

Science & Community Environmental Knowledge Fund



Engineering and Technology Envelope

Background

The purpose of the Engineering and Technology envelope of the SCEK Fund is to promote research associated with engineering and technological innovations that minimize the impacts of oil and gas activities on the environment and communities. It supports projects that focus on:

- Reducing and managing emissions to air, land and water
- Rehabilitating land and water bodies disturbed by oil and gas activities

Areas of Interest:

- Facility and well test flaring impact and overall reduction in quantity
- Disposal and clean up of wastes and contaminants
- Rehabilitation/reclamation of disturbed lands
- Pipeline integrity management (downstream and upstream)
- Greenhouse gas reduction at source and via sinks

The Engineering and Technology envelope of the Fund is one of five funding envelopes within the program. The other four envelopes are Health and Safety, Ecosystem and Cumulative Impact Management, Education and Extension, and Community Environmental Knowledge.

**For more information
on the SCEK Fund,
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Current portfolio of projects

Title	Proponent	SCEK Investment	Status
Acid Gas Sorption by British Columbia Coals: Implications for Permanent Disposal of Acid Gas in Deep Coal Seams and Possible Co-Production of Methane.	University of BC	\$239,200.00	Anticipated completion by May 2004
Application of High Resolution Mesoscale Model Fields with the Calpuff Dispersion Modeling System in Prince George BC	University of Northern BC	\$31,113.77	Completed October 2002
Research on the Applicability of Modeled Site Specific Meteorological Data to Well Test Flaring Assessments in BC	Levelton Engineering Ltd.	\$49,286.56	Completed September 2002
Muskwa-Kechika Management Area Heliportable Drilling Feasibility Study	Ministry of Sustainable Resource Management and TERA Environmental Consultants	\$43,049.00	Completed June 2002
Soil Productivity and Forest Regeneration Success on Reclaimed Oil and Gas Sites	BC Ministry of Forests, Kalamalka Research Station	\$58,000.00	Completed April 2003
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 and the BC Ministry of Forests	\$195,000.00	Year 2 of 3 anticipated completion March 2005
Demonstration of the Applicability of the Maxxam All-season Passive Air Sampling System to the Management of Hydrogen Sulfide in Northeast BC	Maxxam Analytics Inc.	\$27,645.00	Completed June 2002
Sustainable and Eco-Efficient Technologies: Economic Greenhouse Gas Reducing Technologies	Petroleum Technology Alliance Canada (PTAC)	\$25,000.00	Anticipated completion December 2005
Healing the Land: An Elder's Perspective	Monashee Resources Ltd.	\$24,700.00	Anticipated completion July 2004
Well Test Flare Plume Monitoring Phase II: Measurement of SO ₂ in Flare Plumes using the DIAL Method	Alberta Research Council Inc.	\$75,000.00	Final Report Pending 2004



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ACID GAS SORPTION BY BRITISH COLUMBIA COALS: IMPLICATIONS FOR PERMANENT DISPOSAL OF ACID GAS IN DEEP COAL SEAMS AND POSSIBLE CO-PRODUCTION OF METHANE.

PROPOSER:
University of BC

PROJECT PURPOSE:
To determine whether disposal of waste gases by injection into coal seams is an environmental and economical alternative. The research will also evaluate the potential for co-producing coalbed methane.

PROJECT SUMMARY:
This is a highly technical study undertaken to determine the sequestration potential of acid gas using coal as a medium. It addresses a number of questions relating to the capacity of coal to sorb hydrogen sulphide (H₂S) and sulfur dioxide (SO₂), the effect on coal, and the effects of moisture, mineral matter and other factors on the sorption of H₂S, SO₂ and carbon dioxide (CO₂) gases.

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APPLICATION OF HIGH RESOLUTION MESOSCALE MODEL FIELDS WITH THE CALPUFF DISPERSION MODELING SYSTEM IN PRINCE GEORGE BC

PROPOSER:
University of Northern BC

PROJECT PURPOSE:
To facilitate better monitoring of pollution concentrations in surrounding areas.

