

REMEMBERING RUMSEY RANCH: A CASE STUDY OF THE POLLUTION OF A CATTLE RANCH IN THE ALBERTA FOOTHILLS; REPORT ON A PROJECT IN PROGRESS

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Abstract

This paper deals with the pollution of Rumsey Ranch, located in the foothills of the Turner Valley in Alberta. The first section introduces the issues surrounding the case. Over the course of two decades, a prolonged confrontation unfolded in Turner Valley, Alberta, involving Esso Resources Canada Ltd. and Zahava Hanen, the owner and operator of a 2,867 acre ranch in the foothills south of Calgary. The dispute began in the mid-1970s when Hanen became concerned over Esso's expansion of its Quirk Creek gas plant, located about one-half mile north of the ranch. While Hanen was able to force various improvements in the plant operations in the 1970s and the 1980s, plant pollutants had seriously eroded both the environmental purity and property value of the ranch by 1990. Convinced that government and industry were working in tandem to ignore and silence her concerns, Hanen filed suit in 1991 against Esso and the Energy Resources Conservation Board of Alberta for damages to the ranch's cattle, soil, air and groundwater. While a settlement was ultimately achieved, the much more difficult task of finding ways of remedying, if not restoring the ranch's environment is underway through the work of the Restoration Action Committee. There are a number of themes at work in the account given in this paper: the regulatory authority's failure to regulate; political disinterest in redressing that failure; Esso's refusal to acknowledge the extent of pollution and their strategy of portraying Hanen as a corporate adversary; the insignificance of the community's role in the dispute; and perhaps most clearly, the utter lack of coherent management of remediation efforts after the groundwater pollution was confirmed in 1986. The last section provides some concluding notes.

Section 1: Introduction

This paper deals with the pollution of Rumsey Ranch, located in the foothills of the Turner Valley in Alberta. Its primary focus is the struggle of one citizen to have her complaints about the declining quality of the air, soil and water heard and addressed by the big oil companies and the regulatory agencies responsible for monitoring the natural gas industry. In the course of developing her arguments and briefing counsel and experts, Zahava Hanen took care to keep a detailed paper record of every turn of events and to acquire copies of the large flow of documents that her confrontations with these "Goliaths" generated. As a result, there has come down to us a collection of papers unique in the realm of environmental history. The collection was donated to Carleton University in 1995, and is the inspiration for this paper.

Before dealing with the results of the research, it is vital to explain the genesis and purpose of the Rumsey Ranch project. First, the paper is a preliminary study based almost entirely on the Hanen Collection. Putting

together the complex series of events for which they account began only a few months ago. Hence what is presented here is the first phase of the study. It is a documentary case study of one major dimension of Ms. Hanen's long twenty-year struggle to seek solutions to the persistent pollution of her ranch by the natural gas industry. The second phase will reach beyond the Hanen Collection to the regulatory agencies and the industry, and also provide the historiographical and scientific context the study now lacks.

The paper is also a collaborative work, researched and written by members of the Carleton University History Collaborative. For this particular paper, it comprises a group of the Department of History's graduate students, whose interests in environmental history have been awakened by this study. Other history collaboratives have published, or are currently preparing important studies in equally topical fields¹. This is the first collaborative study in environmental history. There will be others. In addition to new work on this study, a new collaborative is being planned to prepare a case study of the Sydney, Nova Scotia, tar ponds, the second largest instance of industrial pollution in North America.

Second, the project to study Ms. Hanen's papers had an unusual genesis. When the papers were delivered to Carleton in August 1995, a number of our science colleagues proposed the Graduate Practicum in history undertake a preliminary inventory and devise some indices that would be useful to their research. The very helpful work of the 1995-96 seminar², and the encouragement and help of Ms. Hanen, gave rise to the Rumsey Ranch project in May of this year. To this end, a collaborative was organized to develop a catalogue of the papers which briefly lists the essential archival data of each document. The 200-page Control Catalogue of the Hanen Collection, which accounts for the more than 2,200 documents, is now being used as the means of digitizing the collection in preparation of a CD-ROM, access to which will be served by the Adobe Acrobat program. It was only upon the completion of the Control Catalogue in mid-August that work began on this paper.

Finally, this paper is cast in the mould of a case study. It is meant as an accurate record of how the pollution occurred, the lost opportunities to prevent or remedy it, the repeated tolerance of hazards thought integral to discovering the safety margin and the ethos that risk can only be known when measurable. The purpose of writing such a record is that it be remembered, "kept close" as the regulator's remembrancer and made the standard by which those who would wish to forget, dare not. Hence the title of this paper, *Remembering Rumsey Ranch*.

Historians have had a part in the act of not remembering. Hegel's old aphorism that "what history teaches us is that men have never learned anything from it" was directed not only to readers of history. We are reminded of one of our colleagues who makes disasters the subject of his writing, "so that they

may be better managed in the future"; or one of our co-authors who has shown that successive generations of fisheries officials, managers and fisheries, from the 1880s onwards, all knew what caused fish stock depletion on Atlantic Canada's Grand Banks and chose to ignore it -- as did the historians of the time. Such history is neither easy to write, nor to read. It does not easily take flight on the wings of some great insight or compelling idea. It is, however, vital to the integrity of any environmental understanding we choose to develop. It should, moreover, be the starting point of that development.

The oil industry is an immensely powerful influence in the polity of Alberta. It has changed the nature of Albertan society and transformed the province's landscape. When Imperial Leduc #1 "blew" in 1947, it accounted for 2 per cent of all personal income in Alberta. A decade later, 40 per cent of personal income in the province was dependent on the oil industry³. In the fifteen years before Leduc, nearly 100,000 more people left Alberta than migrated to it⁴. Twenty years after Leduc, Alberta's population increased by 82 per cent. Two-thirds were urban dwellers⁵ whereas fifteen years before two-thirds were rural. Edmonton grew from 100,000 in 1947 to 400,000 in 1968⁶. Calgary's population more than quadrupled during the same period, from 80,000 to 360,000⁷. The industry has continued to expand since that time, particularly as a result of pipeline capacity construction in the 1950s and 1960s that enabled it to serve the Canadian and American markets. More recent expansion has resulted in a major increase in the number of new wells brought into production⁸. Today, the Alberta industry produces 85 per cent of all oil and gas in Canada, and generates annual revenues in excess of \$21 billion⁹. Few industries anywhere so predominate.

The industry's impact on the demography of Alberta has been profound. One example suffices to illustrate that impact. Fort McMurray, which in 1960 was a small village of 1,100 trappers and traders, was a centre of importance in the fur industry. By 1968, most of the trappers and traders were gone, and in their place were 5,000 people drawn to the area by the Great Canadian Oil Sands Project. The town's population stood at 30,000 in 1980¹⁰.

Closely contiguous to the industry's operations, and laying athwart its constant drilling activities, are the ranches and farms of the cattle and agriculture industries. They, too, are important in today's economy but have long lost the pre-eminent place they held in the pre-Second World War Alberta polity¹¹. This is exemplified by the oil industry's right to drill under ranch and agricultural land, whether vertically "on-site" or horizontally "off-site" -- a right that is expressly protected by surface rights legislation. As 70 per cent of the natural gas found in Alberta is located in agricultural areas, there is a great deal of gas and oil extraction and drilling on or near farms and cattle ranches. There is, as a result, a long tradition of conflict between the

ranchers and farmers over both surface rights and compensation for property and pollution damages, which continues to this day¹².

Conflict over oil companies' right to drill prompted Zahava Hanen in 1975 to confront both the industry and the government agencies charged with its monitoring. Hanen not only challenged the right of Esso Resources to drill on or near her land, but she also questioned the expansion of the Quirk Creek natural gas (methane) plant owned by Esso, situated one-half mile north of the ranch. The force of her representations earned her hearings of both the Surface Rights Board and the Energy Resources Conservation Board¹³ before the end of 1975. While Esso's right to drill and expand its plant were upheld, the hearings marked the beginning of Hanen's public action to address the comprehensive threat posed by the natural gas industry to all living things, and the land, air and water upon which all of them depend¹⁴. At the core of Hanen's concerns was the purpose of the new well and the Quirk Creek plant extension. More "sour gas" would be pumped to the plant, thus increasing the volumes of hydrogen sulphide being transformed into elemental sulphur, the amount of sulphur dust and waste waters produced, and the level of emissions of unrecovered hydrogen sulphide and its oxidized form, sulphur dioxide¹⁵. To understand this process of pollution, it is necessary to briefly account for the development of the sour gas industry and its byproduct, sulphur.

Turner Valley gas is "sour" because it contains large amounts of hydrogen sulphide; about half of all the natural gas being extracted in 1982 was sour. In many instances it is also "wet," that is, laden with liquefied petroleum gases, or LPGs, such as propane and butane, as well as the valuable pentanes plus or natural gasoline (*naphtha*) for which natural gas was first processed in the Turner Valley in the 1920s¹⁶. In the early years of processing, much of the natural gas was blown off into the atmosphere, thus putting at serious risk recovery of the oil that lay below, recoverable only with adequate gas pressure¹⁷.

Blown off with the methane was hydrogen sulphide, which was not only foulsmelling but also highly poisonous. In high enough concentrations it kills without warning¹⁸. The first Turner Valley natural gas used in nearby Calgary was sweetened by using soda ash and later amine solutions to scrub the hydrogen sulphide from the natural gas¹⁹. The hydrogen sulphide or sulphur dioxide was then released into the atmosphere. The only environmental safeguards were high incinerator stacks to disperse these poisonous compounds²⁰. Beginning in the 1950s, two Turner Valley plants were extracting the hydrogen sulphide and converting it to elemental sulphur, for which markets were then beginning to develop. By 1971, when the Quirk Creek sour gas plant was built, sulphur production had reached 4.5 million tons²¹. Because of its market value, producers were happy to have high concentrations of hydrogen sulphide in their raw gas. Canada has since become the world's largest exporter of elemental sulphur²².

The difficulty was in converting enough hydrogen sulphide to gain an economic return from the investment in installing both catalyst beds and tail gas emission controls and, in addition, control environmental contamination. In 1971, sour gas plants were required to report their emissions to the newly created Alberta Environment²³. In that year, the average plant sulphur recovery rate was reported to be 95.3 per cent; in 1981 the figure was said to be 98 per cent, although daily emissions of sulphur dioxide stood at 350 long tonnes²⁴. Despite its state-of-the-art, computer-controlled process analysis of incinerator stack emissions²⁵ and the modern Sulfinol process installed at the time of its building in 1971²⁶, the Quirk Creek plant did not achieve this recovery level until ten years later, in 1992²⁷. Notwithstanding this unsatisfactory emission control record, Esso was twice allowed during this period to pipeline increased amounts of sour gas from other gas fields, in 1983 and 1987. Hanen and her counsel vigorously contested these plant expansions at major hearings of the Energy Resources Conservation Board.

The irony of the approval given Gulf Canada's 1987 application to pump raw sour gas from the North Valley to the Quirk Creek plant is that the previous year, Esso reported that the waste water evaporation pond at Quirk Creek was seeping into the groundwater supply, "in a southerly direction," downgrade from the plant -- toward Rumsey Ranch²⁸. Seepage of corrosive waters into the ranch's groundwater and aquifer had been the subject of Hanen's representation to the Board on several occasions²⁹ and dated back to 1974 when she reported an "undrinkable well".

By early in 1987, as both drinking water and vegetation of Rumsey Ranch showed obvious signs of pollution, it was clear that the concerns Hanen raised at the 1981 and 1983 hearings by the ERCB were substantive and well justified³⁰. The Quirk Creek plant was the source of three pollution processes. The first was seepage from the evaporation ponds which served to hold and settle the waste waters produced in the desulphurization and, after 1984, the tail-gas cleanup operations. The second was the better known, and more common pollution caused by emissions of sulphur dioxide from the well head, the flare pit and the incinerator stack. The third was more elusive and much harder to trace and assess. This was the emission called thiazoles, which occur as a chemical byproduct of an agent used to help remove hydrogen sulphide from the gas. It was first used at Quirk Creek around 1988 in order to upgrade the Sulfinol system's conversion of hydrogen sulphide to sulphur to ERCB standards³¹. The composition of the agent, *Flexorb*, is protected by agreement. It was being used by two gas plants in Alberta in 1988³². Its reaction with hydrogen sulphide can produce a large family of compounds which, although not as well understood as poisonous concentrations of hydrogen sulphide and sulphur dioxide, are neurotoxic³³.

