

**CIRL/ACLRC Human Rights and Resource
Development Project**

**Health Concerns of Albertans Affected by Oil and Gas
Development: A Background Paper**

Nickie Vlavianos, Project Researcher
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1.0 Introduction

For years, rural Albertans have been confronted with oil and gas activities on their lands and in their communities. Although co-existence has generally been possible, Albertans have expressed concerns about the impacts of oil and gas operations on their health. Such concerns are being raised more frequently and more strongly in recent years. In 1999, the Alberta Energy and Utilities Board (the AEUB¹), the province's energy regulator, acknowledged that A[d]isputes between residents and petroleum companies seem to be increasing in number and intensity.¹

A number of factors are likely working together to intensify Albertan's concerns about the impacts of oil and gas operations on their health. First, the past three decades have witnessed a dramatic increase in awareness of the interdependence of the environment and human health around the world. Albertans have been part of, and have been influenced by, this worldwide trend. At the same time, oil and gas development in Alberta has proceeded at a frantic pace in recent years. This increase in activity has heightened concerns about the actual and potential threats to human health, particularly in regard to cumulative effects. It has also brought the oil and gas industry into closer contact with more Albertans.

A final factor likely fueling health concerns in Alberta is the maturity of the oil and gas industry in the province. Not only does a mature industry mean that many facilities and pipelines in the province are older now and thus more prone to environmental problems, the maturity of the industry has also meant that, with the depletion of conventional oil and gas reserves, more environmentally-risky and energy-intensive activities are being pursued.²

After a brief exploration of these factors in Section 2, this paper will provide some background to the health concerns being raised by Albertans in relation to oil and gas development. Section 3 will begin by briefly discussing the actual and potential environmental impacts of oil and gas development

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¹ Alberta Energy and Utilities Board, *Regulatory Highlights for 1999* (Calgary, AB: EUB, 1999) at 10.

² For a number of other socio-economic and political trends that may be influencing health concerns in regard to oil and gas development in Alberta, see: T. Marr-Laing & C. Severson-Baker, *Beyond Eco-terrorism: The Deeper Issues Affecting Alberta's Oilpatch* (Drayton Valley, AB: The Pembina Institute for Appropriate Development, 1999).

in the province. In Section 4, the paper will consider what these environmental impacts may mean from a human health perspective. This section will focus on the *possible* health impacts from oil and gas development given the environmental impacts. Section 5 of the paper will then consider the *actual* health impacts of oil and gas operations in the province. After noting the absence of clear scientific evidence or a clear consensus in the scientific community, the paper provides a glimpse of some of the anecdotal evidence that appears to be proliferating on a daily basis. It is through these stories that an appreciation of the health concerns of Albertans affected by oil and gas development can best be obtained at this time.³

2.0 Background Factors

2.1 Increasing Awareness C Health and the Environment

According to one observer, A[p]ublic interest in and unease about environmental risks and health hazards has reached exceptional heights in recent years.⁴ In September 2000, 93 per cent of Canadians expressed concern that environmental hazards are affecting the health of their children.⁵

Since Rachel Carson warned the world about the harmful effects of pesticides on human health in 1962⁶, awareness of the interdependence between the environment and human health has been growing steadily. Scientific research over the past four decades continues to establish actual and potential links between environmental quality and human health.⁷

Tragically, the residents of Walkerton, Ontario were made all too aware of this interrelationship in May 2000. *E. coli* bacterium from cattle manure contaminated the town=s water supply, causing the deaths of seven people and the serious illness of hundreds of others.

³It should be noted that the project, of which this paper forms part, is one of legal and policy research. The members of the team which worked on this project are all trained in law and several other social sciences and humanities. None is qualified to pass professional judgment on the substantive validity of the scientific and medical issues raised by Albertans about the impact of oil and gas activities on human health. Nevertheless, legal research cannot be carried out in a vacuum. Therefore, it has been important to document the factual background, against which the legal and policy issues must be viewed. The worries that Albertans have voiced and the allegations which they have made, are a matter of public record. The research team decided it was important to summarize those worries and allegations for the interested reader.

⁴Lord Woolf, Lord Chief Justice of England and Wales, AEnvironmental Risk: The Responsibilities of the Law and Science@, The Environmental Law Foundation, Professor David Hall Memorial Lecture (London: May 24, 2001).

⁵Ekos poll, September 2000, cited in National Round Table on the Environment and the Economy, *Achieving a Balance: Four Challenges for Canada in the Next Decade* (Ottawa: NRTEE, 2001).

