



Member Consultation on Climate Change

Report to Council

**A Survey by
APEGGA's
Environment Committee**

February 2008

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Executive Summary

The role of every professional member is to hold the protection of the public as paramount and have regard for the environment. Climate change poses a significant a risk and, as such, it must be considered by professional members in their professional practice.

Recognizing this need, the Environment Committee of the Association of Professional Engineers, Geologists and Geophysicists of Alberta (APEGGA) conducted a survey of members to assess their beliefs and values about climate change. The Committee was pleased with the response to its questionnaire; a total of 1077 online and hard-copy surveys were received from APEGGA members between October 15 and November 12, 2007.

Virtually 100% of the respondents agree that the climate is changing. However, there is disagreement as to the causes – human, natural, or a combination - and few believe that the debate of the scientific causes is settled. Therefore, respondents are actively seeking information about climate change. This interest in education and informed scientific debate is also reflected in what respondents believe is an appropriate role for APEGGA. The preferred roles for APEGGA are to: support scientifically informed debate, provide education to members, and provide technical/policy advice to government. The preferred topics at professional development sessions are: energy efficiency, renewable energy, and climate change science. There also appears to be the need for APEGGA to reinforce professionals' role as corporate technical advisors so that professionals have more influence in corporations planning horizons.

Given these findings, the Environment Committee recommends that APEGGA: provide education, support debate, and provide technical and policy advice. Specifically, it is recommended that APEGGA:

- Continue support for climate change and sustainability articles in *The PEGG*
- Continue sustainability sessions at the April PD Days
- Develop continuing education curriculum for professionals to better understand and incorporate climate change considerations into their professional practices
- Host or partner in an Environmental Summit in 2008 to support debate and address issues of climate change
- Develop and present recommended strategies and a concerted action plan to policy makers

Background and Methodology

The first tenet of APEGGA's *Code of Ethics* is that professionals shall hold the protection of the public as paramount and have regard for the environment. Climate change poses a significant risk to the public and the environment. As such, it affects the manner in which APEGGA's professional members and permit holders practice their professions and conduct business.

In the fourth quarter of 2007, APEGGA's Environment Committee initiated a survey of members' personal and professional views about climate change, their knowledge base, and their opinions about the appropriate roles for APEGGA and government. This report summarizes the results of the survey. Research findings will assist APEGGA council and staff in preparing the strategic and business plan as well as assist staff in the delivery of programs and initiatives.

To obtain the information it required, the Environment committee prepared a survey questionnaire. The committee consulted with Alberta Environment and various environmental non-governmental organizations to finalize the topics and wording of the questions. The survey questionnaire was published in the Association's newspaper, *The PEGG*, and on APEGGA's Web site. It is included in Appendix A of this report.

A total of 1077 surveys were returned. While this is an opinion survey of self-selected respondents, the respondents are comparable to APEGGA membership as a whole. The table below details the demographics (designation, age, and gender) of the survey respondents versus the general membership as of October 2007.

Comparison	% of Survey Respondents	% of General Membership
By Designation*		
P. Eng.	69.9%	64.4%
P. Geol.	10.3%	6.4%
P. Geoph.	3.5%	2.0%
Dual Membership	0.2%	0.3%
RPT	0.4%	0.4%
E.I.T.	14.1%	14.3%
Geol.I.T.	1.3%	1.1%
Geoph.I.T.	0.4%	0.3%
By Age		
20-29 years	19.3%	18.5%
30-39 years	19.2%	19.8%
40-49 years	20.2%	22.1%
50-59 years	21.4%	19.8%
60-69 years	12.8%	9.1%
70 + years	7.1%	6.0%
By Gender		
Male	89.3%	87.5%
Female	10.7%	12.6%

*Note that totals do not add up to 100%, given that other categories of membership are not included such as Examinees, Honorary Members, Provisional Licensees, Restricted Practitioners, Students, and University Students

With a sample of 1077, results are considered accurate to within ± 3.1 percentage points (19 times out of 20) of what they would have been had all members responded. The margin of error for specific member segments is higher due to smaller sample sizes. Given the similarity of the survey respondents to APEGGA's general membership, this suggests that responses may be generalizable to the membership as a whole. Therefore, the survey responses are not weighted.