The production of these compounds is easily accommodated by a well-known characteristic of the desulphurization process, namely that it

"requires a stable and narrow range of temperature [to effect extraction], just above the dewpoint of sulphur."³⁴ The complex created in the reaction at low temperature and high pressure between Flexsorb and hydrogen sulphide rises to the top of the chamber, cools and condenses. The condensate is taken to a second chamber in which conditions are reversed to high temperature and low pressure. This reverses the formation of the complex back to hydrogen and Flexsorb. The Flexsorb is recycled and the hydrogen sulphide is sent to a third chamber for the Claus process which produces solid sulphur and water. The problem occurs when the heat used in the second step is not removed fast enough. This is when the complex converts to thiazoles³⁵.

Carleton University's Dr. Bryan Hollebhone identified thiazoles as one of the key problems at Rumsey Ranch. When blown downwind onto the ranch, the pollution disoriented cattle to the extent that they stopped feeding. It and other sulphurous gases caused the ranch manager to move away from Rumsey. One investigator has complained of severe disorientation when standing directly in the path of the pollution plume. The presence of thiazoles is well advertised by its hot-buttered popcorn smell, and can be detected up to fifteen kilometres downwind from the plant³⁶.

The problems of thiazoles do not stop at the point of their creation. Three per cent of the Flexsorb used is converted to thiazoles on each recycle of the agent. Since one batch (150,000 litres) of Flexsorb is used in several desulphurization processes per day, thiazoles are produced at the rate of three per cent per cycle per day³⁷. Until 1986, oil companies did not realize that the thiazoles were being formed in this conversion. Even now, the pollution extent and impact is not fully known, though thiazoles have been polluting the environs of some oil refineries and gas plants for some years.

Pollution from the sour gas industry is not confined to Quirk Creek, however. The Turner Valley's high concentration of plant facilities and its particular geographical and climatological characteristics create widespread problems. The aforementioned contaminants are carried from plant sites in air and water. As Walter Trost noted in his 1972 report, temperature inversion and turbulence in the Turner Valley result in the confinement, rather than dispersal, of air-borne pollutants. Thus sulphur dioxide and thiazoles are trapped in "looping plumes" that fall to earth relatively intact and remain in deadly pockets³⁸.

What follows is the account from the Hanen Collection of Ms. Hanen's attempts to have these issues illuminated and addressed. The nature of the contamination is outlined, as are her efforts at redress and the more recent movement towards remediation. Section Three will return to the themes elucidated in this introduction.

Endnotes

1. *Urban and Community Development in Atlantic Canada, 1867-1991*. Canadian Museum of Civilization, Mercury Series #44, 1993. Completed and ready for the press are, *Canadian Newspaper Perspectives on the Maritimes, 1920-1926 (1993)* and *The Duncan Royal Commission and Nova Scotia's Coal Industry, 1925 (1994)*.
2. The authors acknowledge with gratitude the work of the Graduate Practicum seminar, 1995-1996: Vicky Arnold, Donald Belanger, Claire Booth, Jayne Elliott, Chris Gagne, Catherine Harley, Catherine Kiszkiel, Michael Matijek, Jacob Selwood, Michael Sletcher. They are particularly grateful to Stephen Millar, who co-ordinated the seminar's work, and Professor John Taylor who co-directed the seminar with Professor Carman Bickerton.
3. Eric J. Hanson, *Dynamic Decade: The Evolution and Effects of the Oil Industry in Alberta* (Toronto, 1958) p. 270.
4. *Ibid.*, p. 281.
5. Earle Gray, *Impact of Oil: The Development of Canada's Oil Resources* (Toronto, 1969) pp. 98-99.
6. *Ibid.*
7. *Ibid.*, pp. 94-98.
8. Alberta Energy and Utilities Board, "Alberta's Energy Resources -- 1995 in Review" (Calgary: AEUB, n.d.), p. 4; *Alberta Ministry of Energy: 1995-1996 Annual Report* (Calgary, n.d.) p. 14. *AEUB Annual Review*, p.8.
9. *AEUB Annual Review*, p.8.
10. Barry Potyandi, *The Athabaska Oil Sands, 1951-1983: A History* (Historic Sites Service, Alberta Culture, 1984), pp. 167-168.
11. Howard Palmer and Don Smith, *The New Provinces: Alberta and Saskatchewan, 1905-1980* (Vancouver, 1980), pp. 29-34; 39.
12. *Annual Reports of The Office of The Farmers' Advocate, 1974-1995. Passim*; Calvin Webb, "The Impact of Linear Developments, Resource Extraction, and Industry on the Agricultural Land Base" (1982), p. 7.
13. Created in 1938 as the Petroleum and Natural Gas Conservation Board, it has since had three different names: the Oil and Gas Conservation Board (1957), the Energy Resources Conservation Board (1971) and the Alberta Energy and Utilities Board (1995).
14. Hanen Collection 4.F.83, 4.F.79.
15. *Ibid.*, 2.C.56, 57; 4.F.71-87; 7.C.17; 16.B.1.
16. Fred Stenson. *Waste to Wealth: A History of Gas Processing in Canada* (Calgary, 1985) p. 213; Calvin Webb. "The Impact of Linear Developments, Resource Extraction, and Industry on the Agricultural Land Base," Environmental Council of Alberta (Edmonton, 1982), p. 7.
17. David H. Breen. *Alberta's Petroleum Industry and the Conservation Board* (Edmonton, 1993), p. 60.
18. Stenson, pp.34-35.
19. *Ibid.*
20. *Ibid.*, pp. 184.
21. *Environmental Effects of the Operation of Sulphur Extraction Plants in Alberta. Report and Recommendations. October 1972* (Edmonton, 1973), p. 22.
22. Stenson, p. 189.
23. Peter McKenzie-Brown, Gordon Jaremko and David Finch. *The Great Oil Age*. (Calgary, 1993) p.148.
24. Petroleum Communication Foundation, *Backgrounders: Sour Gas* (Calgary, n.d.), p.2
25. Stenson, p. 202.
26. *Ibid.*, p. 182.
27. Carleton University History Collaborative. *Narrative of the Rumsey Ranch Case*. (Unpublished research paper, 1996) p. 29.
28. Hanen Collection, 16.B.1.

29. *Ibid.*, 4.B.63-64; 8.B.16; 16.B.1.
30. *Ibid.*, 4.B.44.
31. *Ibid.*, 2.B.27.
32. Interview with Professor Bryan Hollebhone, Department of Chemistry, Carleton University, November 6, 1996.
33. Dr. Bryan Hollebhone. "Identification and Remediation of Possible Air and Water Pollutants at Quirk Creek," consultant's report, 1991. Hanen Collection 6.F.49.
34. Hanson, p. 197.
35. Interview with Professor Bryan Hollebhone, Department of Chemistry, Carleton University, November 6, 1996.
36. *Ibid.*
37. *Ibid.*, November 8, 1996.
38. Trost, p. 44-45.

Section 2: Report on Rumsey Ranch-Quirk Creek dispute

Despite evidence to the contrary, Esso Resources Canada Limited¹ refused to admit that sour gas plants caused pollution problems, either in broad environmental terms or in specific locales. Even after the 1986 discovery of contaminated water leakage from the Quirk Creek gas plant, the company avoided acknowledging the extent of the environmental damage caused by plant operations to soil, air and water, and thus delayed remediation. The company continually asserted that the problem was under control, and that adverse effects from the contamination could and would be contained.² Not until 1990, when a company report confirmed that plant activities had resulted in some groundwater contamination, did it begin to provide the Rumsey Ranch buildings with an alternate water supply.³ Two years later, at the end of its long twenty-year resistance to Hanen's and others' testimony, the company finally accepted its responsibility for remediation and for preventing further contamination. It adopted a similar approach with the air and soil pollution of Rumsey Ranch.

Many reports available in the early 1980s could not conclusively establish a cause-and-effect relationship between sour gas plant emissions and environmental degradation because research had not yet advanced to this point.⁴ The pollution problem recognized earliest, and the most serious one impacting on Rumsey Ranch, was groundwater contamination which clearly exemplifies this difficulty. The sources of the contaminated groundwater were the evaporation pond, the flare pit, the landfill site and the sulphur block area. In 1987, a well located approximately one-third of the distance between the Rumsey Ranch main residence and the Quirk Creek Gas Plant was so polluted as to be dangerous for both cattle and people; the inhabitants of the ranch were advised not to use the water for bathing.⁵

Other contaminant emissions polluted the air, vegetation and soil in the plant's environs. The nature of the contaminants' impact was unappreciated until late in 1991 when Dr. Bryan Hollebhone found traces of neurotoxins, identified in 1992 as thiazoles, in areas of the ranch surrounding the Quirk

Creek plant.⁶ Investigation of the possible links to environmental and public health concerns was not undertaken, however, until 1992 by the Air Emissions Committee via several studies and sampling.⁷ It recognized that Rumsey Ranch was being affected by "an unknown nuisance odour." Hollebhone suspected the source was Flexsorb, a chemical amine used to remove hydrogen sulphide from sour gas. A study of its composition identified twenty-five trace elements which were either constituents of Flexsorb or by-products of the degradation in the Flexsorb process. Some of the symptoms reported by individuals near the plant, such as disorientation, were consistent with some of the trace chemicals identified.⁸

Contamination emanating from sour gas plant evaporation ponds was a very common but newly discovered problem associated with many gas plants throughout Alberta.⁹ John Rooke, Hanen's solicitor until 1991, did not believe that the company was negligent concerning the evaporation pond leakage because it was unlikely that it knew about the contamination before it discovered it in 1986.¹⁰ Hanen's own concerns date from 1974, when she reported an "undrinkable well" on her property.¹¹ After the Quirk Creek plant's expansion in the late 1970s, Hanen informed the company and the regulatory agencies of her concerns with the plant's wastewater management system in 1980 and at the 1981 Energy Resources Conservation Board (ERCB) hearings.¹² She was supported by a Northwest Hydraulic Consultants report, commissioned in 1980, which suggested she had "grounds for concern about wastewater and surface runoff discharges."¹³

After advising Alberta Environment of the report's findings, Hanen learned that water discharges from the back of the plant had destroyed metal culverts along the drainage course running southwest from the plant onto the northwest part of Rumsey Ranch. The company replaced the metal pipeline with a plastic one and Alberta Environment deemed that further investigation of the incident was unnecessary.¹⁴ Ten years later, the company finally completed the building of an approved wastewater treatment facility at the plant and replaced the evaporation pond with new clay-lined ponds approved by Alberta Environment.¹⁵

In the early 1980s, Hanen questioned the environmental effects of plant operations on Rumsey Ranch, as signs of potential contamination were becoming increasingly evident in the Quirk Creek region. On numerous occasions throughout 1980 and 1981, Hanen filed complaints with both the ERCB and the company itself with regard to the various incidents of "flaring" at the Quirk Creek plant and the accompanying noise, black smoke, and odour. During this period, a total of 119 "black smoke" incidents alone were reported. Hanen's complaints were met with assurances that the problems, the result of minor operational flaws, had been, or were in the process of being, corrected.¹⁶

Once Esso could no longer deny that pollution problems existed, Hanen and the local community were repeatedly assured that problems were under control. In mid-1991, Piteau Engineering Limited, retained by the plant in 1986 to assess immediate measures to control the wastewater leakage, indicated that it had determined the boundary of the area affected by the groundwater contaminants. Thus, Esso assured Hanen that its corrective actions ensured public, aquatic and animal health would be unaffected by the contaminated groundwater.¹⁷ In 1992, when Andy Russell, Rumsey Ranch manager, well-known Calgary conservationist and author, outlined the health problems he believed were caused by plant emissions, the company responded that it would take his concerns into consideration, assuring Russell that it was doing everything in its power to limit adverse health impacts.¹⁸ But at a groundwater contamination meeting in January 1992 involving the company, Piteau and Rumsey Ranch, Dr. Tad Dabrowski of Piteau acknowledged that even with volumes of information gathered over many years by groundwater experts, much still remained unknown about the severity and the impact of the contamination.¹⁹

Through the 1980s and 1990s the company continually maintained that their environmental efforts were satisfactory and reliable. During a 1993 Esso Resources-Quirk Creek Community Committee Meeting, its representative noted that the company's report to the committee emphasized environmental performance and activities, because these aspects of the Quirk Creek plant's operations were of significant interest to the community. It was estimated that about thirty per cent of the plant's 1993 operating budget would be spent on managing environmental activities.²⁰ A breakdown of this substantial sum is not available. Apparently, by 1993, the company was very confident of its abilities and its management of environmental issues in the Quirk Creek area.

