska Pipeline System that connected the Prudhoe Bay oil discoveries to markets. Hydroconsult continues to serve in Alaska, on a team doing an Environmental Impact Assessment needed to extend the life of the TAPS right-of-way agreement with state authorities beyond the 30-year term of the original land grant when it expires in 2004. Veldman's outfit is also in a long lineup of professional firms forming in western Canada and Alaska to lay out proposed Arctic gas pipelines.

The Andes assignment arrived courtesy of a contact made in Alaska, at engineering giant Fluor Daniel Williams Bros. in Tulsa, Oklahoma. Hydroconsult entered the picture because the project – a 940-kilometre stretch of 24-inch-diameter pipe between gas fields in northern Argentina and customers on the fringes of Chile's Atacama Desert – had to cope with more than high elevation.

The Andes are so rugged that the only ways through are often along rivers in steep-sided gorges. The channels fill up with violent, bottom-scouring torrents during rainy seasons and dry up to wide beds of big gravel in between. Temperatures range from the stifling +50s°C in summer at 100 metres above sea level at the inlet to the line on the northern plains of Argentina to the -20s°C on the windy heights of the mountains. The human environment is also challenging. The communities are poor. There is uncontrolled mining of the river beds for

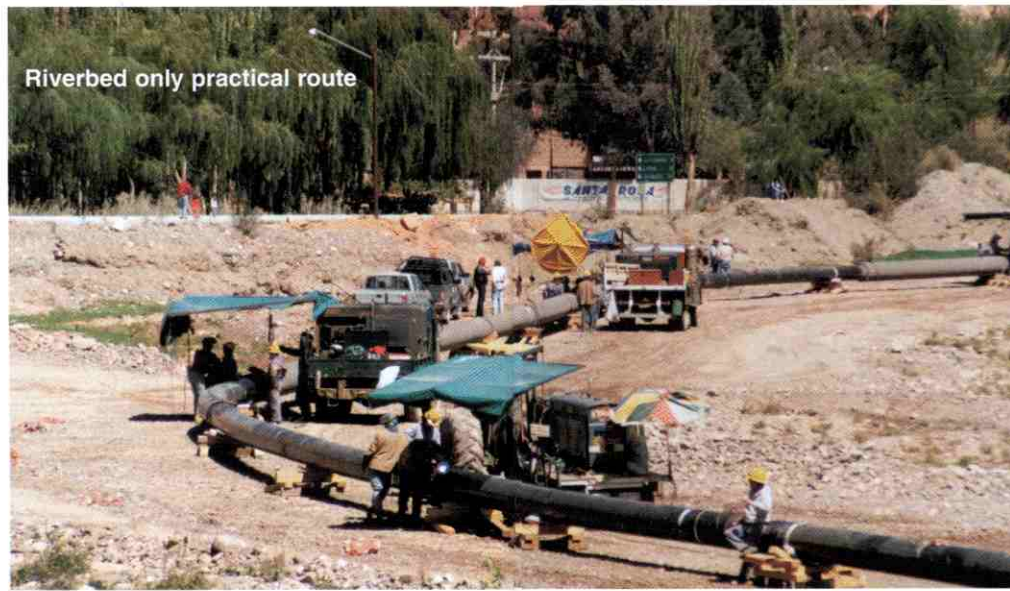


Wim Veldman

construction materials. Squatters perch on any even slightly accommodating structures. Every flat spot is intensively cultivated and irrigated for food.

Hydroconsult devised a route that included 23,000 metres of "midstream alignment." The pipeline was laid under the rivers, deep enough to escape the scouring forces of wet-season runoff, and protected by 23 kilometres of gabions or mammoth mats made of heavy rock held together by chicken wire-like steel nets.

During construction, local irrigation systems were kept going with pumps. "If I had it to do again, I'd get the local and provincial people more involved," Veldman says. Although the project had full approval by national authorities, residents along the route did not hesitate to call local police if they had any grievances – and the calls got results.



Riverbed only practical route