⁶R. Carson, *Silent Spring* (Boston: Houghton Mifflin, 1962).

⁷For a summary of some of the science linking human health and environmental quality, see: D. Bates, *A Citizen=s Guide to Air Pollution* (Montreal: McGill-Queen=s University Press, 1972) and P.A. Larkin, *Freshwater Pollution, Canadian Style* (McGill-Queen=s University Press, 1974).

Other examples of the health effects of environmental degradation and contamination abound. Most notably, the harmful effects of second-hand smoke on the health of non-smokers is now beyond question. In short, there is broad consensus that A... substances that are released into the environment can ultimately find their way back to us in various amounts and combinations through our air, water, soil and food, and can affect our health and the health of ecosystems.@⁸

In Canada, both federal and provincial legislation recognizes and highlights the interdependence between human health and the environment. The *Canadian Environmental Protection Act* is subtitled A[a]n Act respecting pollution prevention and the protection of the environment *and human health* in order to contribute to sustainable development@⁹. The Act=s preamble also recognizes that A... the protection of the environment is essential to the *well-being* of Canadians...@¹⁰ Similarly, Alberta=s environmental legislation highlights that A... the protection of the environment is essential to the integrity of ecosystems *and human health* and to the well-being of society@.¹¹

Undoubtedly, Albertans have been part of, and have been influenced by, this growing awareness of the interrelationship between the environment and human health. Given Alberta=s position as a world leader in oil and gas production, it is not surprising that this growing awareness would translate into concerns about the effects of oil and gas development on human health.

2.2 Intensification of Oil and Gas Development in Alberta

Since the discovery of oil in 1947, oil and gas exploration and production have grown steadily in Alberta. One estimate suggests that only 12.7% of Alberta=s total area does not contain oil and gas potential.¹² While conventional oil and natural gas development continues at a brisk pace, non-conventional development of massive deposits of oil sands in the province is just beginning.

⁸Report of the Commissioner of the Environment and Sustainable Development to the House of Commons (Public Works Canada, 1999), Chapter 3: AManaging Toxic Substances@ at 3-7.

⁹*Canadian Environmental Protection Act*, S.C. 1999, c. 33 (ACEPA@) [Emphasis added]. Notably, CEPA was revised in 1999 on the basis of a Standing Committee report AIt=s About Our Health! Toward Pollution Prevention@.

¹⁰*Ibid.*, Preamble [Emphasis added].

¹¹*Environmental Protection and Enhancement Act*, R.S.A. 2001, c. E-13.3, s. 2(a) (AEPEA@) [Emphasis added]. Elsewhere, the Act recognizes the A... integral relationship between human health and the environment...@ and directs the provincial Environment Minister to A... cooperate with and assist the Minister of Health and Wellness in promoting human health through environmental protection@: EPEA, s. 11.

¹²M. Ross, *Legal and Institutional Responses to Conflicts Involving the Oil and Gas and Forestry Sectors*, Occasional Paper #10 (Calgary: Canadian Institute of Resources Law, University of Calgary, 2001), citing a 1992 report of the Alberta Energy Resources Conservation Board.

The number of conventional oil and gas wells being drilled in the province on an annual basis is considerable and continues to grow each year. By 1998, more than 199,025 wells had been drilled in Alberta¹³ and, between 1998 and 2002, an average of about another 12,000 wells was drilled each year.¹⁴

In addition, by July 2002, 703 gas plants were operating in the province and over 300,000 kilometres of pipeline were in the ground.¹⁵ Along with conventional oil and gas development, the development of Alberta's oil sands is only just beginning. In 2001, raw bitumen production surpassed conventional crude production for the first time, and the EUB estimates that production of crude bitumen will triple by 2011, accounting for as much as 75% of Alberta's total oil supply.¹⁶

This increase in oil and gas activity not only means that more Albertans are coming into contact with the industry, but it also means that those already living and working near resource facilities are coming into more contact with industry activities. While the presence of one well in a given area may not be particularly worrisome, the addition of a number of others along with batteries, pipelines and gas plants may raise the level of actual or perceived environmental risk amongst those in the area. Such growing concerns about cumulative effects have been summarized as follows:

Researchers now suspect that accumulated pollution and low-level exposure to several pollutants at once (also known as >total pollution loads=) have interactive and cumulative impacts on human health. Exposure may fall short of causing death or hospital admission, but still may affect large numbers of people. Ongoing exposure to low levels of pollution may result in permanent harm to healthy human function.¹⁷

The focus here is not the impact of a single operation, but rather, the impacts and risks posed by that

¹³EUB, *Alberta's Energy Resources: 1998 in Review* (Calgary: Alberta Energy and Utilities Board, 1999) at 4.