From the beginning, however, the company and its experts underestimated the extent of the pollution. According to the company, the leakage from the evaporation pond was discovered in the spring of 1986. Six months of testing by Piteau revealed that the contaminated water had seeped into the groundwater supply and was moving in a southerly direction, "possibly" onto Hanen's property. When the company informed Hanen of this discovery, the consequences or risks involved were downplayed, since it was confident that the number of recovery wells installed immediately following the discovery of leakage provided an "extensive and immediate barrier".²¹ Further investigation by means of testing wells was ongoing to prevent further groundwater contamination. Piteau formulated a groundwater monitoring programme which consisted of spring and fall sampling, in compliance with the requirements of Alberta Environment's 1981 "Licence to Operate or Use."²²

As various engineering reports generated through the period show, while the testing programme kept expanding, all of the sources of the contaminated water were not removed until the mid-1990s. The sulphur block at the plant site had been removed in 1985, but the contaminated soil in that area was not remediated until 1987.²³ The source of organic contaminants, the landfill site, was eventually reclaimed in 1988.²⁴ The flare pit was not decommissioned until November 1991, and it was not until early 1992 that the company began considering alternative treatment technologies for the complete cleanup.²⁵ The drainage of the evaporation pond did not begin until 1990 and was completed in 1993.²⁶

Initial engineering work by Piteau indicated that wells to withdraw water from the aquifer could prevent the groundwater contamination from spreading further, and that ultimately the contaminants would be removed by cycling the aquifer itself.²⁷ It became apparent, however, that groundwater containment was impossible, as the extent of the contamination was not definitively determined. Since the preliminary phases of the investigation had revealed the dimensions of the contaminant plumes from just a few points, the August 1987 Piteau report indicated that additional testing with more groundwater monitoring wells was required.²⁸

In 1989, Piteau reaffirmed the need for further expansion of the monitoring well network west and south from the plant.²⁹ The recovery wells initially installed failed to recover all the contaminated water. Piteau's plan recognized that early estimations for recovery wells might not be sufficient, as its proposed groundwater and remediation investigation programme included periodical assessment of contaminant recovery effectiveness, with the installation of additional testing and recovery wells if required.³⁰

Reid Crowther, the firm retained by Hanen to review Piteau's groundwater reports, prepared a report in March 1989 which concluded that the groundwater pumping program commissioned by the company had not succeeded in extracting the contaminated water that flowed off-site onto adjacent properties. Testing wells had not detected the migration pathways of the contaminated groundwater from the site. The report recommended the installation of additional piezometers (monitoring wells drilled one metre deep with water sampling buckets at the bottom) to define the extent of groundwater contamination and to better define the groundwater migration pathways, as well as the installation of any recovery wells necessary to intercept and extract the contaminated groundwater. As well, the report suggested more specific analyses of the water samples. While the contamination had clearly reached Rumsey Ranch, the short-term and long-term damage remained unclear.³¹ Reid Crowther and Piteau agreed that the potential impact required further study.³²

Although the extent of the groundwater contamination to the south of the plant was reasonably well defined as of 1990, little was known about the

extent to the east and west, or about the impact of gas plant operations on soil quality and vegetation.³³ As well, it seemed that the company's efforts at groundwater remediation were poor, with the time frame of the recovery and remediation options estimated at anywhere from one to three or more decades.³⁴ Dr. A.W. Wilson of Reid Crowther agreed that remedial measures could take as long as thirty years, and indicated that it would be impossible to ensure that all contaminated groundwater could be intercepted and treated.³⁵

In early 1990, Piteau continued its groundwater monitoring program and drilled additional piezometers.³⁶ In mid-1990, Piteau indicated it had delineated the extent of groundwater contamination south of the plant, and defined movement patterns, directions and velocities between the plant and Three Point Creek. As well, Piteau determined the groundwater quality and identified the contamination within the Rumsey Ranch area. This phase of exploration confirmed two contaminated groundwater plumes -- a sulphate plume and a chloride/sulphate/organics plume -- emanating from the gas plant and flowing generally southward beneath Rumsey Ranch property.³⁷ According to Dr. Wilson, the data gathered by Piteau indicated beyond a doubt that certain groundwaters beneath the Rumsey Ranch property had been contaminated by operations at the Quirk Creek Gas plant.³⁸

Since Esso needed more detailed information before it could tender cleanup contract, this first phase of remediation, installing new wells, was necessary to establish the outer limits of the plume and to determine how fast the contaminated groundwater was moving.³⁹ As well, in early 1992 the company undertook a preliminary risk assessment, including analyses of the contaminant effects on plant, animal and human life.⁴⁰ A management plan for the remediation of the groundwater contamination was being developed by the Quirk Creek Gas Plant Groundwater Risk Assessment team⁴¹; but by the end of 1992, however, no positive steps had been taken in addressing the groundwater contamination issue, due to the ERCB's lack of funds. The company's material had been reviewed but groundwater specialists had not been assembled to work with the committee.⁴² The Restoration Action Committee (RAC), formed to evaluate the remediation strategies in the Quirk Creek-Rumsey Ranch site, assumed the responsibilities and objectives of the ineffectual groundwater committee in 1994 and, by the end of that year, the groundwater risk assessment was completed.⁴³

In February 1994, the RAC decided key wells needed more frequent monitoring. After six years of testing and modelling up to 1992, the groundwater investigation concluded that a sulphate plume did extend down under the Rumsey Ranch property.⁴⁴ There were 78 groundwater monitoring wells being sampled twice per year.⁴⁵ Fifteen additional wells were drilled in strategic locations to further delineate and characterize the plume. This project included extensive water sample testing and analysis and aimed to provide a definitive account of the groundwater circulation regime. The expanded

groundwater testing program at Rumsey Ranch consisted of the drilling and surveying of a number of wells, where samples were now collected on a monthly basis.⁴⁶

Hanen's counsel, John Rooke, repeatedly expressed concern over whether the groundwater investigation and remediation program was being properly monitored.⁴⁷ For instance, Dr. Dabrowski took his lead from the company while Dr. Wilson reacted to the company's and Dabrowski's actions -- in effect providing recommendations based on their activities, rather than directing management control.⁴⁸ In early 1991, Rooke summed up his apprehension about the lack of significant management of the contamination issues on both sides of the dispute: "It appears that [the company] will take no steps on matters for long periods of time and then jump in and expect answers very quickly on a number of subjects for which Hanen has not been inclined to respond on all occasions unless she considers the matter of importance to her." In particular, Rooke questioned the company's management of the evaporation pond leakage and remediation.⁴⁹

Rooke and Dr. Wilson were anxious to appoint an agricultural expert at the company's expense who could provide advice about the contamination's impact on the land, animals and plants.⁵⁰ However, Hanen's responses to Rooke's recommendations indicated that she did not have sufficient confidence in Dr. Wilson to authorize his supervision of the management control project.⁵¹ Hanen was unwilling to authorize Dr. Wilson to lead or manage the groundwater investigations, although he did continue to advise her as a technical consultant through 1990. But in the fall of that year, Hanen contacted Dr. John Todd at the Centre for Restoration of Waters, Ocean Arks International, in Massachusetts, U.S.A., about groundwater contamination and remediation at Rumsey Ranch.⁵² Hanen unofficially deferred pollution management to Dr. Todd, who referred her to a number of environmental experts on water, soil, and air.⁵³ During this time, Hanen had also considered the possibility of having the University of Calgary or the University of Edinburgh manage the groundwater problem.⁵⁴

Another issue affecting the plant and the neighbouring Rumsey Ranch was soil contamination and the effect the pollutants might have on the ranch's vegetation. The company wanted to take soil samples in 1988 as part of their reporting requirements to the ERCB and Alberta Environment, but Hanen suspected that the soil sampling results might be used to support the company's position in any legal action. Hanen was adamant that an independent expert, of her choice, take soil samples to be used by both parties.⁵⁵ But the parties could not agree on the selection of an expert. Finally, in September 1988, Hanen authorized the company to proceed with the soil sampling program, allowing that any results or reports be provided to her for review by a third-party consultant.⁵⁶ It appears, however, that the controversy surrounding this issue continued throughout 1989 and 1990.

Viewing the soil monitoring as interrelated with the groundwater contamination problem, Rooke believed that it was better that some soil monitoring be done "to learn what can be learned rather than do nothing."⁵⁷ Thus, Rooke urged Hanen to appoint a manager to oversee both the groundwater monitoring and the soil testing. Hanen, however, maintained that no monitoring would be done until a suitable independent expert was retained.⁵⁸ After further dispute, the company finally agreed that if Hanen appointed a qualified expert to do the soil monitoring, then that expert could perform the monitoring for its benefit and at its expense.⁵⁹ In mid-1991, Hanen named Dr. Stuart Hill of McGill University and the company agreed to allow him to undertake the testing.⁶⁰

Concern over air-borne emissions at the plant focused on the release of sulphur dioxide and trioxide from the flare stacks and of thiazoles from the waste disposal stacks. During his October 1991 visit to the Quirk Creek area Dr. Hollebhone made his discovery of thiazoles, and documented some measurable and tangible signs that the ranch land surrounding the plant was suffering significant adverse effects.⁶¹ The main source of thiazole emissions appeared to be the use of the chemical agent Flexsorb in the acid-gas separator unit. Dr. Hollebhone proposed that once the emissions were identified and their route of emission confirmed, then the chemical process in the plant should be remediated. He warned that contamination caused by leakage from the evaporation pond would generate other waste components not then detectable. Dr. Hollebhone cautioned that further delays in remediation would result in more extensive and persistent damage which, coupled with inflation, would "drive the costs of remediation beyond the capacity of business or government to solve."⁶²

The continued operation of the Quirk Creek Plant was an important asset for Esso.⁶³ But by 1992 it was also mindful of Hanen's concerns. Thus, the company emphasized the Quirk Creek initiatives which it would undertake to ensure maximum environmental consideration:

We will ensure that the plant operates in an outstanding fashion and are committed to minimizing the impact the operation has on its surrounding neighbours and the environment... we accept the responsibility for taking the steps to prevent any further contamination and to clean up the contamination that has occurred.⁶⁴

After an out-of-court settlement and Hanen's relocation to a new ranch in 1993, the management of groundwater and air emissions issues was passed to the company, the Alberta ERCB, and Alberta Environment.⁶⁵ Doug Baldwin, Esso's Senior Vice-President and Director, who negotiated the settlement with Hanen, kept her informed of the progress on these issues. Even though Hanen had at times felt very frustrated with the negotiations with the company, she nevertheless respected and admired Baldwin, and considered him "a friend".⁶⁶ Through 1992 and 1993, the management issue

was considered separately by the Groundwater Risk Assessment Team and the Air Emissions Committee.⁶⁷ In 1994, the Restoration Action Committee took over the groundwater remediation efforts, but in effect, it was managing all of the pollution problems of water, soil and air.⁶⁸

Even in 1994 the identification of contamination was still being debated. At an RAC meeting, Dr. Digby McLaren, a leading geologist in the field and a Fellow of The Royal Society of Canada, referring to the computer modeling of the groundwater contamination, suggested that the committee needed more evidence, as the data base which existed was too weak from which to make models. He warned of the danger of relying on "scientific misinformation".⁶⁹ The committee agreed on the need to explore international sources of information, both successes and failures of pollution clean-up. These would provide a wealth of ideas. Baldwin agreed, saying that the company was "relatively ignorant to the problem created."⁷⁰

In 1995 Dr. Hollebone asked ADAMAS Environmental Incorporated to prepare a proposal for a more thorough review of the data obtained to date in an effort to develop a comprehensive management strategy.⁷¹ This proposal was reviewed at the August 1995 RAC meeting and was passed on to the company.⁷²

Through the early phases of the dispute, Hanen met with resistance from the company and regulatory agencies whenever she presented evidence of water, soil and air pollution. Although there was a need for independent testing, the company resisted independent investigation and disputed the independent findings. The company and its experts underestimated the environmental problems associated with the Quirk Creek gas plant. Despite the range of the expertise it retained and its reports and recommendations, sufficient information about testing programmes was unavailable.

The company demonstrated a lack of management initiative by failing to consider a holistic, all-encompassing approach to air, soil and water pollution concerns. Hanen sought out an impressive group of environmental experts in an effort to support and advance her position, but failed to assert the demand for control of the situation at Quirk Creek and Rumsey Ranch. Thus, neither Hanen nor the company showed a willingness to take over management of the pollution issues. No clear remediation plan was established, and no one accepted responsibility for mistakes and delays. There was no comprehensive management of water, soil and air investigation and remediation until the RAC was formed in 1994.

The role played by the provincial regulatory agencies in the Rumsey Ranch Esso Resources dispute determined the shape and treatment of the environmental concerns identified by Hanen. The Hanen collection of records indicate that from the 1970s to the 1990s, the Alberta Surface Rights Board (SRB), the Alberta Energy Resources Conservation Board (ERCB), and the Alberta Department of the Environment were reluctant to acknowledge

adverse environmental effects caused by the sour gas industry, and consistently circumvented Hanen's concerns with the industry's operations. Although the ERCB and Alberta Environment occasionally showed initiative in addressing the problems, their standards and regulations were violated frequently and without penalty, and their actions to augment controls and to remedy problems were reactive and nominal.