Personal and Professional Views about Climate Change

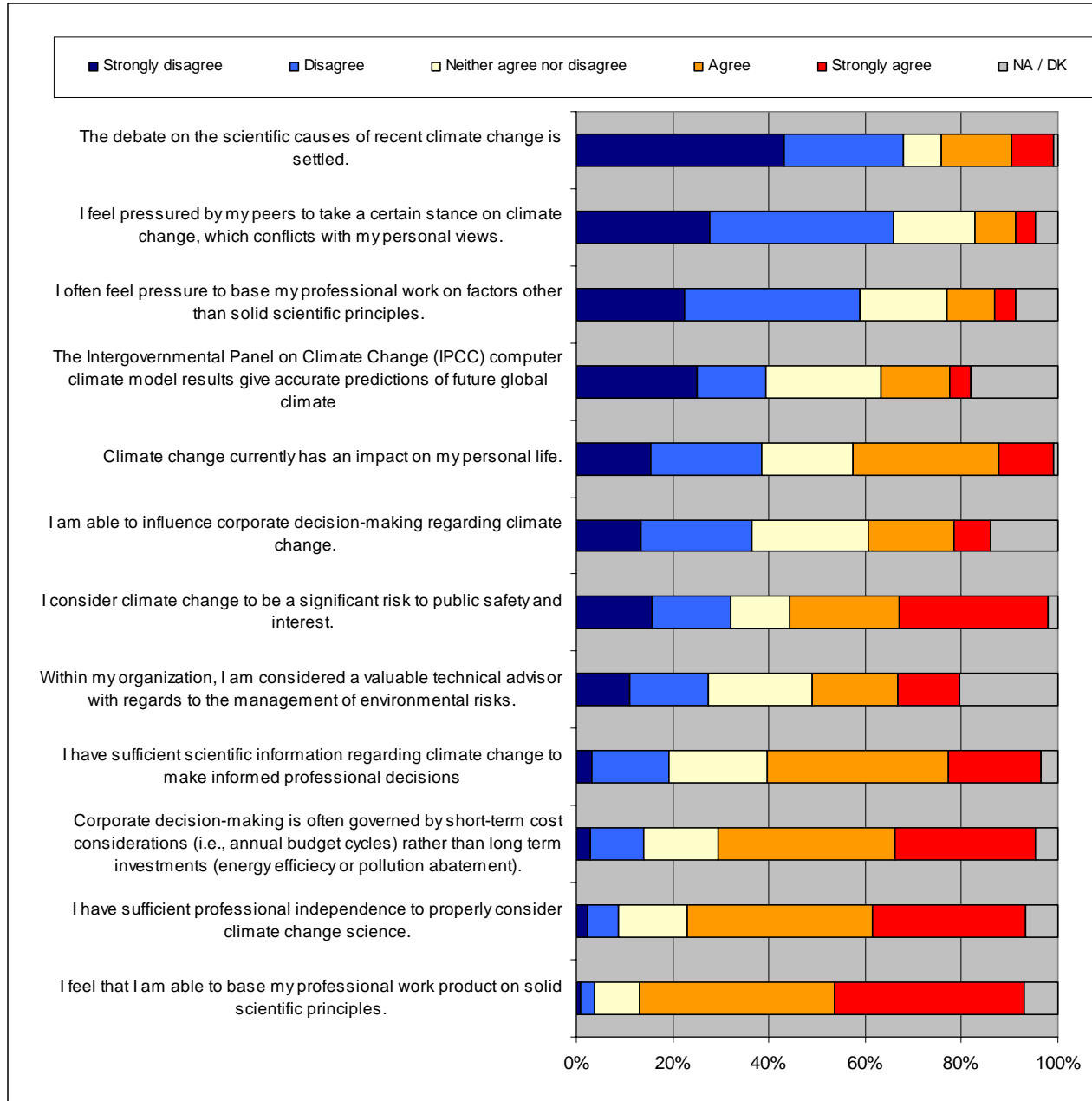
Virtually all respondents (99.4%) agree that the climate is changing. There is also general agreement that the climate is changing both regionally and globally (78.7% agree) and that it may result in both warming and cooling (83.0% agree). There is less agreement as to the magnitude of the change: 65.7% believe that there are changes to both the average and variability of the climate, 20.2% believe that there are changes to the average state, and 14.1% believe that there are changes to the variability. There is also disagreement as to the timescale: 55.3% believe that there are both long and short term effects, 28.8% believe there are long term effects, and 11.6% believe that there are short term effects.