¹⁴EUB, *Field Surveillance Provincial Summary April 2001/March 2002*, Statistical Series 57 (Calgary: Alberta Energy and Utilities Board, July 2002) at 19.

¹⁵*Ibid.* at v.

¹⁶EUB, *Alberta's Reserves 2001 & Supply/Demand Outlook 2002-2011*, Statistical Series 2002-98 at 1 and 3.

¹⁷National Round Table on the Environment and the Economy, *supra* note 4. Elsewhere, the NRTEE has similarly noted that although "... cancer has historically been the focus of assessments, recent research suggests that significant, non-cancer health impacts can arise from long-term, low-level exposure to a mix of substances.": National Round Table on the Environment and the Economy, *Managing Potentially Toxic Substances in Canada C A State of the Debate Report* (Ottawa: NRTEE, 2001) at 3. For an excellent review of how cumulative effects are addressed in Canada and the difficulties of doing so, see: S. Kennett, *Towards a New Paradigm for Cumulative Effects Management*, Occasional Paper #8 (Calgary, AB: Canadian Institute of Resources Law, 1999).

operation in conjunction with those of other projects and activities.¹⁸ These projects and activities include past, present and reasonably foreseeable future ones¹⁹ and are not limited to oil and gas operations. In short, the concern is with the cumulative effects of the total sum of oil and gas operations and other industrial activities within a region.

2.3 Maturation of Alberta's Oil and Gas Industry

Given the intense development of oil and gas in Alberta, established oil and gas reserves in the province are being depleted. Since production peaked in 1973, conventional oil production continues to outpace any additions to established reserves through new discoveries.²⁰ Similarly, production of natural gas is outstripping additions, resulting in a steady decline of established natural gas reserves in the province.²¹

According to two observers,

... as the province's high-producing fields are depleted, companies are left to pursue riskier, less economic, smaller and deeper reserves. This is causing the oil and gas industry to encroach on populated areas, leading to increased conflict with landowners.²²

In addition, the decline in established oil reserves has led to increasing pressure to explore and develop non-conventional crude oil from oil sands in the province. According to the EUB in 1998, as oil reserves are decreasing, A...synthetic crude oil production from oil sands continues to expand, filling the gap left by declining conventional oil reserves.²³ It is beyond question that the sheer nature of oil sands operations are (and have the potential to be) more energy intensive and environmentally destructive and thus raise even greater concerns in regard to human health impacts.

3.0 Environmental Impacts of Oil and Gas Development

¹⁸J. R. Creasey, *Cumulative Effects and the Wellsite Approval Process*, M.Sc. Thesis (Faculty of Graduate Studies, University of Calgary, 1998).

¹⁹S. Kennett, *supra* note 17 at 2.

²⁰EUB 1998 Report, *supra* note 12 at 6.

²¹*Ibid.* at 9.

²²T. Marr-Laing & C. Severson-Baker, *supra* note 2.

²³EUB 1998 Report, *supra* note 13 at 6.

The previous section of this paper discussed some of the factors which are likely serving to heighten concerns about the impact on human health from oil and gas development in Alberta. In this section, a review of the actual and potential environmental impacts of that development will be undertaken. This will serve to highlight why Albertans are so concerned about their health.

The actual and potential environmental effects of upstream oil and gas operations²⁴ have been well documented. According to the Petroleum Communication Foundation, activities in each of the drilling, production and processing sectors face a number of environmental challenges. For drilling activities, the following concerns are identified: emissions of greenhouse gases and volatile organic compounds; the use and discharge of toxic fluids; the disturbance of land and its uses; and the disruption of plant and animal life. During production, odors, emissions, spills, leaks, and soil and groundwater contamination are all of concern. And finally, at the processing stage, environmental challenges in regard to emissions of sulphur dioxide, greenhouse gases and volatile organic compounds, as well as water use, have been identified.²⁵

Elsewhere, the most significant environmental impacts of oil and gas activities have been summarized as follows:

1. habitat destruction and fragmentation related to seismic exploration and the construction of roads, wells, and pipelines;
2. increased human access resulting in increased hunting and fishing (both legal and illegal), mortality from vehicles, and habitat avoidance by some species;
3. altered water flows and increased stream sedimentation resulting from stream crossing by seismic lines, roads, and pipelines. These changes can impede the movement of fish and damage fish habitat;
4. altered animal movement patterns (e.g., increased wolf access to caribou habitat);
5. air pollution from gas flaring, gas processing plants, and from oil sands refineries; and
6. contamination of soil and water from pipeline failures, well sites, holding sites, and processing sites.²⁶

²⁴For purposes of this paper, upstream oil and gas activities refer to the extraction/drilling, production and processing of oil and gas. It does not include their marketing, distribution or use which are generally referred to as downstream operations. See, for example: Petroleum Communication Foundation, *Canada's Oil and Gas Industry and Our Global Environment* (Calgary: Petroleum Communication Foundation, 1997) at 33. While downstream activities also have environmental impacts, the focus of this paper is current concerns about human health risks in Alberta stemming from the upstream sector.

