SCEK Fund

Science & Community
Environmental Knowledge Fund

Forum Proceedings

June 10, 2004

ABSTRACT

Information transfer is a key component to managing our natural resources in a sustainable manner. Part of the mandate of the Science and Community Environmental Knowledge (SCEK) Fund is to provide communications and extension to the public and other stakeholders. The SCEK Forum is a critical part of this effort.

The specific purpose of the SCEK Forum, held on June 10, 2004, was to provide Fund partners and stakeholders with opportunities to see results of recent projects and discuss future directions for research and funding. The event was conceived as a "reporting out" for those interested in environmental impacts of oil and gas activities and as a forum for sharing information.

The one-day event was also structured so that information flowed between presenters and participants on the theme of achievements, trends, challenges and innovations in environmental impact management. It offered a detailed look at current environmental impact management in BC's oil and gas industry. Information generated by the Forum will be considered when priorities are determined for the Fund.

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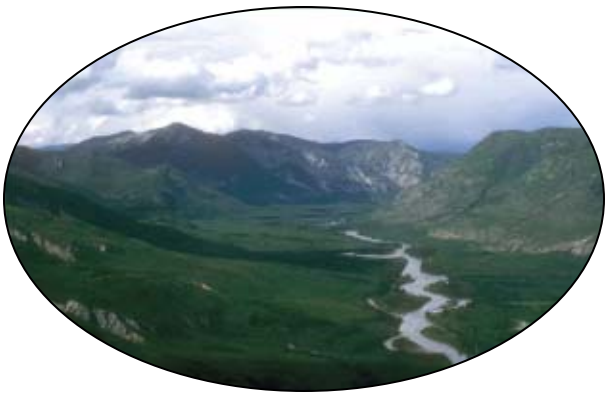


1.0 INTRODUCTION

The Second Annual Science and Community Environmental Knowledge (SCEK) Fund Forum was held in Fort St. John at the Quality Inn Northern Grand on June 10, 2004.

The Forum was sponsored by the Oil and Gas Commission in collaboration with the Canadian Association of Petroleum Producers (CAPP) and the Small Explorers and Producers Association of Canada (SEPAC).

Some 110 people attended the event, including representatives from communities, government ministries, First Nations, industry, consulting firms, and several natural resource associations and boards. Participants were given an opportunity to gain information on recent SCEK-funded projects and provide input into future Fund priorities.

The Fund is comprised of five knowledge envelopes covering the environmental issues relevant to the oil and gas industry, including:

- Ecosystem and Cumulative Impact Management
- Health and Safety
- Education and Extension
- Engineering and Technology
- Community Environmental Knowledge

The Forum comprised an introductory session for all participants and morning and afternoon workshops focusing on SCEK-funded themes (see agenda page 2 and 3). There were three concurrent morning workshops and four concurrent afternoon sessions. In total, some 29 presentations were made throughout the day, including opening and closing remarks. Participants were engaged in the event through questions, comments and discussions that came out of the presentations. Participants and presenters were asked to consider the achievements, trends, challenges and opportunities for each workshop topic. The presentations and ensuing discussions form the content of this proceedings document.

This document is written from notes taken by forum recorders; presenters were not required to supply written submissions. Recorders submitted notes to a proceedings coordinator who then edited these submissions for clarity and consistency and combined with submitted Powerpoint presentations where available. It is hoped that the essence, spirit, and intent of all presentations and workshop discussions have been captured herein.

2.0 SCEK FORUM AGENDA

8:00 - 8:45	Registration and Continental Breakfast - Compliments of the SCEK Fund
8:45 - 9:00	Welcome and Opening Statements - Derek Doyle, Oil and Gas Commissioner
9:00 - 9:15	Conference Overview - Arnica Wills, Cross Country Consultants
9:15 - 9:25	Greetings from CAPP and SEPAC
9:25 - 9:45	Overview of SCEK Fund and Report - Andrea Morison, Manager, Science & Community Environmental Knowledge Fund, Oil and Gas Commission
9:45 - 10:15	COFFEE BREAK - Compliments of the SCEK Fund
10:15 - 12:00	Morning Workshops: Innovations and Opportunities in Environmental Impact Research 1. Wildlife Presenters: • Goat Study - EBA Waberski • Snake-Sahtaneh Boreal Caribou Habitat Use and Ecology Study - Diversified Environmental Services • Wildlife Habitat Connectivity and Conservation of Peace River Lowlands - Chillborne Environmental Panelists: • John Elliot, Section Head, Fish and Wildlife Science and Allocation Section, Ministry of Water, Land and Air Protection 2. Impact and Footprint Minimization Presenters: • Water Use Plan and Low Flow Analysis - Diversified Technical Services • Development of a Practical Framework for Cumulative Effects Assessment and Management for Northeast British Columbia - Axys Environmental Consulting Panelists: • Howard Madill, Manager – Peace, Ministry of Sustainable Resource Management • Dr. John Innes, Professor, University of British Columbia • Harry Offizier, Manager, Exploration and Construction, Oil and Gas Commission 3. Healing the Land Presenters: • Healing the Land, an Elder's Perspective - Monashee Resources • West Moberly First Nations Traditional Knowledge Project - Dahke Community Projects • Reclamation in Right-of-Ways – Ian Stacey, BC Hydro Panelists: • Wayne Sawchuk, Board Member, Muskwa-Kechika Advisory Board • Danny Way, District Manager, Ministry of Forests • Sammy Acko, Elder, Doig River First Nation
12:00 - 1:30	LUNCH Compliments of the SCEK Fund

SCEK Agenda Continued 1:30 - 3:00	Afternoon Workshops: Achievements, Trends and Challenges. How Can Research Help All Move Ahead? 1. Drilling and Construction Panelists: • Mike Waberski, Manager, EBA Waberski • Egan Wuth, Operations Inspector, Oil and Gas Commission • Rick Newlove, Operations Inspector, Oil and Gas Commission 2. Waste & Air Quality Management Panelists: • Del Rheinheimer, Environmental Management Section Head, Ministry of Water, Land and Air Protection 3. Facility Operations Panelists: • Bruce Kosugi, Duke Energy • Edward Stanford, President, Charlie Lake Conservation Society 4. Reclamation and Impact Management Panelists: • Nolan Steinand, Environmental Representative, Pengrowth Corporation • Korry Green, Lands and Environment Supervisor, Monashee Resources Ltd. • Robert Martens, Environmental Advisor, Encana Corporation
3:00 - 3:15	Closing Remarks – Derek Doyle, Oil and Gas Commisioner
3:15 - 3:30	COFFEE BREAK Compliments of the SCEK Fund
3:30 - 5:00	Poster Sessions
5:00 - 7:00	DINNER BREAK
7:00 - 7:30	Open to the Public: Overview of SCEK Fund and Report
7:00 - 8:30	Open to the Public: Poster Sessions (see list on page 42)

3.0 INTRODUCTORY SESSIONS

3.1 Welcome and Opening Statements

Derek Doyle, Oil and Gas Commissioner

Commissioner Doyle opened the Forum with a prayer of thanks to those who helped make the Forum a reality. He acknowledged and gave thanks to:

- The dreamers and visionaries who conceived the idea
- The advisory committee who foresaw the usefulness of the Forum
- Proposal writers and investigators who defined the path to knowledge
- Ministries, organizations and individuals
- Companies that supported and participated in projects
- Funders who worked collaboratively to undertake projects
- First Nations who opened their storehouse of knowledge
- Organizers, facilitators and workshop reporters
- The participants, who help illuminate the road ahead for the Fund

"If we are to prosper in our communities we need the eyes, ears, minds, hearts and hands of many to build the knowledge that we can rely upon in doing our work," said the Commissioner.

He added that last year Forum participants asked that the Fund be broadened to go beyond just research, to share the knowledge and build understanding, and to enlarge the harvest of First Nations' knowledge. This has been achieved, he said. "The work of the Fund is vital to the Commission in striving to be *the* innovative regulatory leader, respected by all."

He concluded by asking participants to give the gift of their ideas, to listen, and to share.

3.2 Conference Overview

Arnica Wills, Conference Coordinator

Arnica Wills, whose company, Cross Country Consultants, coordinated the Forum, introduced and pointed out the location of Joyce Beadry, OGC director; Andrea Morison, Fund manager; Ritchie Morrison, proceedings coordinator; and her green-shirted team members, who were helping with event logistics.

She reminded the participants of the location of workshops and also pointed out the poster displays throughout the conference room. She then introduced the Forum's main sponsors: the Canadian Association of Petroleum Producers (CAPP) and the Small Explorers and Producers Association of Canada (SEPAC).

3.3 Greetings from CAPP and SEPAC

Rob Carss, Canadian Association of Petroleum Producers

Rob Carss of the Canadian Association of Petroleum Producers (CAPP) provided greetings from both CAPP and the Small Explorers and Producers Association of Canada (SEPAC) and presented background information on the Fund to participants. The Fund was established in 1998 for a five-year period with total funding set at $5 million. Funding is based on portions of revenue received from well applicants and oil and gas production levies and is administered by the Oil and Gas Commission.

The original Fund mandate and focus have changed recently to include not only environmental research, but also the integration of science with community environmental knowledge and First Nations' knowledge. The funding agreement, which has now been approved for a nine-year term (to 2008-2009), is currently being revised to incorporate a new governance model.