The Alberta ERCB was authorized with specific energy resource functions with regard to the province's energy resources, being responsible for the preservation and effective use of certain of Alberta's energy resources, such as oil, coal and gas. The Board was also charged with certain environmental management functions which were administered with reference to and in consultation with the Provincial Departments of the Environment and Energy and Natural Resources. For instance, Alberta Environment prescribed the criteria that determine whether pollutants from a resource development project are kept within acceptable limits, while the Board required that the criteria be met.⁷³ The mandate of Alberta Environment's Environmental Protection Services section was "to prevent or control pollution, to encourage research into applied solutions for environmental problems, to enforce the Clean Water, Hazardous Chemicals and Clean Air Acts, and to issue permits and licenses with respect to these acts." The Alberta Clean Water Act deals with all aspects of water contamination and protection and the Groundwater Protection Branch investigates groundwater contamination and monitors groundwater quality.⁷⁴

Throughout her dispute with the plant, Hanen maintained that sour gas plant operations and emissions affected soils and crops, and human and animal health. Hanen compiled an over 300-page volume of correspondence and reports to support her claims, which she presented at ERCB hearings and used in communications with the ERCB, Alberta Environment and the gas companies.⁷⁵

During the 1970s and 1980s, the SRB and the ERCB were prepared to grant access to land and operating licenses for the expansion of the province's oil and gas industry without any inquiries, until Hanen formally protested the proposed expansions.⁷⁶ In 1975, Hanen objected to the SRB's decision to grant the company a "right-of-entry" on a section of her land to drill another well on the basis of the noise, aesthetic and odour problems associated with the proposal.⁷⁷ After a public hearing, the SRB upheld its decision, citing that Hanen was aware when she leased the land that the previous owner had observed the right-of-entry.⁷⁸ Subsequent public hearings determined Hanen's compensation for damage to lands, general disturbance, loss of land use, adverse effects, and other damages and costs.⁷⁹

When the company intended to drill a second sour gas well on a section of leased land in 1975, Hanen conveyed her objection to the ERCB. She protested that the proposed location of the well site would reduce the hay

yield, and that the well construction and operation would cause aesthetic and noise distress. Well-site odours would drift towards the ranch buildings.⁸⁰ Hanen urged the ERCB to hold a public hearing.⁸¹ But after reviewing the company's amended application, which addressed Hanen's concerns, the ERCB granted the drilling license.⁸²

In 1981, Shell Canada Resources entered the Hanen-Esso Resources dispute. Shell filed an application to build a pipeline from its Moose Mountain and Whiskey Creek gas fields to carry sour gas to Quirk Creek for processing.⁸³ In connection with this pipeline application, Shell submitted another application to expand its Jumping Pound plant and Esso applied at the same time to modify its Quirk Creek plant to process the additional gas.⁸⁴ In response, Rumsey Ranch submitted formal interventions against Shell and Esso to the ERCB.⁸⁵ The ERCB held a public hearing, which was expected to last two weeks but lasted for 45 days.⁸⁶ The hearings were a turning point in Hanen's efforts to bring the sour gas industry under closer environmental scrutiny.

Two central issues addressed at these hearings were the rate of sulphur emissions and the cost of installing pollution control equipment (i.e. a tail gas cleanup unit). According to Shell's representation, "the application would result in an economic, orderly and efficient development of the gas resulting in less pollution".⁸⁷ For Shell tail gas cleanup at the 30-year-old plant at Jumping Pound, as recommended by experts on behalf of Rumsey Ranch, would not be economically feasible⁸⁸ But the ERCB accepted Rumsey Ranch's concerns and the application was rejected.⁸⁹ The "environmentalists" (as described by the *Calgary Herald*) had successfully challenged Shell's claim that the cost of installing state-of-the-art pollution equipment would make the plant unprofitable.

The *Calgary Herald's* measure of the proceedings was that the "tedious" and highly technical hearings "turned into a complete environmental inquiry into the sour gas industry."⁹⁰ Rooke and Hanen expressed that they felt "a little bit like David facing Goliath" during the proceedings, but they tellingly addressed the health and environmental risks posed by the proposed pipeline.⁹¹ For instance, they argued that Shell had not conducted a thorough risk assessment of its project. Shell's representative charged, however, that Hanen had provided no evidence for the alleged adverse effects. The internal risk assessment later conducted by Shell countered the Rumsey Ranch allegations. The study contended that there was no evidence to indicate that the pipeline construction would significantly elevate sulphur emissions, and in the event of a rupture, the impact on humans and wildlife would actually be negligible.⁹²

At the 1983 ERCB re-hearing into Esso's proposal to expand the Quirk Creek Plant to process additional gas from the Moose Mountain and Whiskey Creek fields, the Board did consider the environmental impact and

additional gas recovery due to the extension of the plant's operating life. Hanen's intervention against Esso's application for expanded operations relating to the proposed Shell pipeline consisted of twenty-nine concerns relating to the environment, animal and human health, and economic damages.⁹³ The company's evidence, however, indicated no adverse local environmental impacts had occurred since the end of the 1981 hearings, and the company's experts contended that future operations would meet and even exceed established standards and would not cause discernible environmental impacts.⁹⁴ Rumsey Ranch maintained that it was difficult to measure sulphur dioxide effects over a short time frame. Thus, the cumulative impact of the additional sulphur emissions as a result of extended plant life could not easily be measured, but would have long-term impact.⁹⁵

The major issue for the Board, however, was establishing the appropriate sulphur recovery efficiency for the Quirk Creek plant, not local environmental impact. The ERCB, satisfied that the Quirk Creek plant could meet current and future local environmental standards as defined by the guidelines for the plant's planned operations, approved Esso's application in April 1984.⁹⁶ The license to operate required a minimum rate of 97.5 per cent sulphur recovery for the plant, up from 96.5 per cent, thus necessitating the installation of a tail gas cleanup unit.⁹⁷ Hanen hoped that a precedent had been set for tougher controls on sulphur dioxide emissions, as the ERCB ruling was the first official recognition that emissions of sulphur dioxide and other gases from sour gas plants were a serious environmental concern. Earlier in 1984, the ERCB had granted Shell the license to build its pipeline.⁹⁸

Not until Hanen challenged the plant's technological capabilities during the ERCB hearings in 1981 and 1983 did the Board impose improved operating procedures and order equipment modification. During the early 1980s, whenever Hanen had reported excessive plant noise, black smoke and odour to the ERCB, the Board gently rebuked the company. In one instance, it informed the plant that, while it was aware of the difficulties,

it is of the utmost importance that you and your staff continue to make every effort to ensure that environmental concerns are kept to a minimum. If it is determined that this is in fact not the case, it may become necessary for the Board to impose certain operating procedures and/or equipment modification.⁹⁹

Another outstanding environmental matter in the 1980s and 1990s was the abatement of plant noise caused by the hydrogen sulphide flaring. Although the Quirk Creek plant was monitored by the ERCB and was subject to industry standards, testing was performed only at the plant site and with the knowledge of the gas plant employees.¹⁰⁰ Hanen suggested the installation of a device to continually measure and report the plant's noise level and that an independent surveyor perform a periodic "blind" noise survey.¹⁰¹ The latter was not done until November 1990, and this survey revealed that the

nighttime noise levels at the ranch cabin exceeded the ERCB allowable level.¹⁰² A second study of environmental noise at the plant in August 1991 also registered considerable levels.¹⁰³ The 1992 noise assessment reported that while the noise abatement work done by the company had reduced plant noise levels, the nighttime noise level recorded at the ranch hands' cabin still exceeded the ERCB permissible level.¹⁰⁴

Alberta Environment was responsible for the licensing of gas plants and for imposing certain restrictions, such as sulphur dioxide emission levels. Provincial Environment Reports from 1980 and 1981 indicated that sour gas plants in Alberta violated the stack standards and ambient standards of the 1971 *Clean Air Act* 1,135 and 1,104 times respectively without being prosecuted; according to Alberta Environment, these violations were due to mechanical failures.¹⁰⁵ In addressing the situation at the Quirk Creek plant, Alberta Environment reported that flaring incidents were handled appropriately and any flaring that occurred was necessary.¹⁰⁶ The April 1981 flaring incidents at the plant were caused by a new computerized control centre which was not working properly.¹⁰⁷ In 1986 and 1987, excessive flaring at the plant was also due to operational problems.¹⁰⁸ According to Hanen, these violations of environmental regulations were always backed up with operational excuses and explanations of how the flaring incidents happened. Since the violations were attributed to operational problems, they went unprosecuted.¹⁰⁹ The company described flaring as a "process requirement" when the plant is starting up or shutting down. Alberta Environment told a Community Meeting in 1986 that flaring is a "necessity,"¹¹⁰ even though at the 1981 ERCB hearings, experts testified that more harmful emissions escape in a very short period of flaring than a longer period of normal plant operations.¹¹¹

Hanen fought long and hard to convince the ERCB that emission standards must be improved. At the 1981 hearings, she argued that existing plants should be licensed under the same standards as new plants, and that since older plants had potentially inferior technology, improvements should be required to maintain lower emissions rates.¹¹² Hanen also contended that environmental damage and health impacts would decrease significantly if the emissions were stopped at the source.¹¹³

During the 1981 and 1983 ERCB hearings, Hanen's solicitor presented evidence of operational difficulties at the Quirk Creek plant, including the struggle to maintain minimum sulphur recovery levels. He asked various experts to testify about the detrimental effects of sour gas processing plants on the surrounding environment and populace. A leading authority on the effects of sulphur extraction, Dr R F Klemm indicated that while scientific evidence of adverse environmental effects was limited, a number of significant effects had been observed.¹¹⁴ The company, however, insisted that according to "extensive environmental studies" it had undertaken, there was no evidence

of environmental damage, and that the plant's process was modern and the facilities sound.¹¹⁵

When the company submitted another application for amendment of its operating license in 1987, the ERCB informed Hanen that it would grant the license without a public hearing. The Board contended that Hanen's concerns were related to past and ongoing operational problems at the plant, problems that were being satisfactorily resolved. It was also satisfied that the planned technical review of the plant operations on Hanen's behalf demonstrated the company's willingness to co-operate with Hanen and resolve her concerns.¹¹⁶

Nonetheless, operational problems at the Quirk Creek plant persisted: in 1987 the plant flaring volume exceeded twice the approved allowance.¹¹⁷ The ERCB exhibited some initiative by performing an in-depth examination of plant operations and reset the plant's sulphur recovery level at 97.7 per cent.¹¹⁸ Overall, the Board was satisfied with the plant's progress towards resolving operational concerns, including wastewater handling, sulphur recovery, air monitoring, flaring, rainfall acidity, noise and odours. It also observed that the plant's upgrading was reasonably successful. In December 1987, the ERCB increased the required minimum sulphur recovery efficiency to 98.0 per cent for an interim period of twelve months.¹¹⁹

Furthermore, Esso, the ERCB and Alberta Environment held meetings to address the plant's operational concerns.¹²⁰ As a result of investigations, the ERCB and Alberta Environment conducted a more detailed review.¹²¹ Following this technical review, the company committed itself to a number of modification initiatives under the supervision of the ERCB.¹²² The "Quirk Creek Action Plan" was formulated to compel the company to not only permanently resolve plant and other operational problems, but also to identify measures to minimize or avoid environmental impacts and to communicate and resolve issues with local people in an effective manner.¹²³ Although certain problems continued, Hanen's persistent attempts to have the plant's operational problems resolved eventually resulted in significant modifications during the late 1980s.¹²⁴

In 1988, the ERCB increased the sulphur recovery guidelines for the plant to a minimum quarterly recovery of 98.3 percent.¹²⁵ The ERCB was satisfied with the plant's operations and the modifications done under the action plan in 1988 and 1989, but acknowledged that some upgrading was still required.¹²⁶ Since the 1989 summer shutdown, the plant was still working out the "bugs" in new equipment implemented in the new Flexsorb process; the ERCB was aware of the "bugs", continued to monitor operations and any problems, and granted six months for the plant to achieve stable operation.¹²⁷ Hanen felt this grace period was too long and forgiving.¹²⁸ Even though the plant did not run completely troublefree for the months following the 1989

"turnaround", the ERCB was satisfied with the company's initiatives and its efforts to fulfill the requirements.¹²⁹

Through 1989 and 1990, the plant achieved sulphur recovery levels above the licensed limit.¹³⁰ In 1991, flaring at the plant was well below the maximum allowed, but it did not meet the new sulphur recovery requirement of 98.3 per cent in the second and third quarters of that year.¹³¹ The plant reported numerous violations in 1990, and asked for an amendment to their allowable one-hour sulphur dioxide emission license, since the plant operations technology of the plant caused an exceedance every 18 hours. In the interim, the company continued to violate the license conditions.¹³² The Board suggested the plant improve its technology instead of amending the license, but the company believed the sulphur dioxide emissions increase would not have an environmental impact.¹³³