²⁵Petroleum Communication Foundation, *ibid.* at 33. See also: Society of Petroleum Engineers of AIME, *Petroleum Production and the Environment* (Dallas, Texas: Society of Petroleum Engineers of AIME, 1975); P. Kostecki & E. Calabrese, *Hydrocarbon contaminated soils and groundwater* (Chelsea, Mich.: Lewis Publishers, 1991); and J. Long & D. Graham, *Environmental Impact of Drilling Fluids and Drilling Practices* in *Working with the New Rules for Wellsite Abandonment*, papers delivered at an Insight seminar on April 21, 1997 (Toronto: Insight Press, 1997).

²⁶Forest Watch Alberta, *Oil and Gas Overview*. Online at http://www.forestwatchalberta.ca/oil/oil_frame.html

4.0 Possible Health Impacts of Oil and Gas Development

To the extent that each of these types of environmental impacts affects the health and functioning of ecosystems that humans depend upon for their survival, they are all of importance to human health. Those that have a more immediate and direct impact on human health, however, are those concerning air pollution and the contamination of soil and water. These represent the most frequently-cited concerns amongst Albertans exposed to oil and gas activities in their communities.

In their 1999 report, T. Marr-Laing and C. Severson-Baker focus upon the air, surface, and groundwater impacts of oil and gas activities in Alberta. Their focus is also the potential for harm to human health as a result of these impacts.

4.1 Air quality concerns

With respect to air impacts, T. Marr-Laing and C. Severson-Baker identify a number of air contaminants of concern from a human health perspective. These include: sulphur dioxide, nitrogen oxides, volatile organic compounds, ground level ozone, fine particulate matter, and air toxics. Within Alberta, the oil and gas industry is the predominant contributor of such air emissions.²⁷ These emissions can impact significantly upon human health in various ways. For example:

- (a) acute exposure to high concentrations of sulphur dioxide can irritate the upper respiratory tract and increase susceptibility to respiratory infections; long term exposure may increase the risk of developing chronic respiratory disease;
- (b) volatile organic compounds include compounds such as benzene which are known to be carcinogenic and toxic to humans;
- (c) ground level ozone causes adverse effects on humans, including irritation of the eyes, nose and throat, reduced lung function, and the development of chronic respiratory disease;
- (d) fine particulate matter can penetrate into the lungs, have serious effects on respiratory function, and have been linked to respiratory and cardiac disease; and
- (e) air toxics such as benzene, styrene and toluene are known carcinogens.

All of these types of air emissions are associated with the development of the oil and gas in Alberta.

²⁷T. Marr-Laing & C. Severson-Baker, *supra* note 2 at 4.

4.2 Soil & Groundwater Quality

With respect to surface impacts, the key impact of oil and gas operations from a human health perspective is the actual or potential contamination of soil and surface water. This contamination can result from waste disposal practices that are permitted or it may result from inadvertent or deliberate spills or surface and subsurface leaks at wells, facilities or pipelines.²⁸

The primary soil and surface water contaminants associated with oil and gas operations are hydrocarbons, salts, heavy metals, and process chemicals.²⁹ While hydrocarbon compounds (such as crude oil) vary in their complexity, they include substances such as benzene which can be toxic and carcinogenic. High concentrations of salts, for example sodium chloride and calcium chloride, are also found in hydrocarbons such as crude oil and in the water produced along with the hydrocarbons.