Rob added thanks to participants and presenters, stressing that the SCEK Fund, "is the right thing to be doing."

3.4 SCEK Fund Overview

Andrea Morison, SCEK Fund Manager

Andrea Morison began her talk by welcoming participants, noting that she had not seen many of the project consultants since the last conference, held in 2003. She provided some background to the Fund and stated that its purpose is to "support studies concerning practical ways of addressing environmental, social and cultural impacts of activities associated with oil and gas exploration and development."

A total of 40 projects have been approved in each of the five funding envelopes since the Fund's inception in 1998. Total allocation of dollars as of June 2004 is $3,228,902.00. Project spending for fiscal 2003/2004 was $1,150,880.00. The fiscal year 2003/2004 saw many achievements in Fund management (fund manager position, workshop and forum, addition of a new funding envelope), application processes, and communications (website and print materials).Looking ahead, a strategic plan will be developed for the Fund that will address such topics as governance, management issues, performance measures and extension. One million dollars is allocated for fiscal year 2004/2005.

In summary, the Fund is evolving to be more proactive, transparent and accountable. It is also seeing change in its governance and management structures and will continue to respond to change over time.

Andrea thanked fellow staff members in the Oil and Gas Commission for their support and called on all participants and presenters to enjoy the workshops and poster presentations throughout the day.

4.0 MORNING WORKSHOPS

After the opening remarks, welcome and background presentations, participants selected from three concurrent workshops running from 10:15 a.m. to 12:00 noon. These three workshops were entitled:

1) Wildlife
2) Impact and Footprint Minimization
3) Healing the Land

Each workshop included presentations and discussion on innovations and opportunities in environmental impact research. Discussion was to be focused on achievements, trends, and challenges within the workshop theme. In addition, participants and presenters were asked to identify opportunities for innovation.

4.1 Wildlife

Mountain Goats and Helicopters: Implications for Heliportable Geophysical Activities

Jeff Matheson, EBA Waberski Darrow Ltd.

Jeff Matheson presented information on this goat habitat study located southeast of Tumbler Ridge on the BC/Alberta border, near the confluences of the Wapiti River and the Belcourt and Mistanusk Creeks. The overall purpose of the study was to evaluate the response of this mountain goat population to aerial activities and to provide management information and guidelines for oil and gas development.

Mr. Matheson gave some background to the project, describing the location and geographical features of the study area. BC's Ministry of Water, Land and Air Protection is concerned about these goats, as they occupy atypical habitat and no guidelines are in place for the animals. The ministry agreed to allow heliportable activities in the area provided a goat inventory be completed and goats monitored when helicopters worked within one kilometre of their location.

Aerial and ground surveys were conducted, and an inventory of goats was established, with a population range estimated at 75-95 animals. The animals were then monitored during heliportable 3D seismic activity, recording behavioural responses to helicopter distance. Responses were noted using a six class scale, from no overt response to high alarm response. The study noted that high alarm did not occur during normal operation but that there were increased levels of alarm and flight at helicopter distances less than 1000 metres.

The study concluded that helicopters can operate close to goats, provided there is operational monitoring and offered some operational guidelines for flying near goats. For canyon-dwelling goats, the study recommended that there be a 1000m buffer no-fly zone from high use goat areas, unless goats are monitored.

Questions and Comments:

Q: Was an analysis of habitat completed?

A: No. There are complications in tracking exposure to helicopters and it was not within the scope of the project.

Q: Was it the noise or visual cues that goats were responding to?

A: Likely sound, but very difficult to tell.

Q: What percent of the sites were inaccessible to the proponent based on the no-flight areas determines?

A: This data was not calculated, but the proponent was able to collect their data with modifications to the project.

Q: It appears that project activities were very tightly controlled. Were there (geographical) areas that were not controlled?

A: No, a one km buffer was observed around all goat habitat. Monitoring occurred within all of these zones.

Snake-Sahtaneh Boreal Caribou Habitat Use and Ecology

Diane Culling, Diversified Environmental Services and
Terry Antoniuk, Salmo Consulting

Both Diane Culling and Terry Antoniuk presented on this wildlife study, which was initiated in 1999/2000 as a joint project of BC Environment and Slocan Forest Products. The study is collecting baseline ecological information on BC Boreal caribou in Northeast BC, east of Fort Nelson.

The project involved radio collaring caribou as well as monitoring of animals from aircraft. As of June 2004, some 65,000 data points have been gathered on caribou movements. In addition to caribou, wolves and black bears were also radio collared. Diane Culling presented maps illustrating movements of both wolves and black bear n the study area.

Terry Antoniuk posed the question: What are the effects of industrial activity on caribou? The project is currently in a data collection phase concerning this question and cumulative impact models now need to be constructed. Predation seems to be the cause of mortality, but we want to know causes that can be attributed to industry, and we need to identify impact management tools.

Diane Culling completed the presentation by offering interim operational guidelines and best practices for oil and gas activities in boreal caribou range. She stressed that this is a first pass on these guidelines.

Questions and Comments:

Q: Have any studies been completed on wolf predation as it increases with increasing seismic line density or road access?

A: Not in this study area. However, a lot of good work has been undertaken in Alberta.

Q: The telemetry shows caribou activity on lease sites and linear disturbances. Where these active or reclaimed sites?

A: These were old disturbances with re-vegetation.

Q: Your results were three adult mortalities in five years from 20 collars?

A: Yes. We observed less than 2% adult mortality.

Wildlife Habitat Connectivity and Conservation of Peace River Lowlands

Brian Churchill, Chillborne Environmental

Mr. Churchill made a presentation on the Peace Connectivity Network, a project not funded by SCEK, but an important initiative that identifies connected corridors through the Peace River region.

He is a member of PHACET, the Peace Habitat and Conservation Endowment Trust, which involves local people working for wildlife habitat. The group fosters public understanding and support for the need to protect wildlife habitat and the link of local conservation efforts to the broader Y2Y (Yellowstone to Yukon) vision.

The group also increases specific information on bird, animal and fish habitat and needs in the area and shows the required links through the connectivity strategy and Y2Y science. He defined connectivity and described the physical attributes of the Peace Connectivity Network and how incremental development can fragment wildlife habitat corridors.

From 2001 to 2003 a Joint Habitat Conservation Trust Fund/PHACET project worked on developing more information on the Peace Connectivity Network. This included key habitat and land tenure identification, habitat linkages, mapping products, the identification of 30 priority sites, and stewardship and management recommendations.

Mr. Churchill described the conservation challenge of the Peace Connectivity Network as two-fold. Firstly, communication is necessary to create an understanding of the critical value of the connectivity network. Secondly, partnerships need to be forged with government, industry and landowners to develop stewardship plans, acquisition projects, information signs and funding.

Questions and Comments:

Q: Has your project considered planning for fire management?

A: We have mapping capabilities, yet the equation is very complex.

Q: Did you use furbearers in the study?

A: We looked at ten factors. Under general habitat, small mammals were included. Small mammals are difficult to handle. Forest cover is commonly used as a proxy for small mammals.

Q: There are hills on the way to Stewart Lake that would appear to be utilized by animals for migration. Is there a migratory corridor through this area?

A: The model flushed out several high-use areas. Access to Stewart Lake can be gained to Stewart Lake from all sides. Much of the area is in good shape, the challenge is to keep it.

Q: Were you concerned with the portion of the study area that is private land compared to the rest of the Y2Y corridor?

A: Yes. The Y2Y Network has identified the Peace Lowlands as a priority, in part, because of the amount of private land in the area

Q: Given the core area depicted in the area, what are the implications of the Site C project?

A: Site C has high potential for impacts – what those impacts will be…?

C: Would like to see a good study by credible individuals on furbearers, and the impacts of oil and gas on them.

Panelist Presentation:

John Elliot, Section Head, Fish and Wildlife Science and Allocation Section, Ministry of Water, Land and Air Protection

With very little time left in the workshop, Mr. Elliot offered some thought-provoking ideas on the entire notion of conservation.

- A more pragmatic approach to conservation is required. An approach that considers: 1) Ecosystems need not necessarily be based on historical views of ecological structure/function at a particular time, and 2) ecosystems must provide ecological, social, and economic services (e.g., CO_2 cycling, erosion control, water cycling, etc.).

- By focusing on Utopian views of ecosystems "before man", rather than on functioning ecosystems incorporating human realities, our efforts often don't meet anyone's expectations. This shortfall results in enviro-marketeers filling the gap in science with mission-driven messages. We need to consider the full range of ecosystem needs while also acknowledging human needs.

- "Designed" ecosystems could range from being very similar to what existed 09:23 a.m. May 17 1963 (or whatever point in time is selected as the desired) to ones created from scratch, if required, to achieve a combination of ecological, social, and/or economic goals. Thus ecosystems of the future should not necessarily be based on historical views of ecological structure and function but instead may be designed to mitigate unfavourable conditions with a blend of technological innovation coupled with novel mixtures of species that favour specific ecosystem functions. Ecological solutions need to focus not on conservation and restoration but rather on the need for vital ecological services which may require purposeful intervention.