Hanen, however, did not want any license changes without a full public hearing. She believed that the company should operate within the established limits, and if necessary, improve its technology.¹³⁴ Rooke was wary that this application might get "rubber stamped by the Department of Environment without further inquiry".¹³⁵ After the recommendation of the ERCB, the application to amend the Quirk Creek Clean Air license was considered by Alberta Environment, but it had not been approved, nor had it been withdrawn by the end of 1992.¹³⁶ In that year, the company undertook a number of upgrading initiatives at the Quirk Creek plant, thus improving their technology to maintain normal recovery levels of 98.5 per cent or better, which also reduced the number of dioxide exceedances, plant shutdowns and operational upsets. The company admitted that these measures did not eliminate all the operational problems at the plant, but maintained the improvements in pollution control were nevertheless significant.¹³⁷

In October 1993, the ERCB indicated that the plant was meeting all regulations and guidelines. Current licenses for air and water were due to expire on May 1, 1993, and the company intended to apply for renewal under new environmental legislation. The 1993 *Alberta Environmental Protection and Enhancement Act* (AEPEA) focuses on the protection of human health and the environment, is all-encompassing in its provisions for air, water and waste, and provides for more public consultation. Technological limitations and historical plant performance still influenced the licensing of sour gas plants.¹³⁸ The company filed its application at the end of 1993, and promised to establish sulphur dioxide emission limits as defined by the Act. After the ERCB's inspection of the plant was reported as satisfactory, the plant's operating license was renewed in April 1994.¹³⁹

While the company made progress getting the Quirk Creek plant into proper operational order, other recommendations and conditions arose out of Hanen's concerns with the operations and expansion of the sour gas industry both near and on her property. Hanen repeatedly petitioned the ERCB and

Alberta Environment for independent and expanded monitoring and testing and improved methods of measuring environmental effects.¹⁴⁰ For instance, in 1988 Rooke recommended that Alberta Environment "do a more extensive job of monitoring of not only the Plant but also the field facilities and that such monitoring should be upgraded to the state of the art level [sic] with special equipment."¹⁴¹

The ERCB required the company to report soil sampling results, but the program did not include Rumsey Ranch land until 1988.¹⁴² As noted, Hanen insisted that an independent expert be appointed to take samples which could be used by both parties. At the end of 1991 an independent soil expert, Dr. Hill, undertook the testing.¹⁴³ After water and soil samples tested negative for contaminants in December 1991, air sampling was the next step.¹⁴⁴ In 1989, Rumsey Ranch sought ERCB air monitoring in the plant area, but received no response.¹⁴⁵ At the end of 1991, Hanen retained Western Research to perform on-site air monitoring at the plant, with the company's permission.¹⁴⁶ The ingredient vital to the desulphurization process, an agent called Flexsorb, was suspected as a key to the air emissions puzzle. Its composition was protected by agreement¹⁴⁷ and so Hanen was denied access to information on its chemical composition.¹⁴⁸

Although at least two other experts (Dr. Thompson, of the University of Calgary, and Dr. Hill) were sceptical about Dr. Hollebone's reported findings of neurotoxins, originating with the use of Flexsorb,¹⁴⁹ in early 1992, the ERCB began to consider the formation of a committee to investigate that theory.¹⁵⁰ The Board commissioned Dr. Harald Thimm to review the chemical processes proposed by Dr. Hollebone, but Dr. Thimm's report was restricted to internal ERCB use to protect the secret chemical composition of Flexsorb.¹⁵¹ According to Hanen, the ERCB seemed to stall on the formation of a committee and on giving it a mandate, but in mid-1992, the ERCB asked Hanen to act as an advisor to an air emissions committee, described by the ERCB as a technical working group formed to generate solutions to the questions raised by Dr. Hollebone's report.¹⁵² The cause of the "hot buttered popcorn" smell, the characteristic odour of the chemical air pollutants identified as thiazoles in Dr. Hollebone's supplementary report, was still uncertain.¹⁵³ Air testing results in 1992 had proved inconclusive because air sampling and analysis procedures were not appropriate for detecting the Flexsorb by-products. Nonetheless, by April 1992, the ERCB had finally recognized that air pollution at Rumsey Ranch was "real" and that remediation must become a priority.¹⁵⁴

The 1992 Vegetation Stress Survey indicated that soil monitoring requirements at the Quirk Creek plant were inadequate. Since 1970, False Colour Infrared aerial surveys had been performed on Quirk Creek to assess long-term damage, but these surveys were ineffective for short-term acute symptom analysis and could not identify the cause of damage. As well, the

quality of the earlier surveys is questionable because there was no ground-level survey done. The 1992 survey included sixteen sites, and was done by a third party consultant, but there was no specific examination of areas that Rumsey Ranch had indicated were affected.¹⁵⁵

Subsurface contamination at sour gas plants in Alberta was under close scrutiny at this time. The Canadian Petroleum Association's 1990 study of monitoring reports from 54 sour gas plants in the province revealed that only one had escaped impact on the quality of its groundwater. The study was critical of Alberta Environment's monitoring standards and recommended that monitoring requirements be standardized and that the need for remediation should be assessed on a case-by-case basis, using detailed risk analysis.¹⁵⁶

Esso initiated the Groundwater Risk Assessment Team in 1992 to analyze the risk to the groundwater at the Quirk Creek plant. The ERCB role was purely advisory, but Alberta Environment was responsible for approving the risk assessment and the technology to remediate the contaminated groundwater, as well as remediation monitoring. The department planned to review the company's remediation plan and ultimately provide confirmation when the risk assessment standards were met and the remediation had been concluded.¹⁵⁷ The ERCB's participation waned due to funding problems, and the committee's initiatives were stalled;¹⁵⁸ all these tasks, however, were overtaken by the Restoration Action Committee in 1994.

It took almost two decades for Esso and Alberta's regulatory agencies to recognize, acknowledge and act on the concerns Hanen raised about the adverse affects of sour gas plant operations. Clearly, the regulatory agencies were unprepared to address local environmental impacts until the 1990s, when evidence of pollution became too strong to deny. This may be attributed to the agencies' historical role as resource conservationists and their close relationship with the industry. Private citizens like Hanen, and increased public awareness, forced government agencies to acknowledge environmental concerns.

Hanen was alone for much of her struggle to have the environment integrated within the values of the Alberta regulatory agencies and the oil industry. Neither the existing public consultative body, the Esso Resources-Quirk Creek Gas Processing Plant Community Committee, nor the public at large offered support for her concerns. Since the community committee was formed and dominated by the company, its critical function was limited by the type of information and initiatives the company offered. Hanen experienced similar frustration in her attempts to raise awareness through newspapers and television. Hanen's efforts came at great personal, emotional and financial stress, including the loss of friendships.

The Quirk Creek Community Committee was the first of its kind to be formed in Alberta and was used as a blueprint for others elsewhere in the province. One of the conditions for ERCB approval for the Quirk Creek plant

application to process additional gas from the Moose Mountain and Whiskey Creek fields was the formation of a liaison committee between the gas plant and the surrounding community. Formed in 1982, the committee initially consisted of two local resident representatives, one representative each from the ERCB and Alberta Environment, and two members from the company's staff at Quirk Creek. Since the committee's formation, Home Oil Company Limited, Gulf Canada Resources Limited, Shell Canada Resources and the Millarville Community School have been asked to send representatives to the meetings. Rumsey Ranch was not represented on this committee until 1991, and then only sporadically. The first meeting was in January of 1983, and subsequent meetings were held monthly; as environmental and operating concerns were addressed, meetings were held less frequently. The committee now meets on a quarterly basis.¹⁵⁹

The committee's main goal was "communication and information sharing between the gas plant and the community".¹⁶⁰ All residents within an eight-kilometre radius of the plant are sent the meeting minutes, which contain various updates regarding plant operations and initiatives, but rarely mention community opinion. A public meeting, known as an "Open House," is held annually to update community members on environmental or operating issues.¹⁶¹ The public's role at these meetings is unclear. For example, the meeting on May 6, 1992, consisted of presentations followed by a question-and-answer session with community members. The meeting raised concerns including plant operations, the plant's environmental record, emissions monitoring and noise monitoring. The questions but not the answers are provided in the minutes.¹⁶²

Only after Hanen's pressure forced the company to change its approach to plant operations and pollution were the "new" environmental issues considered by the committee -- a shift quite evident in the committee meetings. By 1990, the committee minutes included more attachments and explanations, and contained references to the plant's environmental initiatives. They also included community information such as emergency phone numbers, and plant-community communications had improved. Attendance at the meetings grew. Another significant addition was the "environmental update". During the early and mid-1980s, the plant reported on sulphur recovery efficiency and violations, but by about 1990, the meetings began to include the steps being taken to remediate sources of pollution -- issues which Hanen fought to have recognized.¹⁶³ In 1993, the company's committee representative was quite pleased with the updates emphasizing environmental performance and activities, an emphasis based on the belief that this aspect of plant operations was of significant community interest.¹⁶⁴

As the available minutes reveal, the Community Committee seemed satisfied with the plant and its operations. That view was reflected at the 1983 ERCB hearings, which received a submission by the Square Butte Community

Association observing that the Quirk Creek plant was "a modern, well-run facility with a very acceptable environmental management record."¹⁶⁵ In December 1992, a "health check" was done on the committee asking whether the consultative process was working for local representatives and the community, and whether the committee was effective.¹⁶⁶ Committee members observed that the frequency of meetings was "good and effective," and that the initiatives between the school and the plant (i.e. tours of the plant, information talks, and displays) had "worked well." A local representative and founding committee member commented in March 1993 that the "committee is efficient and of value to the community. It is important that the committee stay that way, even if there are no controversial issues happening on a continual basis."¹⁶⁷

There can be little doubt that Hanen was not enamoured of the Community Committee as an "effective means" of addressing the reforms she was seeking. In 1988, Deputy Premier D J Russe11 advised Hanen to meet with the Quirk Creek Community Committee to gain greater exposure for her concerns.¹⁶⁸ But Hanen rejected this advice, as she felt the committee had inherent limitations. She felt that it was not a vehicle for protest, and did not exert any pressure on the Quirk Creek plant because the members did not see the need. As well, the form, content, and agenda of the committee meetings were dictated by the gas plant, not by the community.

Hanen's view of the committee was not improved when she finally sent a representative to a meeting June 12, 1991. Her representative reported that a company employee told the committee that "Ms Hanen did not allow soil samples to be taken." Hanen charged that it was an attempt "to damage and blacken [her] character with respect to [her] cooperation with the company."¹⁶⁹ In November, the company apologized to Hanen for the "misunderstanding."¹⁷⁰

In 1992, Esso's Doug Baldwin discussed with Hanen the possibility of building a type of broad organization which would be responsible for remediation and the clean up operation and would operate as a direct offshoot of the Quirk Creek plant.¹⁷¹ The result was the Restoration Action Committee, formed in 1994. It was responsible for proposing a strategy for the reclamation and development of the Quirk Creek area, noting methodologies and remediation and hazardous waste treatment technologies. As well, the committee kept the Alberta government informed about the remediation plan and the progress being made. The committee was also to advise the company, which accepted responsibility for remediation, and to ensure the cleanup was cost-effective and environmentally beneficial.¹⁷²

The Restoration Action Committee was also the first of its kind, but unlike the Community Committee, its relationship with the company was based more on mutual information-sharing and problem-solving. The RAC met and organized with more autonomy, expertise and control; apparently it

possessed the power to ask tough questions and seek its own answers Unlike the community representatives attending the Community Committee, RAC members had access to resources data, scientific expertise, and the Quirk Creek plant itself. The company accepted responsibility for remediation and was open to suggestions and direction from the RAC.¹⁷³

Hanen, viewing the RAC as a "think tank" for water restoration, extended invitations to people with expertise relevant to the Quirk Creek pollution issues.¹⁷⁴ The first RAC meeting was held in January 1994 with four members participating, including Hanen. At this meeting, Dr R F Church, Field of Veterinary Husbandry at the University of Calgary, recommended that the committee, to work better as a "team," should move slowly and involve a small number of people.¹⁷⁵ Hanen, however, felt that the more expertise the better, and so the number and diversity of RAC meeting attendees grew with each meeting.

As an ongoing process, the RAC continued to address the question of disseminating information in many forms, including workshops, conferences, or public seminars. One RAC member suggested appointing a committee to prepare a working document in the form of a "case study."¹⁷⁶ Several RAC participants considered how to share their knowledge and experience with specific organizations such as the Canadian Association of Petroleum Producers as well as with the general public.¹⁷⁷ Closer to home, a newsletter was suggested to improve communication between the committee, the actual field operations of Quirk Creek, and the community.¹⁷⁸ Although the RAC participants underscored the importance of sharing the lessons learned at Quirk Creek as widely as possible, no concrete action has been taken with regards to organizing any awareness raising and/or information-sharing forum.