At low concentrations, salts can affect water and soil quality, but they can also be toxic to plants and aquatic life at higher concentrations.³⁰ Similarly, some heavy metals (introduced largely during the drilling and processing stages of oil and gas production) are toxic and carcinogenic. And finally, process chemicals (which include drilling mud additives, lubricants, cleaners, pesticides, and numerous other compounds used in oil and gas operations) can have various impacts on soil and surface waters.³¹

These four types of contaminants, which can affect soils and surface water, can have similar impacts on groundwater. However, as T. Marr-Laing & C. Severson-Baker caution, A[a]n important difference is the fact that groundwater is the only source of drinking water for a large percentage of rural Albertans, thus increasing the risk of human exposure and health impacts.³²

4.3 Examples

Examples of the impacts of oil and gas activities on the air, soil and water in Alberta abound. Here are just three reported incidents:

- a. During an accidental shutdown of the Strachan gas processing plant near Rocky Mountain House in January 2001, fuel was diverted from a flare designed to burn dangerous gases. As a result, hydrogen sulphide gases were burned incompletely and breaches of air quality guidelines occurred.

²⁸*Ibid.* at 8-10.

²⁹*Ibid.* at 8.

³⁰*Ibid.*

³¹*Ibid.*

³²*Ibid.* at 10.

According to a report prepared by the EUB, for two one-hour periods on January 23, hydrogen sulphide levels in the area reached hourly averages of 12 parts per billion, exceeding Alberta's current guidelines of 10 parts per billion. As these hourly measures reflect only an average of the high and low readings over that time, it is possible that many more times the provincial guideline limit could have been in the air for short periods of time.³³

- b. From 1922 until the mid-1970s, an oil refinery operated in southeast Calgary, AB. In the 1980s, the area was developed as a residential community. Tests since then have shown elevated levels of lead and hydrocarbons in the soil and has prompted health concerns among residents. Alberta Environment has ordered the former operator of the refinery to clean up the contamination.³⁴
- c. In September 1992, a faulty gas line at a gas processing plant 10 km west of Rocky Mountain House leaked hydrocarbons into the ground, contaminating the plant site and water aquifer that supplies residents of the community of Ferrier Acres with water supply. One resident's well was found to contain 500 micrograms of benzene, 100 times higher than acceptable levels for drinking water. After a decade of cleanup efforts, the water has improved, but is not yet entirely pollution free.³⁵

5.0 Actual Health Impacts of Oil and Gas Development

Although the possible impacts to human health from air emissions and soil and groundwater contamination associated with oil and gas development are well-known and accepted, there is vast disagreement on the level of risk involved.³⁶ There is also serious disagreement on whether oil and

³³L. Michelin, A Gas plant emissions exceeded limits@, Red Deer Advocate (Sept. 17, 2001).

³⁴W-A. Thompson, A Province demands Imperial Oil replace soil@, Calgary Herald (July 25, 2002). An appeal by Imperial Oil of the clean-up order to the Alberta Environmental Appeal Board (AAEAB@) was unsuccessful: *Imperial Oil Ltd. and Devon Estates Ltd. v. Director, Enforcement and Monitoring, Bow Region, Regional Services, Alberta Environment re: Imperial Oil Ltd.*, Appeal No. 01-062-R (May 21, 2002). Further litigation on this matter is pending.

³⁵P. Cowley, A Fears linger over chemicals in well water@, Red Deer Advocate (June 8, 2001).

³⁶The risks are well-known and accepted since, after all, they are what the numerous environmental regulations faced by the oil and gas industry in Alberta are intended to address. For example, the legal requirements to abandon facilities and to remediate sites at the end of operations recognize that contamination of soil and groundwater is a real possibility.

gas operations, as currently regulated, are adversely affecting the health of Albertans, particularly those living near such operations.

5.1 Lack of Scientific Evidence

A survey conducted in 1999 revealed that 57 % of those polled either moderately or strongly agreed that the activities of the oil and gas industry are harmful to the health of people living nearby.³⁷ By contrast, in determining whether an oil and gas project is in the public interest, the EUB has repeatedly emphasized the lack of clear scientific evidence for such a conclusion.

In a recent decision, interveners faced with sour gas operations near their residence argued that they had suffered significant ill health effects from this activity. In rendering its decision approving the drilling of three additional sour gas wells in the area, the EUB noted the disagreement between the two medical experts on the cause and nature of the illnesses complained of. The EUB stated as follows:

The Board notes that while both medical experts agree that Darrell Graff, Barbara Graff, and Anita Sorgard are ill, Drs. Young and van Olm clearly disagree on the cause and nature of the illness. The Board views this disagreement as consistent with the limited state of understanding and capability to characterize and test for a relatively new class of illnesses such as those environmentally triggered. The Board notes that despite persuasive evidence necessitating further investigation, these illnesses are yet to be recognized as a disease or distinct syndrome by the Alberta Heritage Foundation for Medical Research.³⁸

In other words, according to the EUB, the residents had failed to establish an undisputed causal link between the oil and gas operations in question and their illnesses. The Board highlighted its view of the importance of scientific over anecdotal evidence as follows:

The Board notes the detailed submission presented by the Graffs, correlating suspected exposure to emissions from oil and gas activities to diary entries documenting adverse health effects experienced. The Board, however, also notes an

³⁷1999 Poll conducted by Angus Reid for the Petroleum Communication Foundation. Opinions were obtained from 1,200 Albertans, 800 from the general population and 400 who lived near oil and gas production facilities: Petroleum Communication Foundation News Release, AAlbertans= Views of the Oil and Gas Industry@, July 29, 1999.