- By way of example, Mr. Elliot described three conservation efforts: the tar sands at Fort McMurray, efforts concerning Boreal caribou, and the Moberly area. The Moberly is an area of intense oil and gas development but other land uses include logging, farming, recreation,

and First Nations traditional activities. The environmental focus of the oil and gas industry is on mitigation and historical ecosystems. Well, it's not Kansas and it isn't going to look like it did before Alexander Mackenzie arrived. Perhaps this should be accepted and a new target established that includes what local communities want as well as industrial and recreation needs. All, of course, subservient to basic ecosystem functioning. We might for example find on the wildlife front that we want a diversity of vertebrates and specifically 10,000 moose and 5,000 marten. Appreciate this is a hypothetical example but highlights that there may be some real wildlife needs over and above a fuzzy target like biodiversity.

- In conclusion, shifting from a focus primarily on historical, undisturbed ecosystems to a perspective that acknowledges humans as components of ecosystems, together with new research on ecosystem services and ecological design, will lay the groundwork for sustaining the quality and diversity of life on Earth.

4.2 Impact and Footprint Minimization

Low Flow Analysis and Water Use Plan

Barry Ortman,, Diversified Technical Services

Barry Ortman's presentation described his company's SCEK-funded project, which is aimed at mitigating the impacts of water use on the aquatic resources by developing a water plan for oil and gas exploration. The basic concept of the project is to identify where water supply problems exist, map the base flow conditions, locate suitable storage sites and review with the stakeholders for input. Water will be diverted and stored during the spring runoff and used when the stream flow has dropped.

Mr. Ortman noted potential problems and impacts associated with such a project. These include: monitoring of withdrawals, minimal water flow data, lack of infrastructure, beaver/fish habitat impacts, downstream water users and regulatory and administrative problems.

He went on to describe the phases of the project, including phase 1 (low flow analysis) and phase 2 (water use plan in the Upper Beaton River system) and also described the Healing the Land Pilot Project. His recommendations and conclusions from the project include:

- Completing the hydrology and water demand mapping.
- Implementing the Beatton Water Use Plan and the Healing the Land pilot project.
- Requiring oil companies to obtain a water licence and use the base map as source of supply.
- Assessing lakes and identifying acceptable sources.

In conclusion, he acknowledged the Oil and Gas Commission, the SCEK Fund and Commissioner Derek Doyle for their interest and enthusiasm.

Panelist Presentation: Cumulative Impacts

Howard Madill, Ministry of Sustainable Resource Management.

Howard Madill of the Ministry of Sustainable Resource Management started the workshop with a slide featuring the following sentence:

Much of the wealth in Northeast BC is generated through access to public resources on public lands.

He then presented a list of what constitutes cumulative impact. This includes:

- Social, economic, environmental
- Coordinating tenured activities
- First Nations
- Effect of oil and gas activities on the annual allowable cut
- Roads increase access
- Aquatic system impacts
- Vegetation removal
- Wildlife habitat
- Visual landscapes

Land-use planning—through Land and Resource Management Plans and through the provision of management areas like the Muskwa – Kechika, for instance—represents a major achievement in cumulative impact management. He cited other initiatives, such as the Oil and Gas Commission's Practices and Guidelines, as achievements in cumulative impact management.

Trends into the future include an increased awareness of cumulative impact by the general public and increased oil and gas activities.

Challenges for the oil and gas industry include:
- Results-based management
- Industry stewardship
- Integrated land management
- Maintaining a social license
- Cost effective techniques
- Availability of resources

Panelist Presentation: Cumulative Impacts Assessment of Development on the Forests and First Nations of Northeast BC

Dr. John Innes, Professor, Faculty of Forestry, University of British Columbia

Dr. Innes described this research project, which is funded through the Ministry of Sustainable Resource Management and the National Center of Excellence. The project's field areas and science committee are guided by First Nations. It looks at the cumulative effects of forestry, oil and gas, agriculture, tourism, and recreation on the landbase. He is working to fill the gaps in existing research.

A "black box" approach was used to address the complex and difficult topic, as it is not necessary for users to understand everything. Common priorities and concerns have been gained primarily from the Blueberry River First Nation and other groups in the Treaty 8 First Nations. Fecal coliform loads in the water and other pollutants were measured. Spatially specific modeling measured dispersion of pollutants over the landscape. The project is planned to exceed two years and is dependent on funding.

Issues identified in the project include:
- lack of reliable data
- lack of base level data
- lack of good information on oil and gas
- expense involved in acquiring digital terrain maps
- lack of coordination with research and information management
- oil and gas development and water issues are not dealt with together

Other difficulties facing researchers include:
- suspicions that research outcomes will create restrictions for different sectors
- maintaining research quality in sampling and statistics
- differing values between stakeholders
- differing road radio frequencies between oil and gas and forestry

Simple and easy solutions:

- The oil and gas industry should follow forestry procedures.
- Sumps need to be fenced so that animals can't drink from them.
- Workers need to be educated, in some cases, to have respect for wildlife and to have an appreciation of environmental issues.
- Research projects must use regression analysis when analyzing data.

Panelist Presentation: Geophysical Line Construction

Harry Offizier, Manager, Exploration and Construction, OGC

Harry Offizier started off his presentation by posing a question: "Are We Really Minimizing Impact by Seismic Exploration?" He ran through a series of images of seismic line clearance showing good and bad seismic line construction.

Adverse impacts can be created by trying to minimize impacts of seismic line construction. Low-impact seismic line construction comes with some adverse effects, including increased risk to workers and impacts to adjacent forest stands.

Proper windrow construction on seismic lines is essential to reducing negative impacts to adjacent forests and wildlife movement corridors. Working in dense forest stands requires operational flexibility, proper slashing and appropriate field management. Fuel management practices are coming to the forefront as activities from 2D seismic to 3D seismic. Winter is the season for the majority of seismic activities, so snow load is another important factor. Activities in dense forest stands require flexibility for operator field changes and education for regulators.

New technologies, such as mulchers and Lidar, are helping to reduce footprint and impacts on land. The situation is much better than it was 10 years ago.

What is needed is a proactive industry. Stakeholders and regulators need to be educated on the adverse impacts that arise from attempting to minimize the environmental footprint.

Room Discussion: Impact and Footprint Minimization

Concerned local resident:

- The oil and gas industry impacts our communities and neighbourhoods in terms of quality of life, safety, and long-term health effects.
- Seismic shot holes are being detonated too close to communities
- Well water changes flavour after seismic explosives are detonated. This is scary for residents.
- Action items include: water quality studies, more education and communications, centralized database and better dialogue with industry.
- Oil and gas workers need to have more empathy for residents and slow their vehicles down in our neighbourhoods. The Canadian Association of Geophysical Contractors (CAGC) should also be involved in studies of the seismic effects on residential well water. More data sharing between companies is needed to reduce the frequency of times seismic is done in residential areas. Also need long-term studies of the health impacts of H_2S

District Council of Chetwynd:

- Industry trucks running engines all day and night causing noise and air pollution.

- Need noise abatement bylaws and drivers need to be educated.

Participant:
- Need more air quality monitoring and baseline information on emissions.
- Air quality monitoring is needed on all sites, not just sour sites.
- Worker safety is an issue.
- Need to more fully understand the impacts of H2S on people.

BC Trapper's Association:
- Government and industry disregarding tenured stakeholders.
- When traplines are lost, there is a negative impact on local families.
- Meetings with government and industry have not been effective.
- A change in political will is required to solve problems.
- Cumulative effects are higher than anticipated.

Ducks Unlimited:
- Proliferation of 3D seismic exploration is not addressed in cumulative impact studies and impacts are unknown. Need more research on the effects of 3D seismic programs on birds such as the northern goshawk and warblers.
- The problem is a lack of research and literature.
- May be an opportunity to utilize graduate students in this area. More communication with the universities would help.
- Effect on bird species needs to be part of the cumulative impact assessment.

Concerned citizen:
- More basic ecological information and increased research funding is needed.
- Create a plan and prioritize the issues.

Trapper:
- Oil and gas industry is creating unsafe conditions on our roads and in our neighbourhoods.
- Education of workers around speed limits and safety is important and needs to be enforced by the companies
- Out-of-town workers are not familiar with the residential areas they are working in.

Oil and Gas Consultant:
- Many companies are responsible concerning safety.
- Recommend having better safety programs.

BC Ministry of Agriculture, Food and Fisheries:
- Good plans are in place, but information needs to filter through to equipment operators.

Additional comments:
- Information issues could be solved with better communication between oil and gas companies and stakeholders, data sharing between companies, and a repository of data.
- The OGC needs to have more information before making decisions on the landbase.
- Cumulative impacts need to be researched and environmental baseline data collection is required.
- Funding needs to be made available for research and communication.

4.3 Healing the Land

Healing the Land: An Elder's Pespective

Sam Bell and Korey Green, Monashee Resources

The project involves three components:
1. Prosperity Through Unity reclamation trial plots/treatments
2. Healing the Land – An Elders Perspective
3. Pre-site / Post-site Assessment Process

The reclamation project comprises various treatment types and planting strategies in fixed-size plots. Ultimately, additional plant species and techniques will be implemented from site visits from First Nations' elders (component 2 of the study). Monashee Resources and the aboriginal groups in the Peace region have been and will continue to complete site visits of the reclamation trial plots and other reclaimed well-sites in their traditional areas.

The objective of these visits is to collect information that will allow consideration of the incorporation of traditional knowledge, traditional activities, and/or create sites that are usable to the community. This can be achieved with little or no impact on current processes.