There is even less agreement as to the cause: 27.4% believe it is caused by primarily natural factors (natural variation, volcanoes, sunspots, lithosphere motions, etc.), 25.7% believe it is caused by primarily human factors (burning fossil fuels, changing land use, enhanced water evaporation due to irrigation), and 45.2% believe that climate change is caused by both human and natural factors.

Respondents' beliefs about climate change also vary significantly. The following figure illustrates the extent to which members agree or disagree with the level of uncertainty, the risk posed, and the decision making processes regarding climate change.

The highest disagreement (68% disagree) with statement "the debate on the scientific causes of recent climate change is settled". It is somewhat reassuring that 66% of respondents do not feel pressured by their peers to take a certain stance on climate change and 59% do not feel like that must base their professional work on factors other their solid scientific principles.

However, given that only 24% believe that the debate of the scientific causes is settled, the 'solidity' of scientific principles is under debate. Regardless, respondents are confident in that they base their work on scientific principles (80% agree) and they have sufficient independence to properly consider climate change (70% agree). However, only 31% of respondents agree that they are considered to be valuable technical advisors regarding climate change within their organizations and even fewer (26%) believe they are able to influence corporate decision making. Two thirds of respondents state that corporate decision making is governed by short term cost considerations rather than long term investment.



There was weak but significant variation in respondents' opinions on climate change as a function of age, gender, and designation. Older respondents are less likely to believe that the IPCC computer models are accurate ($r=-0.184$, significant at 0.01 (2-tailed)) and that the climate change debate is settled ($r=-0.061$, significant at 0.05 level (2-tailed)). Women were more likely to believe that climate change poses a significant risk to the public safety and interest ($r=0.087$, significant at 0.01 (2-tailed)). Geologists and geophysicists were slightly more likely to believe that climate change has natural causes. Engineers were slightly more likely to believe that climate change has human causes or a combination of human and natural causes.

Knowledge

Only 23.5% of respondents deal with climate change as part of their professional duties. However, 91% follow climate change as a matter of personal interest and 73.7% follow climate change issues in *The PEGG*.

Members are relying on multiple sources for information about climate change. Following are the percentage of members who rely on each of the following information sources.

Technical and professional publications	71.9%
Popular print media	67.3%
University or college education	55.5%
Popular broadcast media	54.8%
Weblogs and internet resources	49.0%
First hand research	13.9%
Secondary school education	9.9%

Role of Government

While 92.8% of respondents are familiar with the Kyoto Accord, only 40.0% believe that Canada should implement regulations to comply with the Kyoto Accord. Only 37.9% are familiar with the Sydney Declaration. 39.8% of respondents are familiar with the Alberta Government's own climate change action plan, yet that does not restrict them from developing an opinion about it; 68% believe that the Alberta Government's plan is not appropriate.

Respondents support focussing Alberta's financial and human resources to adaptation and mitigation strategies. Maximizing natural resource development received the lowest support. Following are the percentage of respondents who believe that resources should be focussed on various strategies.

Becoming a leader in developing renewable/sustainable energy	68.8%
Becoming a national leader in promoting energy efficiency to the public	67.9%
Becoming a centre of excellence for carbon capture and sequestration	50.6%
Becoming a centre of excellence for clean coal	48.0%
Becoming a national leader in emission regulation	45.7%
Developing nuclear energy capacity	39.4%
Maximizing natural resource development	19.7%

Role of APEGGA

Respondents also believe that there is a role for APEGGA. Following are the percentages of respondents who believe that APEGGA has an appropriate role to play in various initiatives.

Support scientifically informed debate	83.5%
Provide education to members	77.8%
Provide technical / policy advice to government	65.2%
Provide education to the public	63.4%
Promote best practices	63.3%
Develop mitigation / adaptation strategies	35.4%

Following are the percentages of respondents who would like various topics to be presented at APEGGA's professional development days

Energy efficiency	69.9%
Renewable energy	64.7%
Climate science	63.7%
Recycling and waste management	51.1%
Greenhouse gas mitigation	46.0%

Summary of Findings

In summary, while respondents agree that the climate is changing, there is general disagreement as to the causes – human, natural, or a combination. This disagreement is reflected in that only 24% believe that the debate of the scientific causes is settled. As such, respondents are actively seeking information about climate change: 91% follow climate change as a matter of personal interest and 73.7% read *The PEGG* (recognizing that there is likely selection bias in this figure, i.e., those that read *The PEGG* are more likely to have completed the survey and state that they read *The PEGG*).