Frustrated after the 1981 and 1983 hearings, Hanen tried to mount a public awareness campaign, but no similarly satisfactory ending was achieved. She intended to have her concerns addressed in the provincial and national media via an advertisement and an open letter. Both items were prepared for publication, with graphic design and cost estimates, but it is not likely that either appeared in the print media.¹⁷⁹ The advertisement, titled "Does our Alberta heritage have to stink?" listed the hazardous "facts" associated with sulphur dioxide and hydrogen sulphide emissions released by sour gas plants in Alberta. Originally the advertisement asked that donations be sent to the "Good Neighbour Fund," part of the David Thompson Environmental Trust, an organization Hanen has been deeply involved with for many years, but later was changed to the Greenpeace Foundation. Hanen addressed the open letter to Alberta Premier Peter Lougheed to protest his government's treatment of farmers and ranchers affected by the operations of the sour gas industry. In addition to criticizing the ERCB's actions with regards to the latest Shell proposal, the letter implored Lougheed to "bring the best expertise available in

the world and have an honest go at" studying the effects of sour gas plant emissions on human, animal and plant life.¹⁸⁰

A much more directed effort to attract further attention to the growing environmental damage at Rumsey Ranch was based on Dr Hollebhone's discovery of neurotoxins in the areas of the ranch bordering the Quirk Creek plant. The two national television networks, CBC and CTV television networks were sent the information, but neither responded.¹⁸¹ Silence also greeted Hollebhone's report at the Toronto *Globe and Mail*.¹⁸²

In early 1991, Hanen sought funding for a documentary film about groundwater contamination at Rumsey Ranch from Environment Canada. Her request was refused.¹⁸³ Produced by Terramia Pictures and funded by the David Thompson Trust, the final version of the film, titled "Poison in the Blood Stream," was completed in August 1991.¹⁸⁴ Hanen seemed responsive to a public relations consultant's suggestion that she undertake joint distribution of the film with Esso, or that the rivals commit to a joint project.¹⁸⁵ These options were not pursued however, and Hanen vowed to show the film herself. "Poison in the Blood Stream" was shown on television and received critical acclaim from environmentalists.

Some company officials took notice of the film as well. On October 3, 1991, Gerry Kalyniuk, (Manager, Southern Operations, Esso Resources) visiting Hanen at Rumsey Ranch, allegedly asked if the film was intended as "blackmail."¹⁸⁶ Hanen was angered by Kalyniuk's question; he later apologized for the "misunderstanding,"¹⁸⁷ and Hanen subsequently expressed the desire to improve relations, despite the difficulties.¹⁸⁸ While at one point Hanen indicated that "one of the purposes of the video was to raise funds for an education programme for water remediation," other personal notes reveal that she considered using the film in her negotiations with the company.¹⁸⁹

Seeing the pollution problems as not only regional, but also provincial and national in scope, Hanen contacted provincial and federal political leaders in an effort to bring more significant attention to her problems. The first exchanges of correspondence occurred in 1978, and sporadic contact continued through the 1980's. Up to the early 1990s, Hanen persisted in her efforts to interest the politicians in the pollution problems associated with the Quirk Creek plant and the petroleum industry as a whole. Those who Hanen contacted did not consider her concerns seriously, and her efforts to gain recognition and awareness were unsuccessful.

When responding to Hanen's concerns about black smoke emissions from the Quirk Creek gas plant, Alberta's Minister of the Environment D J Russell echoed the replies sent to Hanen from the ERCB and Alberta Environment. These replies merely explained the reasons behind the problem, and gave some indication that corrective steps had been taken. According to Russell, in the fall of 1977 restrictive legislation had been incorporated into emissions regulations, and in February 1978, the enforcement procedures

were "being finalized to allow for effective enforcement of the visible emission regulations". Russell added that he was "confident that this program will help to reduce black smoke emissions in Alberta."¹⁹⁰ A subsequent letter from Russell to Hanen regarding the status of visual emission legislation indicated that Hanen's concerns with the Quirk Creek Plant had been referred to the ERCB.¹⁹¹ Again, it appears that the Minister was not inclined to take special interest in Hanen's concerns.

Hanen was also worried about the diversion of water from Three Point Creek by the company for the operation of its Quirk Creek plant. In October 1980, Hanen wrote to both Alberta Premier Peter Lougheed and the new Environment Minister, J.S. Cookson, stating that she was "very concerned about the serious threat to the long term viability of the creek which this use constitutes."¹⁹² Though the politicians did not directly respond, Alberta Environment did investigate her concerns and ultimately was satisfied with the initiatives demonstrated by the company regarding problems experienced at the plant. The Pollution Control Division also expressed the opinion that a governmental investigation was unnecessary and therefore would not be forthcoming.¹⁹³

Because of Alberta Environment's unwillingness to follow up her concerns, Hanen again turned to J.S. Cookson in March 1981, requesting a government inquiry into the environmental effects of gas plant operations at Quirk Creek.¹⁹⁴ Citing reasons reminiscent of those given earlier by the Pollution Control Division, Cookson indicated that the government was not prepared to accept her request for an inquiry.¹⁹⁵ At the 1981 ERCB hearing on the Quirk Creek plant, Alberta Environment refused to appear as an intervenor as it was "not the department's policy to provide expert witnesses on behalf of intervenors at ERCB hearings."¹⁹⁶ By the mid-1980s, Hanen was becoming increasingly frustrated with the apparent lack of government interest in her concerns.

Responding with the requested information on the Quirk Creek wastewater system in September 1986, Ken Kowalski, Alberta's Minister of the Environment, wrote that "...the license requirements put considerable onus on the gas plant itself to monitor the effects of its operation on the quality of surface and groundwater..." Kowalski indicated, however, that the new license amendment, dated January 14, 1986, required the company to conduct groundwater monitoring in "pertinent areas" near the gas plant.¹⁹⁷ It may well be that these new requirements led to the company discovering the groundwater contamination emanating from the evaporation pond.

As the problems with the Quirk Creek plant became harder to ignore, Hanen again wrote to D J Russell, by 1988 Deputy Premier of Alberta, regarding the "recent records of mishap at the Quirk Creek plant," stressing the need to hire a consultant to review the situation.¹⁹⁸ Hanen sought a meaningful dialogue to address the concerns with the plant operations and the

groundwater contamination. Russell responded saying that he had discussed her concerns with Environment Minister Kowalski, and that both Alberta Environment and the ERCB were fully prepared to address her concerns.¹⁹⁹ Alberta's political leaders preferred to defer Hanen's persistent concerns to the regulatory departments, in the hopes that the departmental machinery could grind out a resolution. Russell advised Hanen to meet with the Quirk Creek Gas Plant Community Committee to gain greater exposure for her concerns. Hanen apparently interpreted this response positively as it seemed that provincial leaders were at least aware of the problems.

In 1990, Andy Russell wrote to John Fraser, Speaker of the House of Commons, who had assisted Rumsey Ranch during the early 1980s ERCB hearings²⁰⁰, seeking help with the Rumsey Ranch-Quirk Creek situation. Russell felt Rumsey Ranch needed to look beyond the province for help, feeling that although the ranch was in contact with Alberta officials, the general government policy had been "to overlook water pollution." Russell wrote that "more has to be done by the Federal authorities... the Alberta Government needs to know this is not just a local problem but one of national concern." Russell's letter to Fraser called for a "strong Federal environmental policy with teeth in it." Copies of the letter were sent to Lucien Bouchard, federal Environment Minister and Liberal Party opposition environment critic Sheila Coppins.²⁰¹ No concrete results appeared to result from this attempt to involve the federal government.

In February 1991, Hanen again tried to raise interest in the Rumsey Ranch situation. She wrote once more to Premier Lougheed detailing the pollution problems on her ranch and urging him to critically examine the situation and, with his "deep experience both in government and industry," form a partnership with her to "turn this negative into a positive."²⁰² But his silence simply emphasized the general lack of political support of Hanen's problems.

Efforts at remediation of the pollution at Rumsey Ranch were delayed by the slow recognition of the problems by the company and provincial regulatory bodies and also by both Hanen's and the company's reluctance to exert management control. In 1992, when the company acknowledged responsibility for pollution, a more forceful remediation campaign was launched in co-operation with Hanen, the regulatory agencies and a team of experts. But only after the formation of the Restoration Action Committee in 1994 did effective management of the remediation occur.

Hanen's agitation resulted in increasingly strict environmental controls and monitoring at the Quirk Creek plant after 1986. Initial efforts at actual remediation of polluted areas began only in 1986. Questions have been raised about the effectiveness of the groundwater remediation program undertaken by Piteau in 1986. The Quirk Creek groundwater remediation operations were preceded by a relatively detailed hydrogeological exploration

and site characterization program conducted over several years to define the extent and nature of the contamination.²⁰³ But these efforts excluded Rumsey Ranch land, being confined to the plant site until 1989. The hydrogeological exploration program was expanded in 1990 to include areas of the ranch downgradient from the plant to determine off-site migration, using modeling to assess risk.²⁰⁴ Piteau confirmed that contaminant plumes extended under Rumsey Ranch property, but did not estimate the mass of contaminants. The recovery efficiency of the groundwater pumping method could not be evaluated with the available data.²⁰⁵ No significant studies of soil contamination at the plant had been performed as of 1990, and no substantial soil remediation efforts were documented.²⁰⁶

By the admission of a study done in 1990, to which Piteau had contributed, the groundwater remediation program was considered less than ideal. Such a program should not be undertaken, it reported, "until several key steps have been taken," such as a complete hydrogeological investigation of the site and areas downgradient of the site (i.e. determine flow directions and velocities, other hydrogeological properties of groundwater bearing zones at the site, nature and extent of soil and groundwater contamination). Then, using this information, the need for remediation would be assessed through risk analysis, and the results would be used to ensure a case-by-case assessment of the need for remediation. Also, it was imperative that resources of long-term groundwater contamination should be removed. An effective remediation program would include a timetable for action, and set investigative and cleanup goals.²⁰⁷

No timetable was set for Piteau's program, perhaps because so much was unknown and could never be known. The Piteau program for groundwater investigation and remediation began in 1986 and basically consisted of a hydrogeological exploration program in several phases, generating numerous reports on their findings and recommendations. The remediation process was slow because so much investigation was necessary and several factors remained enigmatic, such as the time required for each "phase" of investigation and remediation. The necessary level of remediation was also questioned, because the groundwater's natural chemical composition before the gas extraction activities was unknown.

But even in 1992, Piteau and the company indicated that the extent of the organics plume was still unknown but only inferred, so further investigation was still required. Piteau also remained unsure about the eastern, sulphate plume, as it lacked enough data to do plume modeling.²⁰⁸ Dr Krouse of the University of Calgary performed a sulphur isotope study in 1994 to determine the origin of the sulphates, to determine whether they are natural or industrial. The analysis confirmed that the sulphates in the area were naturally occurring.²⁰⁹

At a July 1992 meeting Wes Vermey, P.Eng, Imperial Oil, and Dr Dabrowski, Piteau, admitted that the cleanup could not be seen as a short-term process, rather it would indeed take a long time. Hanen's legal representative reported that the remediation could not be done quickly, but would in fact be a "lengthy and complicated process, [as well as] time consuming and expensive." Dr. Dabrowski admitted that even though he was "involved from day one," there were many details he still did not understand.²¹⁰ And even two years later, because the company needed more detailed information before a contract for cleanup could be tendered, the monitoring well program was expanded once more to establish the outer limits of the plume and to determine how fast the contaminated groundwater was moving.²¹¹

Despite the lack of information, the recovery, treatment and re-injection of the affected groundwater began soon after the discovery of the contamination. However, Hanen was not included in the remediation decision-making, and was not asked for her input even though the contaminated groundwater had clearly affected her lands. Having been excluded by the company, its consultants and the regulatory agencies from remediation determinations until 1992, Hanen undertook her own investigation. Beginning in 1990, she sought expertise from federal government departments, engineering consulting firms and private environmental agencies for advice about the investigation and remediation of the groundwater contamination.²¹² She also hunted for examples of any other aquifers that had been remediated in the past, in Alberta, Canada or the United States, to obtain a model for remediation and the cost of restoration of the aquifers. Later, in 1994, Doug Baldwin agreed that the RAC will have to look to external sources for ideas since the company was "relatively ignorant to the problem created."²¹³

During 1991 and 1992, a number of consulting firms were retained by Hanen to get the best assessment of the problems at the Quirk Creek/Rumsey Ranch area, to estimate the cost of solving those problems, to identify any gaps in information, and determine what further work would have to be done to solve the problems.²¹⁴ The advice she received was not optimistic; for instance, she was told by Environment Canada's Duane McNaughton that "while the problem is remediable, it will take a major amount of time and money, and will not be simple. Of course the first thing that should be done is to immediately prevent any more input of contaminants. If the sources are not shut down, the problem will never be fixed."²¹⁵

Seeking a solution to the problem, in 1992 Hanen informed the company she had a plan and "would rather do it with you than against you."²¹⁶ Baldwin, too, had a plan, and indicated that the company was prepared to undertake significant remediation plans and provide technical results to others interested in their progress. Their basic plan would be to operate the clean up operation as a direct offshoot of the plant, as it would be the most practical

and cost-effective way to undertake that task. Baldwin also stated that reaching an early out-of-court settlement with Hanen would enable the company to proceed as quickly as possible with groundwater investigation and remediation.²¹⁷

Not until 1992 did the company begin a proposed program and schedule for risk assessment with the Groundwater Risk Assessment Team, and Rumsey Ranch was formally involved in the dialogue concerning remediation. This team also included the company, the ERCB and Alberta Environment. After agreeing on an acceptable process and schedule for conducting a risk assessment, the team formulated a management plan to resolve the groundwater contamination. A risk assessment methodology was devised to identify the groundwater contamination, minimize off-lease groundwater problems, remove the contamination sources and find a permanent resolution.²¹⁸ In April 1992, the company retained Golder and Associates from Calgary to prepare a risk assessment report, which concluded that a plan for remediation would depend on a geological survey to find how the contaminants moved. This required site characterization, investigation of the level of contaminants, and a feasibility study.²¹⁹ Obviously, much work remained to be done.