By completing pre- and post-site assessments, strategies can be implemented to restore a site's productivity, ecological factors and consequently the vegetation that was originally on the site.

The presentation included several photographs illustrating site treatment techniques.

Applying First Nations' Traditional Knowledge to Reclamation in the Oil and Gas Industry

Dahke Community Projects

The presentation outlined how traditional ecological knowledge can be incorporated into operational planning and reclamation. First Nations traditional knowledge is characterized as "the unique experiences, skills and understanding of the environment, accumulated by First Nations over generations." This includes knowledge of plants, animals, cultural sites, change indicators and inter-relationships and dependencies.

This knowledge can be applied to pre–site assessments, reclamation planning and best practices, and reclamation.

The project deliverables include:
1. Traditional Knowledge Reclamation Agreement template (First Nations – Industry – Regulator)
2. Traditional Knowledge Database and Compendium
3. Special Areas GIS mapping
4. First Nations – Industry Community Engagement template
5. Identification of economic opportunities
6. Proposal development

The presentation described each deliverable and concluded with a list of benefits of applying traditional knowledge to reclamation. As a "best practice," applying traditional knowledge can:

- Increase understanding and build stronger relationships, addressing core concerns and priorities of First Nations, as participants in resource development
- Improve development and reclamation planning by companies and First Nations, expanding available information
- Reduce conflict and potential environmental impacts
- Support the regulatory approval process
- Create economic and employment opportunities

Reclamation in Right-of-Ways

Ian Stacey, BC Hydro

Ian Stacey provided practical examples of utilizing First Nations local knowledge of vegetation to improve wildlife forage and habitat. He once noticed a grizzly chasing a moose and thought about providing alternative food sources in the right-of-way for wildlife use. An additional right-of-way management technique might be leaving course woody debris for mice.

As part of his vegetation management work with BC Hydro, he has looked at the vegetation needs of wildlife during all four seasons and planted vegetation types suitable for wildlife.

Panelist Presentation:

Sammy Acko, Elder, Doig River First Nation

Sammy Acko talked about the changes to the wildlife and traditional use he has seen over the years. For example, he has noticed fewer rabbits now than in the past. He also noted that moose are being tainted by the oil and gas industry and that aboriginal people will not eat the animal's meat.

He also feels that herbicide spraying is adversely affecting the wildlife, water, and vegetation (berries and other important traditional plants) in the region.

Mr. Acko then spoke about things that can be done to minimize these kinds of impacts, such as fenced sumps to keep wildlife from drinking contaminated water.

Panelist Presentation:

Wayne Sawchuk, Board Member, Muskwa-Kechika Advisory Board

Wayne Sawchuk made a presentation on recent oil and gas wells in the Upper Sikanni portion of the Muskwa-Kechika Management Area. The wells include the Murphy-Chicken temporary wellsite, the Marathon-Sikanni wellsite, and the CNRL Sikanni well site. He provided examples of good and poor practices associated with these wells.

He concluded that the Murphy-Chicken site was successful with limited long-term impacts, but that the other two sites used damaging cut and fill technology. Therefore, neither best available practices nor adaptive management techniques were properly utilized on these projects.

Room Discussion: Healing the Land

1. Issues and Challenges

- How does one effectively integrate traditional knowledge into land use and resource management planning?
- Traditional knowledge needs to be recorded now: there are fewer and fewer opportunities to acquire this knowledge as time goes on.
- For example, caribou species are said to be at risk but we are missing quality information on caribou populations and their traditional use patterns. Best practices have not been used.
- Some environmental knowledge is most effectively obtained from traditional ecological knowledge. For example historical habitat use and populations.
- How do we incorporate environmental knowledge into the short oil and gas time frame?
- Oil and gas activities have a short operational window and companies need to get their permits in place quickly.

2. Achievements and Trends

- There is a general trend of improvement when compared to early oil and gas development.
- Pre-development at well sites is becoming more common practice. Site assessments are helping in site reclamation.
- Improved technologies are being developed and deployed. For instance: mulchers, mats, rocks for stabilization, re-vegetation/silting.
- Improved construction techniques make reclamation efforts easier after development.
- Stakeholders are being consulted more and awareness of traditional ecological knowledge is improving.
- Well sites are being located with improved technology.
- Industry is more safety conscious and is using advanced environmental planning techniques. Construction techniques have also improved over time.

3. Opportunities/Ideas for Research:

- We need to identify areas of critical community interest for Treaty 8 communities.
- Review existing oil and gas developments (for example: wells) in the Muskwa-Kechika Management Area to learn best practices.
- We need to look at the importance of moose (and other wildlife populations that are culturally important) to Treaty 8.
- We need to develop a more holistic and integrated approach to reclamation that combines western science with traditional knowledge and includes all phases of development (cradle to cradle concept).
- Traditional ecological knowledge can be used to investigate the historical use, habitats and populations of Boreal caribou.

5.0 AFTERNOON WORKSHOPS

After lunch in the main conference room, and an informal presentation by Richard Neufeld, Minister of Energy and Mines, participants selected from four concurrent workshops running from 1:30 p.m. to 3:00 p.m. These four workshops were:

1) Drilling and Construction
2) Waste and Air Quality Management
3) Facility Operations
4) Reclamation and Impact Management

Like the morning workshops, each included presentations and discussion on innovations and opportunities in environmental impact research. Discussion was to be focused on achievements, trends, and challenges within the workshop theme. In addition, participants and presenters were asked to identify opportunities for innovation.

5.1 Drilling and Construction

Oil and Gas Field Development

Mike Waberski, Waberski Darrow

Using the analogy of a quarter section of land being divided up between four companies, Mike Waberski illustrated the concept of land-use planning. In scenario one each company developed each section to develop their own needs. In scenario two, consensus was used to designate the location of roads, schools and neighbourhoods. The second scenario would be much more desirable to live in. Both would be subject to the same enforcement and follow the same standards. The difference between the two scenarios would be that the second one used planning.

Where do we focus our resources in oil and gas to ensure we get the second scenario? We have to manage our activities so that we get to where we want. Integrated resource access management has been talked about for year and years.

Some definitions:

- *Access* is defined as a way in and a way out which is needed for a purpose such as a pipeline.
- *Resource* is defined as some sort of revenue stream.
- *Integrated* can be forestry, oil and gas, mining, hunters, trappers, fisherman, First Nations, and the public.

How do we get large groups of people to work towards an integrated plan? Management has to have the will, money, and the interest in such an effort. The plan should reflect the best compromise for everyone.

All industries now have an emphasis on environmental planning and issues. There could be capital costs for latecomers that would help recover the costs.

Forestry currently uses the Genus GIS system. If we had access to Genus we would have the total consumption of oil and gas in a forestry land base.

Access: Construction and Standards

Egan Wuth, Operations Inspector, OGC

Egan Wuth, using several images of poor road construction to illustrate his presentation, discussed construction standards on access roads in the oil and gas industry.

What is access? The term means different things to different people. To most in the oil industry it is nothing more than how to get to a lease or a location, and in most cases that is where all similarities end. When it comes to construction, every company, every consultant and every contractor has their own idea about what is necessary for access. The emphasis is on what needs to be done to "get in" or "get out" to meet the short-term objectives.

There is (generally) no thought given to the long range plans or general access development. Access roads are built on an as needed, adhoc basis, to satisfy the current requirement, not taking into consideration the needs of tomorrow, next week, next year or future years. This results in a network of functional access trails that evolves into a poorly designed and constructed field road system. It results in a road system which doesn't meet the operating needs of users. Such road systems usually require extensive upgrading and ongoing structural maintenance in order to establish some degree of safety, and meet cycle time expectations with higher traffic volumes.

The continued use of access trails when conditions are inappropriate quite often leads to environmental damage to the land, the soils and the watercourses. Examples of this include using winter access under non-frozen ground conditions, or dry summer access trails when there is excessive soil moisture.

Even when road grades are constructed for drilling, it does not appear that enough consideration is given to future needs, or to the needs of the operator or the tanker that will be visiting the site on a daily or weekly basis. Our industry needs usable access under a variety of unfavourable ground and weather conditions. However, the oil and gas industry has been lagging behind other resource industries—forestry in particular—both in construction practices and in construction standards.

The forest industry has been under intense scrutiny by special interest groups, not only for their harvesting practices but for their road construction practices as well. With the downturn in the forest economy throughout the province, the oil and gas industry may be a possible target for the attention of these groups. In order to defend industry practices, the oil and gas industry needs to develop or adopt and employ a set of standards and practices around access construction, maintenance, and deactivation.

Problems, Technologies, Looking to the Future

Rick Newlove, Operations Inspector, OGC

Rick Newlove showed several images of sumps and containment and discussed problems encountered in oil and gas drilling and construction.

Problems encountered:

- Water issues around withdrawal sites
    - Do the lakes and streams have the capacity of water to deal with drilling?

- Hard to get a handle on the amount of applications for water withdrawal from the same site.

- Water issues and a lack of fisheries inventories
  - The OGC is in the difficult situation of trying to do fisheries inventories during the oil and gas operating season. Planning is a big part of that. Mr. Newlove showed a picture of an unclassified (no approvals required) stream being used for water. There is probably fish in this stream and the suction screen is too big to prevent fish from going through.

- Drilling mud
  - Mr. Newlove showed images of good and bad sumps and discussed drilling mud and containment.