³⁸AEUB, *Gulf Canada Resources Limited Applications for Well Licences and Pipelines Vulcan Field*, Decision 2001 - 48 (June 5, 2001) at 15-16.

absence of critical environmental assessment data to support anecdotal evidence and the claim that Gulf/Crestar=s oil and gas emissions are solely responsible for the onset and continuing symptoms of this complex illness. The Board finds the lack of quantitative data regarding exposure (e.g., ambient, workplace and indoor air quality measurements), as well as the lack of analyses of soil, water, vegetation suspected of contamination, a significant deficiency hampering the development of clear conclusions.³⁹

Elsewhere, the EUB has discussed the lack of objective scientific evidence proving deleterious health effects more generally. In 1998, a number of families had requested a hearing to examine the environmental and health effects of oil and gas operations near their homes. The applicants alleged various health effects from the operations. Noting that the operations had been conducted in accordance with required licences/approvals and environmental standards, the Board dismissed the application for a hearing. In addition, the Board highlighted the absence of objective scientific evidence demonstrating that the health effects were caused by the oil and gas activities in the area. The Board concluded as follows:

... the Board carefully considered the applicants= concerns about adverse effects of local oil and gas activity on their health and that of their livestock. Evidence provided by the families at that time was insufficient to support their request for a review or an inquiry. No credible medical, veterinarian, or environmental evidence was submitted. The families chose not to submit any such evidence to substantiate their claims. To date no compelling evidence has been presented in connection with the current request for an inquiry that would cause the Board to hold a public inquiry into these perceived effects.⁴⁰

In short, the Board concluded that there was A... no objective evidence that the deleterious effects identified by the families [were] caused by the lawful activities of energy companies operating in the Hythe area@. The request for a hearing was thus denied.⁴¹

³⁹*Ibid.* at 16.

⁴⁰AEUB, *Response to Inquiry Request from the Ludwig, Schilthuis, Boonstra, Wraight, Bryzgori, and Johnstone Families and Dr. W.O. Scott* (May 9, 2000) at 2.

⁴¹It is somewhat odd that the EUB denied the request for a hearing simply because of a lack of objective scientific evidence at this stage in the proceedings. Clearly the very purpose of the hearing would be the introduction and examination of such evidence. Perhaps the EUB is suggesting that it requires *some* objective evidence (establishing a *prima facie* case?) prior to granting a hearing, but this is not at all clear from its decision. Another interesting aspect of the EUB=s position with respect to the lack of clear scientific evidence emerges when the Board=s view of the precautionary principle is examined. In regard to setting new sulphur recovery guidelines for processing plants, the Board has noted that a review of the guidelines would A... focus on the precautionary principle of minimizing emissions of all potentially harmful substances to the extent practical, *even in the absence of specific evidence of adverse impacts.*@: see EUB, *Regulatory Highlights 1999*, *supra* note 1. There seems to be a discrepancy between this view and the Board=s general position noted above that no action will be taken where

Throughout its decisions, the EUB=s position undoubtedly reflects the fact that to date there exists no formal scientific study (or scientific consensus) providing support for the proposition that oil and gas operations in Alberta are harmful to the health of Albertans in some way.⁴² Interestingly, though, there is also no study or consensus that establishes that they are not.⁴³

Despite the absence of uncontradicted scientific proof and consensus, some argue that Aa growing body of hard scientific evidence@ is emerging which A... seriously challenges the industry claims that their activities have no negative health and environmental impacts.@⁴⁴ These studies have focused on the impacts on cattle of routine (i.e., licensed) and non-routine (i.e., spills) air emissions from oil and gas operations on cattle. Although not determinative on all issues, some negative correlations have been found, most notably in the area of reproduction C for example, increased risk of non-pregnancy, abortions, stillbirths, and twinning.⁴⁵ As for soil and water contamination (spills of crude oil or salt water, for example), the evidence of a direct and identifiable risk to cattle is even stronger.⁴⁶

5.2 The Stories of Albertans

there is a lack of scientific evidence with respect to health impacts.