This interest in education and informed scientific debate is also reflected in what respondents believe is an appropriate role for APEGGA. The preferred roles for APEGGA are to: support scientifically informed debate (83.5%), provide education to members (77.8%), and provide technical/policy advice to government (65.2%). The preferred topics at professional development sessions are: energy efficiency (69.9%), renewable energy (64.7%) and climate change science (63.7%).

It appears that APEGGA may also have a role in supporting debate and providing information at the corporate level. By reinforcing professionals' role as corporate technical advisors, individuals could have more influence in affecting corporations short versus long term planning horizons.

Recommendations

Provide Education to Members and Companies

A priority of the 2008 Business Plan is to monitor the professions' abilities to meet the needs for professional practice. Given this, the Environment Committee has supported a series of climate

change and sustainability articles in The PEGG and sustainability sessions at the April PD Days. These will be continued.

APEGGA continues to support various climate change initiatives undertaken by Engineers Canada. These initiatives include:

- partnering with the Engineering Institute of Canada to organize the Engineering Climate Change Technology Conference in 2006,
- the formation and operation of the *Public Infrastructure Engineering Vulnerability Committee (PIEVC)* to systematically analyze the vulnerability of Canada's infrastructure to the impacts of climate change, and
- chairing the World Federation of Engineering Organizations' Committee on Engineering and the Environment with a focus on climate change and infrastructure.

Additionally, Engineers Canada's Canadian Engineering Accreditation Board (CEAB) has been working with the Canadian Standards Association (CSA) to develop a continuing education curriculum for professionals to better understand and incorporate climate change considerations into their professional practices. Simultaneously, APEGGA's Environment Committee has been approached by the University of Alberta's Faculty of Extension to support course development for their Environmental Resource Management Certificate program. Therefore, it is recommended that APEGGA partner with the University of Alberta to develop a pilot program based upon the CEAB and CSA's climate change curriculum. Given a successful pilot program, this curriculum could be rolled out to other college and university programs.

Support Debate and Provide Technical / Policy Advice to Government

APEGGA's 2008 Business Plan states that we shall provide informed, balanced discussion on professional issues and technical issues affecting society. This is accomplished by identifying important issues where our involvement will contribute to the public's understanding of the issues and to provide positive solutions through regular government relations. Climate change is one such issue.

As such, it is recommended that APEGGA host or partner in an Environmental Summit in 2008 to address issues of climate change. The focus could be on technologies and policies regarding climate science (i.e., Alberta climate change modeling), mitigation strategies (CO₂ capture and sequestration, renewable/ sustainable energy, cleaner non-renewables) and adaptation strategies (water usage, improved energy efficiency). These sessions can be structured so that they result in a report with recommended strategies and a concerted action plan to be directed at policy makers. The Environment Committee is currently exploring options for the format and delivery of such a summit.

Appendix A – Survey Questionnaire

APEGGA ENVIRONMENT COMMITTEE

Member Consultation on Climate Change

APEGGA's Environment Committee is undertaking this survey to determine members' opinions about climate change and an appropriate role for APEGGA. All responses will be kept in the strictest confidence and information received will be used exclusively for the purposes of this survey. Summary results will be reported to the membership in an upcoming *PEGG* article.

Personal and Professional Views

1. There are differing opinions about the certainty of climate change. Please check if you believe the climate is changing or not:

Our climate is not presently changing (*Please elaborate*) _____

Please skip to question 3.

Our climate is changing. *Please proceed to question 2.*

2. There are differing opinions about the definition of climate change. *Please check the box that most closely matches your beliefs about each element of a definition of climate change (extent, magnitude, time scale, effect, and cause):*

Extent:

(*check one*)

- Changes to the climate of a place or *region*.
 Changes to the Earth's *global* climate.
 Changes both *regionally* and *globally*.

Magnitude:

(*check one*)

- Significant difference in the *average state* of the climate.
 Significant difference in the *variability* of the climate.
 Significant difference in *both the average state and variability* of the climate.