- Environmental concerns
  - Season and weather can cause environmental problems with drilling and construction.

Mr. Newlove concluded his presentation by pointing out that some rigs are using a containment catch and re-using the water for washing. This drops the water consumption on the site by 60 percent.

Room Discussion: Drilling and Construction

1. Challenges and issues

- Mimic natural disturbance types.
- Irregular shaped leases for WCB requirements (worker safety versus environmental impact).
- Trailer shacks reduced from 50 meters to 25 meters allowing them some flexibility. 120 x 120 lease is required more at completion stage.
- Shift mindset of industry to more multi-pad leases or multi legs within the same well bore. As technology improves things like this will change.
- Planning of well sites needs to include reclamation for the lifetime of the well. If the well is sold while in planning stages then the new owner should have to take on that plan.
- Preplanning of the well for the lifetime.
- There has to be more thought with reclamation. Need more planning of roads.
- Existing development should be given consideration. Development roads should be placed given consideration to environment, etc.
- Tried to identify potential corridors and there was extreme anxiety around the table. They felt that if they did that they were giving permission for oil and gas to go there.
- Conflicts concerning road location and construction. If not addressed the environmental cost is going to keep going up and up. Put something down on a piece of paper and then let everyone review it if they have a problem.
- Where the contractor is saying this access makes for more sense to minimize impact and we have to fight. Can ask for a review of that decision. The senior manager can review it. Forestry says you just use an existing access.
- Are there standards and approvals for reclamation projects? After a well has been abandoned and reclaimed they have two years before they can apply for COR and it is inspected. If we have a good photograph then we may grant it on the photograph. They pay for the tenure on the land until a COR is granted.

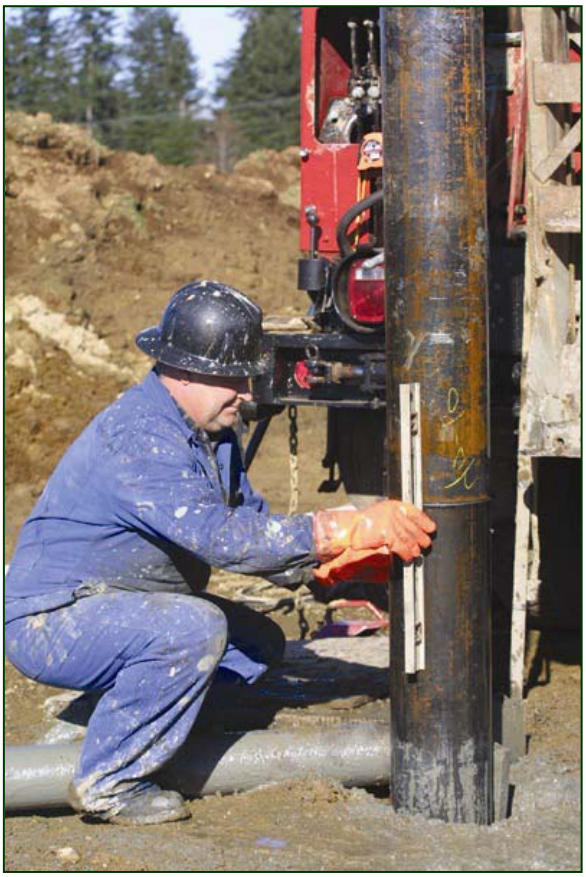
- Why is a well site seeded if it was forest before? The reason is it prevents erosion and is a form of weed control. Natural regeneration is allowed to take place. The only time they must plant trees is if it is a cut block. In one case a company had planted alders at a site and over time most of these died but natural regeneration was doing fine.
- Better off to have something there to hold the soil down and then let nature take over.
- Reclamation pilot projects are ongoing.

2. Achievements and Trends

- Sewage is better taken care of.

3. Opportunities

- Is there any kind of way to develop an incentive rather than penalize for trying to be more proactive? Practices coming forward for looking at the lifetime of the well. Remote sumps make a smaller lease but use the same amount of area in a different spot.
- Companies are not being rewarded for what they do right.
- What is the definition of existing access? Is it in the last 50 years, the last 10 years?
- We need to incorporate a tracking system for access roads. Make it a required legal regulation to do this. We don't have the capability to put in a database.
- Integrated access, integrated usage.
- Better plan to access system for new areas.



5.2 Waste and Air Quality Management

Waste Management and Air Quality Issues of Interest to the Ministry of Water, Land and Air Protection

Panelist: Del Reinheimer, Environmental Protection Section Head, Ministry of Water, Land and Air Protection

Del Reinheimer's presentation focused on three issues: cumulative impact, water quality and closed drilling sumps.

Cumulative Impact:

- Many small emission sources are not tracked very well.
- OGC regulations address facilities that fit a specific criteria, but others are not necessarily covered or managed.
- There is an assumption that small operations do not have not much impact, however the cumulative impacts are potentially great.
- Could look at areas with high concentration of smaller sources, topography, environmental sensitivity (streams, nearby residents, etc.).
- Prioritize areas with respect to concentration of facilities.
- Need an inventory of all sources of emissions. This requires air quality monitoring but there are financial limitations (a portable air quality monitor costs about $75K).
- Putting a management plan into place would be a good step.
- Management strategy should look at largest sources with the most impact and also at individual sources.
- Should have monitoring of facilities post-aproval to get feedback on if these regulations are legitimate.

Water Quality:

- Stakeholders: identification of issues, baseline monitoring.
- Not just oil and gas industry, all industries affect water quality (e.g. agriculture, forestry). Therefore, it makes more sense to look at all industries rather than just one industry.
- Currently baseline water quality monitoring exists in some areas; perhaps this could be expanded to other areas as well. For example, coal bed gas activities. This process generates a lot of water. The output should be tracked and monitored.
- More information is required around shallow aquifers.

Closed Drilling Sumps

- Closed drilling sumps are covered by AEUB G50 regulation. However, little monitoring takes place after sumps are closed.
- Did G50 meet the environmental endpoints in place at the time?
- Does it meet today's contaminated sites regulations?
- AEUB is reviewing G50 – perhaps a percentage of closed sumps will be sampled to see if they meet the endpoints (post closure sampling).

Questions and Comments on Waste and Air Quality

Expanded Comments on G50:

- Current G50 regulations were designed for the basic gel chem system, requires testing of closed sumps for chloride and pH only.
- G50 based on the toxicity data for individually tested drilling mud additives, but there aren't any cumulative studies for all mud additives.
- Mixed bury cover: very lax sampling, no metals analysis, but mud companies always using new additives which may not be tested for.
- Barite (barium sulphite): Alberta is bringing in new regulations for barite separately from barium (immobile form).

Q: Is BC doing anything to review barite standards?

A: Yes, currently under review.

Q: Does any government agency monitor cumulative impacts of all industries in a specific area (separate facilities – e.g. pulp mills, oil and gas facilities – are regulated by different government agencies)

A: WLAP has initial and final look at the environmental impacts of a proposed facility. The OGC has the middle part (approvals, logistics) and data is shared with WLAP along the entire process via copying of documents.

C: WLAP still does technical review of dispersion modeling on sour well test flaring
Well test flaring covered under WLAP regulations, but also OGC drilling & production regulations. It remains to be seen if it will be under new waste regulations (still under review). Recommendations have been made to incorporate well test flaring into another authorization.

Q : Are dehydrators tested for emissions?

A: Operator sends in report (with H_2S, etc. projections) in the application process, but again, these are just based on calculations.

Comments:

- Regulations should be looking at critical loads over the long term.
- Vegetation experiences a chronic accumulation of pollutant in tissues.
- Current regulations: 2t/day sulphur emissions limit. Annually, this represents 35t/ha.
- This leads to acidification, assuming the sulphur is not being dispersed.
- There is a need to set long term goals/thresholds

Reply:

- Regulations need to take these into account; need to be redesigned.
- But there are financial limitations to doing the studies needed to establish these new regulations.
- Can BC learn from Alberta regulations?

C: Regulations are stricter in Alberta

Q: Does WLAP get increased funding for geographical 'hotspots' (e.g. oil and gas industry mostly in Northeast BC). Also, we should not rely on Alberta models/studies as BC's topography is different from theirs. Clusters of facilities— whether continuous emissions, or intermittent but intense emissions—need to be investigated.

A: The question of funding would better be posed to the WLAP environmental section head.

C: Need to address current monitoring system. Is it adequate? Or even set in the right places? Need a well-designed planning study to cover the right areas.

Q: Are there studies available on the effects of prolonged long term exposure to H_2S?

A: Not aware of studies. Is the science available to do these studies yet?

C: Rutgers University is doing studies of H_2S exposure on humans. This information is available at www.ptac.org

C: The animal health study by Western Interprovincial Scientific Studies Association (WISSA) in Alberta is another valuable study.

C: Very little human health studies, mostly cattle.

C: Hart study on human health: some pollutants covered in study, maybe not H_2S

C: Small but annoying issue is the transport of sour liquids (odour nuisance).

C: When loading fluids, operators are seen to leave hoses out, spilling on roads.

C: It is the responsibility of industry to monitor own practices and practice stewardship. It is impossible to regulate. Pressurized tanks would solve problem, but this is very expensive.