⁴²T. Marr-Laing & C. Severson-Baker, *supra* note 2 at 1.

⁴³To date, the largest single human health study carried out in Alberta was the Medical Diagnostic Review, a major component of Alberta=s government-industry Acid Deposition Research Program conducted between 1983 and 1989. It failed to find any difference in most health outcomes between a community near extensive sour gas operations and a community without such operations. Nonetheless, the study did show that there were more respiratory symptoms reported in children aged five to fifteen living downwind from two gas processing plants: see Petroleum Communication Foundation, *Sour Gas Questions and Answers* (Calgary, AB: Petroleum Communication Foundation, 2000) at 26. More recently, a joint project intended to include the four western Canadian provinces was initiated in early 2001 to study the health effects on animals and humans from flaring emissions. As of January 2002, however, only Alberta had contributed funding for the study and it appears that the human health component has been deferred indefinitely: see K. Cryderman, AIndustry to help fund oil and gas flaring research@, *Edmonton Journal* (January 17, 2002); and W-A. Thompson, ACost-cutting may axe environmental studies@, *Calgary Herald* (December 14, 2001).

⁴⁴T. Marr-Laing & C. Severson-Baker, *supra* note 2 at 13.

⁴⁵*Ibid.* at 13-15.

⁴⁶In fact, two Alberta court cases have found a direct causal link between soil and groundwater contamination from oil and gas activities and the health of cattle. In 1975, the court found that a number of cattle had died from crude oil poisoning after grazing in an area where oil had spilled or leaked from two producing well sites: *Girletz v. Bailey Selburn Oil & Gas Ltd.* (1975), 65 D.L.R. (3d) 533 (Alta. S.C.). More recently, Doug Jones successfully sued Mobil Oil Canada Ltd. for the loss of cattle harmed by exposure to soil and water contaminated by oil facilities on his property. Despite conflicting theories as to the cause of the cattle=s poor health, the court held that, on the evidence, it was satisfied that A... the chronic poor performance of [Jones=] cattle was caused by or materially contributed to by exposure to and ingestion of oil and gas contaminants.@: *Jones v. Mobil Oil Canada Ltd.*, (1999), 72 Alta. L.R. (3d) 369 (Q.B.).

While Albertans await scientific studies with respect to human health effects, stories of perceived health effects from oil and gas operations proliferate daily. The following are just a few reported recently in various publications across the province.

\$ According to the Ludwig, Boonstra and Schilthuis families, air emissions in the area around their farm (which is surrounded by oil and gas operations) have resulted in health problems for years. They include: headaches, nausea, colds, skin rashes, insomnia, miscarriages and stillbirths.⁴⁷

\$ T. Evans moved her family out of Alberta to escape emissions from the flaring of unwanted gas at oil and gas installations near her home. She believes her children were poisoned by flaring from a sour gas processing plant in the area. Blood tests of her three-year old son revealed higher than normal levels of hydrocarbons, benzene and xylene. Although away from gas flaring now, her children remain extra-sensitive to chemicals, getting nosebleeds from diesel truck emission or chlorinated pools for example.⁴⁸

\$ According to C. Sutton, her family was agassed four times by air emissions from a nearby oil and gas facility. She was rendered unconscious and suffered subsequent bouts of vomiting and loss of muscle control.⁴⁹

\$ The local health authority in the Turner Valley/Black Diamond region of Alberta has decided to investigate whether there is a link between nearby sour gas wells and the above-average number of people with multiple sclerosis in the area. A local group of concerned residents brought the matter to health officials' attention, pointing out the large number of people in the area diagnosed with the nerve-deteriorating disease.⁵⁰

\$ According to M. Dahl, he and his co-worker, R. Spooner, were seriously injured when they were exposed to gas emissions while working on a remote seismic line in west central Alberta in July 1999. After smelling a rotten egg odour⁵¹, both

⁴⁷AEUB, *Response to Inquiry Request ...*, *supra* note 40. See also: A. Nikiforuk, *Saboteurs: Wiebo Ludwig's War Against Big Oil* (Toronto: McFarlane Walter & Ross, 2001).

⁴⁸L. Michelin, *supra* note 33.

⁴⁹ASour Gas: The Movie, Oilweek (May 7, 2001).

⁵⁰Sterling News, Turner Valley/Black Diamond, AMS cases prompt health probe, Calgary Herald (March 9, 2001). See also: G. Beckett, Residents claim gas flaring is responsible for health concerns, Okotoks Western Wheel (March 7, 2001).