Once the air emissions from the Quirk Creek plant were recognized as serious, scientists were called in to study the problem in an effort to identify the causes and improve air monitoring. The Air Issues meeting, held by the ERCB on May 21, 1992, was attended by representatives from the ERCB, Alberta Environment, the company, as well as Drs. Hollebone and Thimm. Alberta Environment was updated on the recent considerations and was involved in the process of formulating a plan of action to address the issue of fugitive air emissions. The ERCB continued to direct the process, bringing all the stakeholders to the table.²²⁰ Harry Lillo, Manager of the Environmental Protection Department at the ERCB, continually updated Hanen on the progress made in investigating the air issues, acknowledging the need to continue to improve communication and to share all available information openly among working groups. Hanen was asked for her input on the actions to date, the proposed action plan and her involvement in the process.²²¹

The 1992 off-site ambient sampling program attempted to establish a thirdparty, 24-hour response program but the program suffered from great logistical problems, high costs, and a low probability of success.²²² Regarding their report reviewing the known toxicity information on the twenty-five trace compounds in Flexsorb, Exxon Biomedical stated that the number of assumptions and the level of uncertainty associated with their estimates could be high.²²³ In 1995, Dr Hollebone noted that the RAC could "praise [the company] for the fact that they have seen and acknowledged water pollution on the land." But another RAC participant remarked that "....around gas plants we all are learning more about our gas plants every day. And it's all bad news.

And we're learning new things we can do about it, but we know it's an endless project."²²⁴

Competent management of all pollution issues from the outset would have better monitored the investigations and remediation progress. By identifying gaps in information, effective management could have determined what work was needed to solve the problems. The technology and science involved in remediation strategies created many variables, and the procurement and analysis of data was a complex process, making effective management crucial. Proper remediation depended upon accurate diagnoses of the extent and severity of the contamination. But serious management of the issues by the company, the ERCB or Alberta Environment was not forthcoming. When an improved dialogue between Hanen, the company and the ERCB began to develop in early 1992, the management issue was addressed with more urgency.

For instance, Dr Leslie Shemilt, Professor Emeritus of Chemical Engineering at McMaster University, returned a positive assessment of the 1992 groundwater quality monitoring report saying that it was extensive and very competently presented.²²⁵ But in 1995, Dr Hollebhone charged that the report lacked "a standardized stable technology which is available, and was not used in this case, nor was the methodology, nor the results viewed by any third party." Dr Hollebhone also called for an accurate diagnosis of the various chemicals/compounds involved in the contamination. After mapping out this information, this "management step of recognition" would further facilitate the remediation process.²²⁶

Dr Shemilt also reviewed the 1994 report on air quality and concluded that the approaches were sound and the coverage detailed. He felt it provided a logical plan for detection, attribution to source and acknowledgment of uncertainties.²²⁷ But until the ERCB had finally recognized that the air pollution at Rumsey Ranch was "real" (in early 1992) and that remediation must become a priority, the air monitoring at the Quirk Creek plant was insufficient to identify the problems, qualify Hanen's concerns, or properly assess the hazards.²²⁸ According to Western Research, the air contaminants were extremely difficult to detect and subsequently analyze.²²⁹

A condition included in the 1993 settlement declared that the company would keep Hanen informed of progress made with the assessment and remediation of surface and subsurface groundwater contamination on the Rumsey Ranch property and to the air emissions study being conducted in the Quirk Creek area. Hanen would be briefed at regular intervals, and would be given the opportunity to provide input into remediation planning.²³⁰ Eventually, this opportunity came in the form of the Restoration Action Committee. This committee's responsibility was primarily with the groundwater situation, but extended to include soil and air issues as well. Its

formation signalled another shift in management situation, bringing together representatives from the company and the provincial government, as well as Hanen and independent academics, scientists and others invited by Hanen, to help determine the feasibility and methods of remediation.

But at the September 1995 RAC meeting, Hanen questioned the purpose and viability of this committee Hanen seemed to have a plan with regards to the committee and remediation, stating that she "would like to use the twenty years of [her] so-called tenacity and bring it to a dignified conclusion that would be effective." When prompted to elaborate on her vision of the Rumsey Ranch land after the remediation efforts, however, Hanen refused to answer:

No, I don't think I could go that way. I can't see that way, you know that's not my perception. I just want to look at it quietly, and sum up very quietly and with dignity what has been achieved. Not a big long report, just a little page.²³¹

Hanen's frustration with the length of the dispute was evident.

When the RAC took over project management, the main concerns remained groundwater cleanup (i.e. hazards, methods, costs, time) and the viability of the alternatives available for the Quirk Creek groundwater remediation. Esso's Spring 1995 remedial action plan for submission to Alberta Environmental Protection was far from complete. The RAC had brought in three scientists, Drs. McLaren, Shemilt and Hollebhone, to assess the environmental hazards at Quirk Creek and to monitor and give input on the remediation proposal. Initially, however, these experts could only provide partial answers, and continued to work with the committee to generate a complete understanding of the unique situation.²³²

Once it was determined that risk analysis was a necessary part of the remediation process, it was necessary to determine if the scientific expertise that the company relied on was sufficient to identify and solve the problems. The groundwater contamination was being investigated at the company's expense but only one consulting firm, Piteau Engineering Limited, was in charge. For Hansen's side, Dr Wilson reviewed the company and Piteau's material on groundwater contamination and remediation and provided his views and recommendations. But this "review" did not increase the competence of the investigation or remediation.²³³

The RAC recognized the challenges of the remediation tasks and set out to fully explore the available options and technologies. The company and its groundwater consultants, however, had not adequately investigated what information and resources, such as techniques and costs, would be required to remediate the contamination. In 1990, when Wilson discussed groundwater remedial measures with the company and Piteau, the time frame was uncertain --anywhere from one to three decades or more. And the fractured nature of

the bedrock made it unlikely "one could ever be certain that all of the contamination would have been intercepted and treated."²³⁴

Endnotes

1. Effective July 2, 1992, Esso Resources Canada Limited, a subsidiary entity of Imperial Oil Limited, changed its name to Imperial Oil Resources Limited. For the purposes of this paper, Esso/Imperial Oil will be referred to as "the company." Hanen Collection. 4.F.9.
2. Hanen Collection. 16.B.1.
3. Hanen Collection. 6.A.1, 4.E.90
4. Walter Trost had made this clear in his 1972 report *Environmental Effects of the Operation of Sulphur Extraction Gas Plants in Alberta*. Alberta Environment made the same point in a 1977 study, "Effects of Sulphur Dioxide Emissions on Soils and Vegetation in Alberta," adding that the difficulty was not circumscribed by single locales as effects on the total ecosystem had to be considered; new research directions were required to assess the short- and long-range impacts of sulphur gas and other pollutants on agronomic and/or natural ecosystems.
5. Hanen Collection. 4.B.44.
6. Hanen Collection. 6.F.49.
7. Hanen Collection. 2.F.3, 2.F.13-14.
8. Hanen Collection. 2.F.3.
9. Hanen Collection. 3.F.23.
10. Hanen Collection. 2.C.2.
11. Hanen Collection. 4.B.63-64.
12. Hanen Collection. 16.B.1.
13. Hanen Collection. 8.B.16.
14. Hanen Collection. 8.B.36, 7.C.39, 7.C.45.
15. Hanen Collection. 16.B.1.
16. Hanen Collection. 16.B.1.
17. Hanen Collection. 4.D.45.
18. Hanen Collection. 4.C.95, 4.F.155.
19. Hanen Collection. 3.F.52.
20. Hanen Collection. 4.D.10.
21. Hanen Collection. 16.B.1.
22. Hanen Collection. 15.A.1.
23. Hanen Collection. 3.B.8, 3.B.16.
24. Hanen Collection. 3.B.16.
25. Hanen Collection. 4.D.45.
26. Hanen Collection. 4.D.7.
27. Hanen Collection. 4.E.88, 4.E.95, 6.A.1-3, 16.B.1.
28. Hanen Collection. 16.B.1.
29. Hanen Collection. 2.I.45, 2.I.61, 4.B.42, 4.B.114.
30. Hanen Collection. 4.E.88.
31. Hanen Collection. 4.E.108.
32. Hanen Collection. 4.E.88.
33. Hanen Collection. 4.E.89.
34. Hanen Collection. 4.E.89.
35. Hanen Collection. 4.E.90.
36. Hanen Collection. 4.E.89.
37. Hanen Collection. 4.E.89.
38. Hanen Collection. 4.E.90.
39. Hanen Collection. 16.A.19.

HISTORY COLLABORATIVE: RUMSEY RANCH

40. Hanen Collection. 4.E.37.
41. Hanen Collection. 2.E.5.
42. Hanen Collection. 2.D.72.
43. Hanen Collection. 14.A.7.
44. Hanen Collection. 2.E.5.
45. Hanen Collection. 3.B.16.
46. Hanen Collection. 16.A.11.
47. Hanen Collection. 2.C.24, 3.F.35.
48. Hanen Collection. 2.C.2, 2.I.63.
49. Hanen Collection. 2.C.2.
50. Hanen Collection. 6.E.9.
51. Hanen Collection. 2.C.2, 2.E.61.
52. Hanen Collection. 2.A.44.
53. Hanen Collection. 3.F.35.
54. Hanen Collection. 2.C.74, 2.D.57, 3.F.35.
55. Hanen Collection. 2.C.48, 2.E.79, 2.E.82, 2.E.92, 6.E.7-8.
56. Hanen Collection. 6.E.3.
57. Hanen Collection. 2.C.2.
58. Hanen Collection. 6.E.10.
59. Hanen Collection. 6.E.11.
60. Hanen Collection. 6.E.12.
61. Hanen Collection. 6.F.70-72
62. Hanen Collection. 6.F.57.
63. Hanen Collection. 4.C.1.
64. Hanen Collection. 4.C.1.
65. Hanen Collection. 1.A.44.
66. Hanen Collection. 3.A.4.
67. The Groundwater Risk Assessment Team meeting included issue management, particularly cleanup schedules, remediation technology selection and monitoring of the remediation process. The Air Emissions Committee received a report on the Air Emissions Technical Program which provided a timetable for the program. On April 1, 1995, the company finally submitted its long-term Groundwater Management Plan (as related to the Quirk Creek gas processing plant) to Alberta Environmental Protection.
68. Hanen Collection. 14.A.13.
69. Hanen Collection. 14.A.8.
70. Hanen Collection. 14.A.8.
71. Hanen Collection. 15.A.3.
72. *Restoration Action Committee*. Transcript from September 1995 meeting.
73. Hanen Collection. 6.B.6.
74. Hanen Collection. 5.G.12.
75. Hanen Collection. 16.B.1.
76. Hanen Collection. 4.F.87.
77. Hanen Collection. 2.C.57, 4.F.83-84.
78. Hanen Collection. 4.F.24.
79. Hanen Collection. 4.F.25-27, 4.F.62.
80. Hanen Collection. 4.F.87.
81. Hanen Collection. 4.F.79, 4.F.81. Public concern over the practice and management of Alberta's energy developments was evident in the mid-1970s as ERCB hearings increasingly involved special-interest groups and individuals rather than industry representatives. To enable more public participation in the ERCB's hearing process, ERCB Intervener Funding was introduced in 1978. ERCB, *Annual Report 1987*, p.23.
82. Hanen Collection. 4.F.26.