Expanded Comments DR: invert drill sump study

- Some drill fluids use hydrocarbons.
- Contaminated drill cuttings: current practice is to haul off for disposal and remediate with bacteria.
- But 10 years ago, drill fluids (~20% oil) were just put in sump and buried. There is a concern with contaminating ground water.
- "Skeleton in closet" for drilling industry.
- Could have study to identify old buried sumps, look at them case by case to prioritize for remediation (e.g. sump is in clay, so little chance of migration of pollutants; sump beside drinking well, should be looked at soon, etc.)

C: Animals dig up old sumps (from the mid 80s, early 90s), looking for salt.

Q: Some 4700 sites have been certified by the OGC as restored. Will this study go over these old sites with Certificates of Restoration (COR)?

A: These should also be looked at; the sooner they're dealt with, the better. (A COR does not relieve the company of liability).

C: But sites are often bought and sold many times and paperwork goes missing from company files.

C: OGC relies on consultants' reports to bring up these issues. The OGC is only five years old.

C: Only in last few years has the COR application required a site profile, but there was no monitoring before then. We should be able to catch more of these sumps now.

C: It was the practice of the day to simply dispose of drill fluids by burial but not practice today, these should be addressed.

Air Quality Discussion

C: Focus used to be on H_2S concentrations and their impacts on human/wildlife, now also looking at vegetation impacts. But the guidelines currently in use may be outdated

C: Modeling methodology is always evolving, incorporating new empirical evidence from other fields (e.g. topography, meteorology). However, meteorology data is lacking; ranges greater than 20 km would be nice. (More weather network stations.)

C: Emissions inventory - national pollution release inventory will be available by next year, but only for very large gas plants.

C: Case of acquaintance visiting a facility site, and the operators not showing their H_2S monitors to them.

C: Should have mandatory air monitoring, including analysis of chemical/physical makeup of pollution – if we don't even know this basic info, how can we know what to measure and regulate for.

C: Cumulative impacts of emissions sources: regulations in place to monitor only specific facilities. Database of existing facilities just doesn't exist. Would like to have GIS of all facilities with pertinent emissions data for each site.

Q: What is the use of having air quality regulations if we have no idea where and when they are being exceeded?

A: H_2S leaks usually are complained about, but usually only in occupied areas, not likely in middle of forest.

C: SO_2 leads to vegetation impact (acidification, etc), H_2S affects humans and wildlife. It's preferred to burn H_2S to produce SO_2, leading to greater vegetation impacts.

C: Passive monitoring is an inexpensive option to enable monitoring of smaller sources.

Q: Can we learn from regulations in Alberta, across Canada, globally? Can we feasibly implement these in BC? (PTAC is doing studies to determine this.)

A: There isn't a huge difference between Alberta and BC guidelines.

Q: But what about enforcement? Compliance numbers going down for BC (e.g. in 1996, there were 350 facilities/sites inspected over the year, now there are 170 inspected annually)

A: Don't know about enforcement, but it is just as important.

C: An alternative to enforcement is the use of incentives to self-control emissions.

C: Environmental Management Act is coming out in about a month to replace the Waste Management Act, including incentives to control emissions. Will see what affect these changes have a few years down the road.

C: Technology to monitor is expensive.

C: But court cases are expensive too.

C: Need to set long-term air quality thresholds, rather than current short term (chronic rather than acute limits). Annual thresholds are given in hourly rates; deposition rates are key.

Achievements, Trends, Challenges and Opportunities: Waste and Air Quality

1. Well Test Flaring

Achievements

- European regulations ban flaring after initial drilling operations
- European trend is going to incineration rather than flaring
- Inline flaring is an option if a pipeline is nearby, but not economical in remote areas (not practical to construct pipeline for one-off flaring, especially if it's not known whether the area will be further developed)

Trends

- Incineration
- Reinjection: will get rid of sour and CO_2 by-products (2 birds, 1 stone), but there is a question of availability of injection wells.
- Federal and provincial governments investing lots of dollars in studies to investigate the above methods

Opportunities

- Can we capture H_2S, since H_2SO_4 used in industrial processes? (Expensive process, also a glut of sulphur in the market).
- How much does incineration/reinjection improve over current method? Is either a new method, is there enough data to compare?

2. Noise Pollution

Achievements

- OGC has implemented condition that drilling rigs put hospital mufflers on rigs drilling close to residents (even one resident is enough to trigger muffler requirement)
- Federal limit is 80 decibels, OGC limit is 40 decibels

Challenges

- Noise pollution is the jurisdiction of the local district government and falls under municipal bylaws. These bylaws can be "wishy washy."
- No regulations for remote areas (may be wildlife impacts from noise)
- Noise is not just from engines; some sources can't always be muffled.
- CBM well uses hydraulic pumps and is louder than engines. Attempted to pass a $500 fine noise bylaw, but it got hung up in provincial government process.

3. Long-term Thresholds

Challenges

- Need to know how much [pollutant] is too much.
- Cumulative impact study: incredibly complex, many factors, cannot isolate effects of single factor (e.g. contamination, drought, pests). Another example: grass transplanted from contaminated site to non-contaminated site died because it had developed need for heavy metals
- WLAP needs to keep prioritization of issues in mind. For instance, the potential impact on 80,000 population in Prince George from nearby source versus vegetation impact study in remote area.

Opportunities

- Regulations currently do not address the potential for buildup in vegetation.
- Trees northeast of the Taylor area had vegetation damage from extra selenium noted in 1980s (heavy pollution since plant was built in 1960s).
- Not a problem any more, but could we test the trees to see what happened back then to compare their rate of growth during those years to other years?
- Is there a Tree Ring Database in BC? The University of Victoria and the University of BC have tree ring analysis data available, but not necessarily for certain pollutants.

Further Discussion

- OGC collaborated in lichen impact study by Katherine Enns, which found that flaring improves lichen growth downwind of flare.
- Some studies show that lichens were more impacted by large facilities kilometers away than the intermittent flare right next door.

4. Microclimate Change From Emissions

Further Discussion

- The resultant warmer conditions may help speed up remediation.
- In our northern climate, bacteria have trouble remediating contaminants because of the shorter growing season.

- But windrows constructed for bioremediation likely to have higher temperatures in middle, which is good for bacterial growth.
- But realistically, an endpoint of zero contamination is not attainable.
- Good initial remediation rate; after two years, the breakdown rate slows and hydrocarbons stabilize. It may take six to seven more years to get rid of rest of the contaminants.
- There is a concern with wildlife getting into contaminated windrows.

5.3 Facility Operations

Panelist Presentation: Environmental Aspects of Natural Gas Midstream Operations

Bruce Kosugi, Duke Energy

Bruce Kosugi began his presentation with a few definitions, describing the difference between gathering lines (pipeline operations in field areas, before gas gets to processing facilities) and transmission lines (pipelines that move cleaned gases from processing facility to markets in the south). He then grouped environmental concerns into four headings: water, soil, air and habitat.

Water concerns include effluent quality and quantity and maintaining cool water temperatures. Soils need structure and quality maintained so top soil is restored following operations and the site is re-vegetated. It is also important to minimize spills to avoid contamination. This reduces the amount of clean up and ultimately reclamation effort required when the facilities are decommissioned.

Some of the largest potential environmental impacts relate to air quality. Potential impacts include acid rain, ozone depletion, toxics, particulates, noise and green house gases. In each of these areas, steps are being taken to reduce emissions and impacts.

In order to protect important wildlife habitat, proper planning and development of projects is required. Avoiding sensitive time periods for specific wildlife species is one way to protect habitat.

Panelist Presentation: Oil and Gas Activities and the Charlie Lake Watershed

Allan Blair, Charlie Lake Conservation Society

Alan Blair provided information on Charlie Lake and the Charlie Lake Conservation Society. In 1996 a watershed stewardship was formed called the Charlie Lake Conservation Society (CLCS). [Charlie Lake is located nine kilometres northwest of Fort St. John and is 14 kilometres in length.] It is a favorite spot for summer and winter recreation in the area. In partnership with Peace River Regional District (PRRD), the society conducted a survey of concerns from lake residents and users. Major concerns identified from that survey included water quality, recreational fisheries, other recreational uses and maintaining bird and wildlife habitat.

Based on the survey results the CLCS received funding and came up with a Strategic Environmental Plan which covered three key areas of improvement:

- Upgrade poorly functioning stream crossings (primarily culverts that pass under roads).
- Prevent run-off from oil and gas sites, agricultural and lakeshore development sites.
- Reduce impacts from isolated septic systems.

In 1992 a new sewer system was installed in the Charlie Lake area, which mitigated sewage disposal problems.

Mr. Blair provided some background on Charlie Lake. It is approximately 10,000 years old and is hydrotropic, which means it is extremely high in nutrients. This causes the lake to produce a significant amount of algae. Additionally, 20 years ago the level of the lake was raised and existing weed beds started disappearing, which affected fish spawning.

He then provided information on sedimentation and run-off, which has implications for water quality, fish spawning and habitat, lake depth, turbidity and land erosion.

There are over 130 oil and gas related industrial sites around the lake and several oilfield roads.

The SCEK Fund will be matching society funding for 2005.

Future work of the society includes:
- identifying sites with opportunities to remedy or mitigate ongoing erosion issues;
- expanding efforts in working with well site operator, the OGC, and landowner;
- developing strategies and a plan of action to deal with the identified erosion issues; and,
- Exploring best practices for erosion control for future development.