Time scale:

(*check one*)

- Changes which occur in the *short term* - in a few years rather than the usual decades and centuries.
 Changes which occur in the *long term* - from decades to millions of years.
 Changes which occur *both* in the *short and long term*.

Effect:

(*check one*)

- Warming* due to greenhouse effect. The effects include sea level rise, potential droughts, habitat loss, and heat stress.
 Possibly both warming and cooling. The effects could include changes to sea level, changes in rainfall patterns, changes in frequency or magnitude of storms, habitat changes, and heat or cooling stress

Cause:

(*check one*)

- Climate change at present is primarily due to *natural factors* (e.g., natural climate variation, volcanoes, sunspots, lithosphere motions, etc.).
 Climate change at present is primarily due to *human factors* (e.g., burning of fossil fuels, changing land use like deforestation, human enhanced water evaporation like irrigation).
 Climate change at present is due to *both natural and human factors*.
 Climate change at present is due to other causes (*please elaborate*) _____
-

3. Following are belief statements about climate change.

Please check the extent to which you agree or disagree with each of the following statements.

	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Not applicable
a) Within my organization, I am considered a valuable technical advisor with regards to the management of environmental risks.	-2	-1	0	1	2	99
b) I have sufficient scientific information regarding climate change to make informed professional decisions.	-2	-1	0	1	2	99
c) I feel that I am able to base my professional work product on solid scientific principles.	-2	-1	0	1	2	99
d) I am able to influence corporate decision making regarding climate change.	-2	-1	0	1	2	99
e) I have sufficient professional independence to properly consider climate change science.	-2	-1	0	1	2	99
f) The debate on the scientific causes of recent climate change is settled.	-2	-1	0	1	2	99
g) I <u>often</u> feel pressure to base my professional work on factors other than solid scientific principles.	-2	-1	0	1	2	99
h) Corporate decision making is often governed by short term cost considerations (i.e., annual budget cycles) rather than long term investments (i.e., energy efficiency or pollution abatement).	-2	-1	0	1	2	99
i) I consider climate change to be a significant risk to public safety and interest.	-2	-1	0	1	2	99
j) The Intergovernmental Panel on Climate Change (IPCC) computer climate model results gives accurate predictions of future global climate.	-2	-1	0	1	2	99
k) I feel pressured by my peers to take a certain stance on climate change, which conflicts with my personal views.	-2	-1	0	1	2	99
l) Climate change presently has an impact on my personal life.	-2	-1	0	1	2	99

Knowledge Base

4. My understanding of climate change issues is based on (*check all that apply*):

- | | |
|---|--|
| <input type="checkbox"/> Popular Print Media | <input type="checkbox"/> University or College Education |
| <input type="checkbox"/> Popular Broadcast Media | <input type="checkbox"/> First-hand research |
| <input type="checkbox"/> Weblogs and Internet Resources | <input type="checkbox"/> Technical and Professional Publications |
| <input type="checkbox"/> Secondary School Education | <input type="checkbox"/> Other (<i>please elaborate</i>) |
-

5. I deal with climate change issues as part of my professional duties:

- Yes No

6. I follow climate science developments as a personal interest:

- Yes No

7. I follow discussions of climate change issues in *The PEGG*:

- Yes No

Role of Government

8. Are you familiar with Canada's obligations under the Sydney Declaration?

- Yes No

(Please comment) _____

9. Are you familiar with Canada's obligations under the Kyoto Protocol?

- Yes No

(Please comment) _____

10. Do you believe that Canada should implement regulations to comply with the Kyoto Protocol?

- Yes No

(Please comment) _____

11. Have you reviewed Alberta's Environment Climate Change Action Plan?

- Yes (Please proceed to Question #12)
- No (Please skip to Question #13)

12. Do you believe that Alberta's Environment Climate Change Action Plan is appropriate and sufficient?

- Yes
 - No
- (Please comment) _____

13. Where should Alberta's financial and human resources be focused so as to have the biggest long term impact on the climate change issue? (check all that apply):

- Becoming a centre of excellence for clean coal
- Becoming a national leader in promoting energy efficiency to the public
- Becoming a centre of excellence for carbon sequestration
- Becoming a leader in developing renewable/sustainable energy
- Becoming a national leader in emission regulation
- Developing nuclear energy capacity
- Maximizing natural resource development
- Other (please elaborate) _____