⁵¹H₂S gas is typically described as smelling like rotten eggs at low levels.

men became ill immediately with headaches, nausea, skin rashes, runny noses and irritated eyes. Mr. Dahl's partner collapsed shortly thereafter. Both men continue to suffer from depression, anxiety and stress, and neither has been able to work since the incident. Mr. Spooner has been diagnosed with brain damage. He slurs his speech and loses his balance in stressful situations.⁵² Before the EUB, similar stories are often repeated during hearings held to determine whether a particular oil and gas operation should proceed. They have included the following:

§ In 2001, A. Sorgard, D. Graff, and B. Graff told the EUB that exposure to emissions from sour gas operations near their farm had caused them to be acutely sensitive to hydrocarbons, sour gas, and the combustion products of sour gas. One doctor diagnosed them as suffering from an environmental illness and a form of multiple chemical sensitivity. The medical symptoms reported included neurological impairment affecting coordination, physical strength and stamina, concentration, and vision. Weight loss and digestive problems were also noted. In addition, each suffered a progressively heightened sensitivity and adverse reaction to a variety of chemicals, including exhaust fumes, methanol, ammonia, cleaning products, plastics and printing ink.⁵³

§ According to the Proc family, they suffered a significant deterioration in health due directly to the venting and emission activities of oil and gas operations in the area around their property. Some of the symptoms, in varying degrees, included: headaches, weight loss, burning of the eyes and nose, memory loss, lethargy, nausea, abdominal pain, and blood in the urine. The Procs noted that their symptoms appeared to worsen when wells were being vented and seemed to lessen when they left the area of their property. The Proc's expert medical witness submitted that their symptoms were attributable to exposure to toluene, mercaptans, and other sulphides, as well as possibly benzene. In his view, this was not a case of overly-sensitive individuals, but rather, it may have been a case of long-term, low-dose exposure to a mixture of many petrochemicals.⁵⁴

⁵²D. Korchinski, *Organizational Meeting of >Survivors of Sour Gas=, October 15, 2000 at Shepard Community Hall, City of Calgary Outskirts* (Calgary, AB: NetNews Inc., 2000) at 10-18. Many other testimonials of perceived health effects from oil and gas operations were presented at this meeting. For more stories, see also: A. Nikiforuk, *supra*, note 47, and Provincial Advisory Committee on Public Safety & Sour Gas Report, *Public Safety & Sour Gas Findings & Recommendations: Final Report* (December 2000), Appendix C.

⁵³AEUB, *Gulf Canada Resources Limited Applications for Well Licences and Pipelines Vulcan Field*, Decision 2001-48 (June 5, 2001). See also: W-A. Thompson, *A Vulcan Family takes on oil giant@*, *Calgary Herald* (April 5, 2001) and A. Nikiforuk, *AFlare Up@*, *National Post Business* (October 2002).

⁵⁴AEUB, *Avalanche Energy Limited Applications for a Holding, Reduced Spacing and Review of Well Licences Keoma/Entice Area*, Decision 2000-49 (July 14, 2000).

§ In early 2001, L. Smith told the EUB that, since moving to an area near a sour gas processing plant, her asthma had worsened and that she had to increase her use of medication and inhalers to control her symptoms.⁵⁵

§ Before the EUB, both A. Dzurny and the Emslie family argued that they were constantly affected by air emissions from oil and gas activities around their properties. According to A. Dzurny, under certain wind conditions, air pollutants caused him lengthy headaches and asthma attacks. The Emslie family was so concerned about their health that when the air smelled bad, or the sky was very grey or an unusual color, the children were not allowed to play outdoors. Such situations occurred on average a couple times a month.⁵⁶

6.0 Summary

This paper has provided some background to assist in understanding why Albertans are becoming increasingly concerned about the impacts of oil and gas operations in the province upon their health.

A number of factors are likely fueling the intensity of these concerns in recent years and the actual and potential effects of these operations on the environment are well-known. The real issue now is whether these environmental effects are causing human health impacts. Without any formal scientific studies or uncontradicted scientific evidence, some doubt will always remain. But so will the numerous stories of Albertans which cannot continue to be ignored forever.

⁵⁵AEUB, *Duke Energy Midstream Services Canada Ltd. Application to Modify an Existing Sour Gas Plant and Amend an Existing Acid Gas Disposal Scheme Pouce Coupe Field*, Decision 2001-43 (May 23, 2001).

⁵⁶AEUB, *Shell Canada Limited Cogeneration Plant and Hydrogen Pipeline Fort Saskatchewan Area*, Addendum to Decision 2000-3- (July 25, 2000).