83. Hanen Collection. 7.B.1-6.
84. Hanen Collection. 7.B.1-6, 8.A.14.
85. Hanen Collection. 8.A.18.
86. Hanen Collection. 16.E.9.
87. Hanen Collection. 8.C.4.
88. Hanen Collection. 16.E.5.
89. Hanen Collection. 16.E.9.
90. Hanen Collection. 16.E.9.
91. Hanen Collection. 8.C.4.
92. Hanen Collection. 8.C.1-4, 9.A.1-5, 10.A.1-5, 10.B.1-3, 10.C.1-7.
93. Hanen Collection. 8.A.18.
94. Hanen Collection. 8.E.1.
95. Hanen Collection. 9.A, 12.A, 12.B, 12.C, 12.D.7.
96. Hanen Collection. 5.D.3.
97. Hanen Collection. 5.D.3.
98. Hanen Collection. 16.E.7.
99. Hanen Collection. 16.B.1.
100. Hanen Collection. 2.G.10.
101. Hanen Collection. 2.G.4, 2.G.6-8, 2.G.9-10.
102. Hanen Collection. 2.G.4-5
103. Hanen Collection. 2.G.3.
104. Hanen Collection. 2.G.1
105. Hanen Collection. 8.A.18
106. Hanen Collection. 16.B.1.
107. Hanen Collection. 7.C.64.
108. Hanen Collection. 16.B.1
109. Hanen Collection. 2.E.35.
110. Hanen Collection. 16.B.1.
111. Hanen Collection. 8.A.32.
112. Hanen Collection. 8.A.18
113. Ironically, this was the very message given to the industry throughout the 1960s and 1970s by the Chairman of the ERCB, Dr George Govier.
114. Hanen Collection. 8.A.30
115. Hanen Collection. 8.E.1.
116. Hanen Collection. 2.E.33.
117. Hanen Collection. 2.E.101, 4.E.97
118. Hanen Collection. 5.D.2.
119. Hanen Collection. 5.D.2.
120. Hanen Collection. 2.E.85, 2.I.96.
121. Hanen Collection. 2.I.96.
122. Hanen Collection. 4.E.106.
123. Hanen Collection. 2.I.96.
124. Hanen Collection. 2.C.40.
125. Hanen Collection. 2.E.33.
126. Hanen Collection. 2.E.71.
127. Hanen Collection. 2.C.40, 2.I.46.
128. Hanen Collection. 2.G.9.
129. Hanen Collection. 2.E.51, 2.E.59.
130. Hanen Collection. 2.E.71
131. Hanen Collection. 2.E.33.
132. Hanen Collection. 2.I.11-12, 2.I.14.
133. Hanen Collection. 2.I.8-9.
134. Hanen Collection. 2.I.7, 2.I.9.
135. Hanen Collection. 2.C.2.

HISTORY COLLABORATIVE: RUMSEY RANCH

136. Hanen Collection. 2.I.6, 4.D.19.
137. Hanen Collection. 3.A.13.
138. Hanen Collection. 4.D.6.
139. Hanen Collection. 4.D.2.
140. Hanen Collection. 2.E.91.
141. Hanen Collection. 2.E.77.
142. Hanen Collection. 2.F.3.
143. Hanen Collection. 2.D.38.
144. Hanen Collection. 2.A.33.
145. Hanen Collection. 2.D.75.
146. Hanen Collection. 3.F.10.
147. Hanen Collection. 2.B.27.
148. The Quirk Creek Plant was the only sour gas plant in Alberta using flexsorb in its desulphurization process.
149. Hanen Collection. 2.C.64, 6.F.25.
150. Hanen Collection. 2.F.49.
151. Hanen Collection. 2.F.112.
152. Hanen Collection. 2.F.17, 2.F.105, 6.F.47.
153. Hanen Collection. 6.F.51.
154. Hanen Collection. 2.F.47.
155. Hanen Collection. 2.F.3.
156. Hanen Collection. 5.A.5.
157. Hanen Collection. 2.D.44, 2.E.5, 2.E.18-20, 2.I.20.
158. Hanen Collection. 2.D.72.
159. Hanen Collection. 2.D.1.
160. Hanen Collection. 2.D.1.
161. Hanen Collection. 2.D.1.
162. Hanen Collection. 3.B.8, 16.B.1.
163. Hanen Collection. 4.D.1-2, 4.D.4,4.D.6, 4.D.10, 4.D.12, 4.D.33-35, 16.B.1.
164. Hanen Collection. 4.D.10.
165. Hanen Collection. 5.D.3.
166. Hanen Collection. 4.D.33.
167. Hanen Collection. 4.D.10.
168. Hanen Collection. 2.E.95.
169. Hanen Collection. 4.D.29.
170. Hanen Collection. 4.D.21.
171. Hanen Collection. 4.C.1.
172. Hanen Collection. 14.A.6, 14.A.8, 14.A.11, 14.A.13, 15.A.3.
173. Hanen Collection. 14.A.13.
174. Hanen Collection. 14.A.8.
175. Hanen Collection. 14.A.13.
176. Hanen Collection. 14.A.1.
177. Hanen Collection. 14.A.8.
178. Hanen Collection. 14.A.8.
179. Research into the *Calgary Herald* for the months of October and November 1983 did not turn up the publication of either the open letter or the advertisement.
180. Hanen Collection. 17.A.
181. Hanen Collection. 2.F.31.
182. Hanen Collection. 2.F.30.
183. Hanen Collection. 2.C.71.
184. Hanen Collection. 15.C.1.
185. Hanen Collection. 2.D.18.
186. Hanen Collection. 3.E.16.
187. Hanen Collection. 2.D.22.

188. Hanen Collection. 2.D.21.
189. Hanen Collection. 3.A.14.
190. Hanen Collection. 7.C.26.
191. Hanen Collection. 7.C.28.
192. Hanen Collection. 7.C.49-50.
193. Hanen Collection. 16.B.1.
194. Hanen Collection. 7.C.4.
195. Hanen Collection. 7.C.5.
196. Hanen Collection. 7.C.94.
197. Hanen Collection. 2.I.91.
198. Hanen Collection. 2.E.99.
199. Hanen Collection. 2.E.95.
200. It is not known to what extent the Hon. John Fraser assisted the Rumsey Ranch intervention to the ERCB in 1981. He was, however, a key member of the 1980 federal Acid Rain Sub-Committee which recommended that Alberta's industries eventually cease emitting pollutants that cause acid rain.
201. Hanen Collection. 1.A.50.
202. Hanen Collection. 2.D.55.
203. Piteau Engineering Limited and Integrated Environments Limited. *Effectiveness of Subsurface Treatment Technology at Alberta Sour Gas Plants, Phase I: Assessment of Subsurface Contamination and Remediation at Alberta Sour Gas Plants*. Prepared for the Canadian Petroleum Association and Environment Canada. July 1990.
204. Hanen Collection. 4.E.88.
205. Hanen Collection. 14.A.5.
206. Hanen Collection. 5.A.5.
207. Hanen Collection. 5.A.5.
208. Hanen Collection. 3.F.52.
209. Hanen Collection. 4.D.2.
210. Hanen Collection. 3.F.52.
211. Hanen Collection. 14.A.13.
212. Hanen Collection. 2.A.27, 2.A.88, 2.C.70, 3.F.63, 4.E.59.
213. Hanen Collection. 14.A.8.
214. Hanen Collection. 4.C.38, 4.E.5, 4.E.42-74.
215. Hanen Collection. 4.E.86.
216. Hanen Collection. 3.A.5. The exact components of Hanen's plan are not known; it can be deduced, however, that Hanen intended to assemble an impressive collection of expert advice, to use in her negotiations with the Company.
217. Hanen Collection. 1.A.44.
218. Hanen Collection. 2.D.44, 2.E.5, 2.E.19, 2.I.20.
219. Hanen Collection. 1.A.25.
220. Hanen Collection. 2.F.16, 2.F.20, 2.F.47, 2.F.110.
221. Hanen Collection. 2.F.8, 2.F.13-16, 2.F.32, 2.F.47.
222. Hanen Collection. 6.B.8.
223. Hanen Collection. 2.F.3.
224. *Restoration Action Committee*. Transcript from September 1995 meeting.
225. Hanen Collection. 15.A.1.
226. *Restoration Action Committee*. Transcript from September 1995 meeting.
227. Hanen Collection. 15.A.1.
228. Hanen Collection. 6.F.40.
229. Hanen Collection. 6.F.51.
230. Hanen Collection. 3.B.22.
231. *Restoration Action Committee*. Transcript from September 1995 meeting.
232. Hanen Collection. 14.A.5.
233. Hanen Collection. 4.E.108.

234. Hanen Collection. 4.E.90, 4.E.108.

Section 3: Conclusion

Esso Resources-Quirk Creek is one of about 700 gas plants in Alberta. While some aspects of its operations, like the use of Flexsorb, make it unique, it is a relatively typical unit of a mammoth industry. Yet, as so often in history, particular circumstances and individual actions have held up the ordinary as exemplary. In this case, the documentary case study of the Rumsey Ranch-Quirk Creek dispute serves as a touchstone for the long-simmering, now explosive debate over the nature of conservation, the relationship between industry, government and citizens, and the importance of citizen participation and activism in confronting corporate power.

The conservationist ethic, as it has emerged in Alberta's oil and gas industry, is firmly rooted in the view that pollution control is integral to the economic conservation of resources. Profitable byproducts, such as sulphur, make use of a pollutant, therefore its recovery is both an economic and environmental measure.¹ Environmental impact is a secondary consideration, putting the costs of protective measures against plant profitability. The same principle is reflected in the judgements of the ERCB. This idea formed the basis of the 1981 Quirk Creek expansion application approval² and remained a central feature of regulatory philosophy as recently as 1994.³ In short, pollution control was a function of the balance between risks and benefits.

The strategy of balancing risks and benefits was recently shown to have resulted in comprehensive contamination of the groundwater. A 1996 review of research literature over a fifty-year period found cattle are affected by hydrogen sulphide at low concentrations [less than fifty parts per million] "and can cause death to cattle at higher concentrations."⁴ Having achieved some measure of toxicological response, the report calls for co-operative research between the oil and gas industry, the ranch and farm industries, and the regulatory authorities -- the same recommendation made by Walter Trost in his 1972 report.

Neither has co-operation extended to public scrutiny into sour gas operations. Hanen's frustration and anger in dealing with the regulatory agencies, particularly the ERCB, has been shared by many other ranchers and farmers. Trost explicitly addressed this ERCB characteristic when he wrote:

In the circumstances surrounding the sulphur extraction industry where toxic and dangerous gases are processed, a private citizen is given inadequate protection by the requirement that he prove beyond a doubt before a court of law that his complaint has its sources in the sour gas plant.⁵

The Board itself recently made a similar observation in a 1994 report, which noted, "We were told that too many people feel that they have not been

listened to and their concerns do not matter."⁶ Trost recommended public participation in all aspects of the regulation and monitoring of the sour gas industry.⁷ Despite initiatives like the Community Committee, the Quirk Creek dispute reveals inadequate public consultation is still a feature of the sour gas industry and its regulators.

Yet there is increasing discontent among some Albertans. The level of complaint is reflected in annual reports by the Office of the Farmers' Advocate, a government advisory bureau created in the early 1970's to aid farmers in disputes with oil companies. The 1995 report records about 2,000-2,500 enquiries by farmers related to the oil and gas industry, more than twice the number reported in the mid-1970s.⁸ This volume of complaint speaks to the growing unease among agricultural producers living in the shadow of the oil and gas industries.

Among these complainants, perhaps the loudest has been one woman, Zahava Hanen. John Ralston Saul has reminded us in his recent Hassey Lectures that corporate power will soon be an even greater presence in our world than it is now. He argues that the only effective challenge to its abuse of power is the citizen, who maintains an informed vigil and dares to stand fast against intimidation. Hanen's struggle, then, is emblematic of how this vigilance serves not merely local self-interest, but also the collective interests of the community, society and the environment. Her unique contribution to understanding the historical development of environmental controversies is the legacy of documents from which this study is taken.

Endnotes

1. Hanson, p. 251, 283.
2. ERCB. "ERCB Report on Sour Gas Processing in Alberta," hearings on Quirk Creek plant, (Calgary, 1982) p. 5.
3. Advisory Committee to the ERCB. "Report and recommendations to the ERCB on public safety and sour gas." (Calgary, 1994) p. iii .
4. *Cattle and the Oil and Gas Industry*. Alberta Cattle Commission (Calgary, 1996) Sec. 8.
5. Trost. p. 34.
6. Advisory Committee to the ERCB, p. ii.
7. Trost, p. 110-111.
8. Annual Reports of the Office of the Farmers' Advocate, 1975-1995, *passim*.