Role of APEGGA

14. Which of the following do you believe are an appropriate roles for APEGGA with respect to climate change (check all that apply):

- Support scientifically informed debate
- Promote best practices
- Provide education to members
- Provide technical / policy advice to government
- Provide education to the public
- Other (please elaborate) _____
- Develop mitigation / adaptation strategies

15. Which of the following would you like to see presented at APEGGA Professional Development Days (check all that apply):

- Topics on energy efficiency
- Topics on renewable energy
- Topics on greenhouse gas mitigation
- Topics on climate science
- Topics on recycling and waste management
- Other (please elaborate) _____

Demographic Information

16. Your professional designation:

- P.Eng.
- P.Geoph.
- E.I.T.
- Geoph.I.T.
- P.Geol.
- R.P.T. (Eng./Geol./Geoph.)
- Geol.I.T.
- Other (please specify) _____

17. Your organization's industry sector:

- Consulting Service
- Engineering, Procurement & Construction
- Resource Exploitation (Oil & Gas)
- Resource Exploitation (Except Oil & Gas)
- Manufacturing (Durables)
- Manufacturing (Non-Durables)
- Service (Not for Profit)
- Service (For Profit)
- Utility – Rate Controlled
- Advanced Technologies
- Government
- Other (*please specify*) _____

18. Your position within the organization :

- F LEVEL - SENIOR MANAGEMENT or SENIOR SPECIALIST in engineering, geology, or geophysics - Has authority over several interrelated professional group sor highly qualified experts in different fields, each under a MANAGEMENT E.G.G.
- E LEVEL - MANAGEMENT ENGINEER, GEOLOGIST, GEOPHYSICIST or ADVANCED SPECIALIST - Has authority over SUPERVISORY E.G.G.'s or a large group containing
- D LEVEL - SUPERVISORY ENGINEER, GEOLOGIST, GEOPHYSICIST or SPECIALIST - First level of direct and sustained supervision over E.G.G.'s. or First level of full specialization in complex eng., geol. geoph.
- C LEVEL - PROJECT ENGINEER, GEOLOGIST, GEOPHYSICIST - Independently puts out responsible & varied E.G.G. assignments. Work not generally supervised in detail. May give guidance to 1 or 2 other E.G.G.'s but supervision of other E.G.G.'s is not usually a continuing responsibility.
- B LEVEL - ASSISTANT PROJECT ENGINEER, GEOLOGIST, GEOPHYSICIST - E.G.G. assignments of limited scope & complexity. Work supervised in detail. May give guidance to members-in training, technicians, technologists, contractor employees, etc.
- A LEVEL - MEMBER-IN-TRAINING

19. Your age:

- 20-29
- 30-39
- 40-49
- 50-59
- 60-69
- 70+

20. our gender:

- Male
- Female

Optional:

Name/Organization: _____

Address: _____

Phone/Fax: _____

Email: _____

Comments

Attach additional sheets, if necessary. _____

Please mail or fax your completed questionnaire to:

APEGGA Environment Committee, c/o L.M. (Lianne) Lefsrud, P.Eng., Professional Practice, 1500
Scotia One, 10060 Jasper AV, Edmonton AB T5J 4A2, fax 780-426-1877

Appendix B –Environment Committee Members

Dr. N.P. (Nathan) Schmidt, P.Eng. (Chair)
Ms. A. (Andrea) Hiba Brack, P.Eng.
Dr. R.M. (Roderick) Facey, P.Eng.
Ms. J.N. (Jennifer) Hedayat, E.I.T.
Ms. A.H. (Anna) Ho, P.Eng.
Dr. A.N. (Neil) Hutton, P.Geol.
Mr. D.P. (Dennis) Langen, P.Eng., LL.B.
Mr. L.T. (Leon) Mah, P.Eng.
Mr. D.R. (David) Morrow, P.Eng.
Ms. A. (Anjum) Mullick, P.Eng.
Mr. E.J.T. (Emmet) Stiff, E.I.T.
Mr. H.K. (Heinz) Unger, P.Eng.
Mr. P.V. (Prasad) Valupadas, P.Eng.
Mr. R. (Ralph) Walicki, P.Eng.
Dr. J.D. (John) Wolodko, P.Eng.