Room Discussion: Facility Operations

1. Challenges
- Operators, inspectors, contractors, public, and other workers need to be better educated on all aspects of operations; they need to know all of the trigger effects of their actions.
- Education developed needs to provide motivation for the employee to follow the right path.
- Push regulations less.
- We don't have time or money to regulate more.
- People generally don't do the right thing if they are overregulated.
- Relationships need to be established between regulators, workers, and public.
- People need to get ideas out there (more of these sessions).
- Need to foresee impacts down the road.
- Education is still the will of the company.
- Lack of communication within companies; information does not get into the field.
- Oil and gas industry needs to be better about putting up signage and educating general public about where reclaimed sites are located.

2. Trends: (Are things getting better?)
- There need to be regulatory implications before things improve.
- Regulatory enforcement will come around as the younger generation gets into the workforce.
- Should go to performance based system in B.C. (Don't like overregulation.)

- Petroleum Technology Alliance Canada (PTAC) conducted a survey on Oil and Gas Conservation and found that:
    - There needs to be more dollars from government.
    - Industry would like to see clarified regulations (no grey areas)

- PTAC is delivering a self-audit program.
    - Many companies are not doing it because they want credits.
    - There needs to be profitability.
    - Midstream business does not get rewarded for saving energy because gas is free to them.
    - Some producers would not jump at the chance of doing an energy audit.
    - If PTAC can prove there will be a greater efficiency and high responsibility rate the new system will be more readily accepted.

- Economic efficiency; companies need to do things right the first time.
- Need to help industry in the beginning stages to avoid problems later on.

5.4 Reclamation and Impact Management

Reclamation Processes and Challenges From an Industry Perspective

Nolan Steinwand, Environmental Representative, Pengrowth Corporation

Nolan Steinwand brought an industry perspective to the workshop, noting challenges to the oil and gas industry. He provided practical information on reclamation processes including preparation, landowner involvement, contractor selection, contamination management, earth movement, monitoring and follow up, and applications for Certificates of Restoration.

Mr. Steinwand finished his presentation by describing challenges to the reclamation process in BC. These challenges include:

- Revegetating low ph sites in a cost effective manner.
- Responsibilities concerning sumps that do not have proper documentation or were mixed off prior to reviewing analytical results.
- Uncertainty around the Ministry of Water, Land and Air Protection's requirements when a Certificate of Restoration submission is made.

Prosperity Through Unity Research Project

Korey Green, Lands and Environment Supervisor, Monashee Resources Ltd.

Korey Green outlined the Prosperity Through Unity Research Project and also discussed a Certificate of Restoration Pilot Project.

The Prosperity Through Unity Research Project comprises both research trial plots and a road map for quantifying and mitigating potential timber supply (allowable annual cut) implications of oil and gas activity in BC. The trial plots aim to evaluate reclamation techniques for achieving alternative end land-use objectives, including reforestation, wildlife habitat, and traditional uses.

The three main objectives of the "road map" are 1) deriving what the past impacts are, 2) mitigating past impacts, and 3) mitigating future impacts.

He illustrated his talk with images of the trial plots, which showed a variety of site treatment and re-vegetation techniques to meet silviculture objectives.

Mr. Green then presented some information on AAC implications in the oil and gas industry, referencing a newspaper article on Alberta's oil/forestry industries heading on a "collision course" regarding productive forest land.

The project is also looking to increase awareness of timber supply impacts from oil and gas activities.

The Certificate of Restoration Pilot Project's goal is to evaluate up to 100 reforested well-sites which would potentially lead to an alternative Certificate of Restoration (COR) guideline for reforestation. Through this project the OGC will be able to evaluate reforested sites and use the data to develop realistic guidelines for issuing COR's on reforested sites.

Achievements, Challenges and Trends in Impact Management

Robert Martens, Environmental Advisor, Encana Corporation

Robert Martens, who has 15 years of reclamation experience in BC and Alberta, provided his perspective on achievements, challenges, and trends in impact management.

Industry achievements include:

- An increased awareness of risk and of site remediation.
- An increased awareness that a wholistic approach, integrating environmental, social, and economic factors is necessary.
- Integrating more stakeholders (First Nations, government ministries, landowners) into the process.
- Increased reclamation activities in general.

Recent trends include more regulations and amendments to existing regulations and an increase in protocols and procedures.

Focusing on soil reclamation, he said a critical industry challenge is to find ways to treat soil with an increase in oil and gas development. Mr. Martens related an incident where two million cubic metres of contaminated soil was disposed of in the Pacific Ocean off BC's Lower Mainland, where 70% of the material was clean. Current legislation makes it very hard to re-use contaminated soil.

He also noted that:

- Eighty percent of the cost of soil reclamation is spent on digging, hauling, etc. He recommends the use of centralized locations in areas of high density activity and a regulatory incentive to re-use oil.
- Regional districts and municipalities should have more input into choosing sites for soil reclamation. At present, only a few businesses have permits to reclaim soil.
- Re-using soil would immobilize contaminants with use in asphalt, however under the Contaminated Sites Act, a Certificate of Compliance does not remove future liability.

- There should be a certificate for treated soil, which would follow the soil as it goes through its uses.

Room Discussion: Reclamation and Impact Management

- How are current Certificate of Restoration objectives set? Is the objective set in the beginning? The need for a definitive process makes it frustrating for reclamation companies to do their work/duties.
- Information about the land needs to be transferred to new owners with company transfers/purchases. Could the government be a steward for this information?
- Other land users need to have information as well (i.e. notified of reclamation by companies). Consultation should be required before reclamation begins.
- Need consultation right down the line with all land users.
- Reclamation does not necessarily mean planting with pine. Sometimes it might mean having coarse woody debris on the site. Reclamation should have a wider view than just planting trees. Perhaps a sliding scale of site reclamation where objectives for the site over time are identified. Reclamation objectives become part of consultation.
- Reclamation objectives should be part of the consultation process prior to activities on the land.
- The OGC needs to be involved in AAC discussions.
- WLAP and OGC conflict on what qualifies as a Certificate of Restoration on sites. A consistent set of regulations and guidelines need to be followed. Would a results-based regime be effective?
- New standards/grandfather in old standards (footprint is greater when trying to fix old projects i.e. sunken sump would require re-opening of access).
- There is a backlog of work in reclamation. The precise number of orphaned sites is unknown.
- Should there be an orphaned well fund with the OGC?
- There is no procedure to abandon/restore pipelines in current reclamation thinking.
    - Cap and fill with NO_2 is questioned.
    - There is less environmental impact by leaving pipelines in the ground than digging them up to reclaim.

Consultation

- Should there be a requirement for Certificate of Consultation prior to application to OGC?
- We should move away from a site by site basis in reclamation and towards a land use disturbance value, then use according to five categories, regional target value, tradeable (exchangeable).
- The more difficult a cleanup is to do, the more reluctant industry will be to comply.
- Expectations of government have been loose up to now and reclamation work has not been done.
- Do companies have to reclaim sites? Or do they want to?
- Volume of consultation is burdensome for companies and stakeholders.
- Dialogue must be greater between oil and gas and other tenure holders.
- How about a ‘Memorandum of Understanding’ with other resource stakeholders?

3D Seismic

- No research on reclaiming seismic areas.
- Negative effects to wildlife.
- Seismic line width has been reduced but line density has increased.

- Female marten: if they kill their young, 3D seismic programs will destroy populations.
- Other animals, such as moose, wolf and lynx are also affected.
- A two to three year study is too long and too late for effectively managing wildlife populations at risk.
- The Muskwa-Kechika Management Area will address this with an island of protected area, however problems include wolf predation of moose and wolves using roads as paths to travel 50 km per night.
- Studies will take too long. Request information from those people that have the information now.

Soil Use in Oil Patch

- Make use of soil that is already contaminated as filler in asphalt.
- Soil may not be suitable for this use because asphalt product quality is compromised, which is a liability concern to asphalt companies.
- More emphasis should be placed on reclamation/enhancement of current land.
- Maybe we shouldn't contaminate the soil in the first place? Use areas of containment?
- There seems to be lots of information, but it is difficult to access. Perhaps the OGC should be the repository of information and make it available to the public.

6.0 CLOSING REMARKS

Derek Doyle, Oil and Gas Commissioner

Commissioner Doyle closed the Forum with thanks to presenters, panelists, participants, organizers, recorders and facilitators. He also thanked the many companies and ministries that supported the work of the Fund.

He pointed out that some Fund projects complement the work of other concurrent projects. As evidence he referred to the Monashee reclamation studies and the West Moberly First Nations community knowledge project.

The commissioner noted that collecting knowledge in a timely manner improves our confidence in moving forward and gives improved value for the funds invested.

As one presenter put it, “The magic is to bring it together for all parties.” The challenge, according to Mr. Doyle, remains to determine what knowledge is essential now.

The Commissioner stressed the importance of collaboration in helping to achieve our goals and the goals of others. It allows us to work towards the bigger picture, beyond our own work.

“The harvest today was bountiful. Small brush piles can benefit small mammals. Cow parsnip and skunk cabbage are favoured by grizzly bears in spring. Willow pruning benefits moose. And selective herbicide use creates habitat diversity on road right-of-ways. Indeed, healing the land heals wildlife and heals our hearts.”

In conclusion, the Commissioner informed the audience that the Fund was recently audited by the provincial Auditor General and was given a clean bill of health. He asked the audience to rate the Forum from one to five and they voted four. He committed to hold the Forum again next year.

7.0 POSTER SESSIONS

The following poster sessions were presented by SCEK project consultants and other organizations as part of the SCEK Forum.

- *Acid Gas Sorption by British Columbia Coals: Implications for Permanent Disposal of Acid Gas in Deep Coal Seams and Possible Co-Production of Methane*
  - Marc Bustin, Department of Earth and Ocean Science, UBC
- *Impacts of Sour Gas Production Flare Tests on Vegetation*
  - Katherine Enns, Golder Associates Ltd.
- *Overview Fish and Fish Habitat Inventory*
  - Fisheries Branch, Ministry of Environment, Lands and Parks
- *Development of a Practical Framework for Cumulative Effects Assessment and Management for Northeast British Columbia* & *Cumulative Impact Management Screener*
  - Nick Poushinsky, Axys Environmental
- *Snake-Sahtaneh Boreal Caribou Habitat Use and Ecology Study* & *Boreal Caribou Interim Management Guidelines*
  - Diversified Environmental Services
- *Low Flow Analysis* & *Water Use Plan and Low Flow Analysis – Phase II* & *CBM Baseline Water Monitoring*
  - Diversified Technical Services
- *Well Test Flare Plume Monitoring Phase II: Measurement of SO_2 in Flare Plumes using the DIAL Method*
  - Rob Bioletti, Alberta Research Council
- *Sustainable and Eco-Efficient Technologies Economic Greenhouse Gas (GHG)Reducing Technologies*
  - Petroleum Technology Alliance Canada (PTAC)
- *Interactive Development and Research into Abandoned Wellsite Reclamation; Cumulative Impact Study on the AAC; and, Development of Results and Performance Based Systems*
  - Monashee Resources Limited
- *Holocene-Human History / Paleoenvironmental Reconstruction ~ 12,000/10,000 Years Ago to the Present*
  - Heritage North Consulting Ltd.
- *West Moberly First Nations Traditional Knowledge Project*
  - Dahke Community Projects Inc
- *Working Towards an Understanding of Cumulative Effects Associated with Oil and Gas Development in the Chinchaga Area of British Columbia and Alberta*
  - Ernst Environmental Services
- *Projects*
  - Muskwa-Kechika Advisory Board

8.0 SCEK FORUM 2004 LIST OF ATTENDEES

Allan Blair
Andrea Morison, Oil and Gas Commisson
Andrea Osterlund, Oil and Gas Commission
Andrew Mathewson
Annette Loe, Oil and Gas Commission
Barry Holland, Muskwa-Kechika Advisory Board
Barry Ortman, Diversified Technical Services
Beth Hrychuk, Landsong Heritage Consulting Ltd.
Bill Adair, Ministry of Sustainable Resource Management
Bill Bayrack
Bill Nalder, Canadian Natural Resources Limited
Bob Barradel
Bob Purdon, Oil and Gas Commisson
Brad Culling, Diversified Environmental Services
Brenda Belland, PTAC
Brian Churchill, Chillborne Enterprises
Bruce Cazes, Oil and Gas Commission
Bruce Harrison, Ducks Unlimited Canada
Bruce Kosugi, Duke Energy
Bruce Murray, LGL Environmental Limited
Cal Faminow, EBA Waberski Darrow Consulting Ltd.
Carl Gitscheff, BC Trappers Association
Carl Reimer, Duke Energy Gas Transmission
Carylin Greatbanks, Oil and Gas Advisory Committee
Catherine Panther, Treaty Negotiations Office
Chad Moffat, EBA Waberski Darrow
Constantin Visan, Oil and Gas Commission
Corrine Porter, Kaska Dena Council
Dale Drown, Guide Outfitters Association of British Columbia
Darren Snider
Darryl Johnson, District of Hudson's Hope
Dave Hamilton, Golder Associates
Dave Stanley, Ecofor Consulting Ltd
David Campbell, Muskwa-Kechika Advisory Board
Del Rheinheimer, Ministry of Water Land and Air Protection
Delia Christianson, Oil and Gas Commission
Derek Doyle, Oil and Gas Commisson
Diane Culling, Diversified Environmental Services
Don MacCuish, Buick Creek Residents Group
Duane Solem, Fort St. John Trapper's Association
Edward Stanford, Charlie Lake Conservation Society
Egan Wuth, Oil and Gas Commission
Francesca Adriano, Oil and Gas Commission
George Hegmann, Axys Environmental Consulting Ltd.
Gord Humprey, Oil and Gas Commission
Greg Bronson, Raeco Geoscience Ltd
Harry Officier, Oil and Gas Commission
Heidi Elias-Bertrim, Oil and Gas Commission
Helen Vokaty, Old Hope Resident's Association
Helga Harlander, Penn West Petroleum
Howard Madill, Ministry of Sustainable Resource Management
Ian Stacey, BC Hydro
James Gladysz, Oil and Gas Commisson
James Wolf, Prophet River First Nation
Jane Calvert, DRFN
Jeff Matheson, EBA
Jessica Ernst, Ernst Environmental Services

Jianbing Li, University of Northern British Columbia
Jim Forbes, Ministry of Agriculture
John Elliot, Ministry of Water, Land and Air Protection
John Innes, Forest Sciences Centre
Jonathan Wright, Ernst Environmental Services
Joyce Beaudry, Oil and Gas Commisson
Judy Krzyzanowski, Forest Science Centre
Katherine Enns, Golder Associates
Kathy Schroeder, Hudson's Hope Landowners
Kenneth Howes, Culturelogix Consulting
Kevin Wilson, Ecofor
Korey Green, Monashee Resources Ltd.
Kurtis Saker, Golder Associates
Larry London, Oil and Gas Commisson
Lenore Harwood, District of Hudson's Hope
Leslie Hogan, Pioneer Natural Resources Canada Inc.
Linda Haugen, Old Hope Resident's Association
Lisa Verbisky, Northern Lights College
Liz Neil, Axys Environmental Consulting Ltd.
Lorraine Chipesia, Prophet River First Nation
Marc Bustin, University of British Columbia
Margaret Fenton, Oil and Gas Commission
Marilyn Pouce Coupe, Doig River First Nation
Mike Waberski, Waberski Darrow
Nick Baccante, Ministry of Water, Land and Air Protection
Nick Poushinsky, Axys Environmental Consulting Ltd
Nolan Steinand, Pengrowth Corporation
Patrick Wiltse, OGC
Paul Gevatkoff, Oilmen's Association, South Peace & City of Dawson Creek
Randall Sweet, Ministry of Energy and Mines
Richard Neufeld, Ministry of Energy and Mines
Ritchie Morrison, Tetrad Communications
Rick Newlove, Oil and Gas commission
Rob Bioletti, Alberta Research Council
Rob Carss, Canadian Association of Petroleum Producers
Robert Martens, EnCana Corporation
Rod Machula, Pengrowth
Ross Peck, Muskwa-Kechika Advisory Board
Sam Bell, Monashee Resources Ltd.
Sammy Acko, Doig River First Nation
Sara Marsh, EBA Waberski Darrow Consulting Ltd.
Sean Moffatt, Big Pine Heritage
Sharon Pachet, BP Canada
Sheila Zilinsky, Oil and Gas Commission
Shelley Chipesia, Prophet River First Nation
Tannis Such, PTAC Petroleum Technology Alliance Canada
Terry Antoniuk, Salmo Consulting Inc.
Tim Malcolm, Heritage North Consulting
Tom Ouelette, Oil and Gas Commisson
Tyson Pylypiw, Encana Corp.
Vera Brandzen, Oil and Gas Commisson
Wanda Macdonald, Dominion Exploration Canada Ltd
Wayne Sawchuk, Muskwa-Kechika Advisory Board
Wim Kok, University of Northern British Columbia

APPENDIX

Facilitators and Recorders

The following individuals provided invaluable assistance in making the 2004 SCEK Forum a success by facilitating and recording each workshop.

Workshop	Facilitator/Recorder
Wildlife	**Facilitator:** Bill Adair, Ministry of Sustainable Resource Management **Recorder:** Gord Humphrey, OGC
Impact and Footprint Minimization	**Facilitator:** Randall Sweet, Manager Resource Access, Ministry of Energy and Mines **Recorder:** Margaret Fenton, Oil and Gas Resource Officer, Forestry, OGC
Healing the Land	**Facilitator:** Bob Purdon**,** Senior Aboriginal Program Specialist, OGC **Recorder:** Sheila Zilinsky, Aboriginal Resource Officer, OGC
Drilling and Construction	**Facilitator:** Bruce Cazes, Manager Drilling and Completions, OGC **Recorder:** Heidi Elias-Bertrim, Operations Assistant, OGC
Waste and Air Quality Management	**Facilitator:** Wim Kok**,** Northern Lights College **Recorder:** Francesca Adriano, Operations Engineering Technician, OGC
Facility Operations	**Facilitator:** Patrick Wiltse, Emergency Response and Safety Inspector, OGC **Recorder:** Andrea Osterlund, Pipeline Technician, OGC
Reclamation and Impact Management	**Facilitator:** Bill Bayrack, Consultant, CAB Ventures **Recorder:** Margaret Fenton, Oil and Gas Resource Officer, OGC