PROJECT SUMMARY:
Air pollution monitoring is the key to managing industrial emissions such as sulphur dioxide, a gas associated with oil and gas activity. Dispersion modelling, a method of predicting pollution concentrations by using emissions and meteorological data, has seen limited use because of some simplifying assumptions that can lead to unrealistic predictions, especially in areas that have complex terrain. This study looks at a new way of modelling in complex terrain using the Regional Atmosphere Mesoscale Model (RAMS) in combination with the California Puff Model (CALPUFF).

CONTACT:
Contact information not available



Photograph courtesy Levelton Consultants Ltd.

RESEARCH ON THE APPLICABILITY OF MODELED SITE SPECIFIC METEOROLOGICAL DATA TO WELL TEST FLARING ASSESSMENTS IN BC

PROPONENT:

Levelton Engineering Ltd.

PROJECT PURPOSE:

To develop procedures and methods of air quality modeling in the foothills of Northeast BC, possibly eliminating the need to acquire long-term weather monitoring data for dispersion models.

PROJECT SUMMARY:

Government and industry measure the impacts of wellsite flaring, but the current practice is to use meteorological data from a single point that is often far from the emission source and is based on simplifying assumptions. This study compared a meteorological model with independent site measurements to assess the accuracy of the model outputs and the feasibility of using modeled data in lieu of site observations, with particular reference to assessing the potential impacts of flaring. The study found that models can act as a substitute for collecting long-term meteorological data.

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MUSKWA-KECHIKA MANAGEMENT AREA HELIPORTABLE DRILLING FEASIBILITY STUDY

PROPONENT:

Ministry of Sustainable Resource Management and TERA Environmental Consultants

PROJECT PURPOSE:

To study the costs, benefits and feasibility of helicopter supported well drilling operations in environmentally sensitive areas.

PROJECT SUMMARY:

This study comprises analyses—regulatory, environmental, technical and economic—of helicopter-based drilling technology in the Muskwa-Kechika Management Area. Some key findings from the study include:

- There are no regulatory or policy constraints that would explicitly exclude heliportable drilling

- The technique has less environmental impact than conventional programs, but disturbance of wildlife and recreationalists needs to be addressed
- The technology is available in Canada, however, rigs capable of drilling in excess of 5000m must be acquired outside of Canada
- Worker safety and sour gas well control concerns are manageable with existing technology and appropriate levels of planning.
- For sites requiring long, complex access, moderate-depth heliportable drilling may be substantially cheaper than conventional road-based drilling.

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**SOIL PRODUCTIVITY AND FOREST
REGENERATION SUCCESS ON
RECLAIMED OIL AND GAS SITES**

PROPONENT:

BC Ministry of Forests, Kalamalka
Research Station

PROJECT PURPOSE:

To evaluate the effectiveness of
previous efforts to restore soil
productivity on abandoned well
sites, seismic lines, and access
roads in the Dawson Creek area of
Northeast BC.

PROJECT SUMMARY:

How effective have previous efforts
to restore forests on abandoned
well sites been? This is the key
question posed by this reclamation
study. While success of restorative
work in the working forest is well
known, to date there is limited
experience in the context of oil
and gas reclamation. The study
evaluated nineteen reclaimed well
sites, and involved measurement of
several site variables including tree
growth, ecological conditions and
soil texture. Recommendations for
increasing reforestation success,
including use of an ecological
approach, were put forward as part
of the project.

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**INTERACTIVE DEVELOPMENT AND
RESEARCH INTO ABANDONED
WELLSITE RECLAMATION; CUMULATIVE
IMPACT STUDY ON THE AAC; AND,
DEVELOPMENT OF RESULTS AND
PERFORMANCE BASED SYSTEMS**

PROPONENT:

Monashee Resources Limited and
BC Ministry of Forests

PROJECT PURPOSE:

To identify and minimize
potential environmental impacts
of oil and gas activities on the land
base.

PROJECT SUMMARY:

The project comprises two key
components: 1) the identification
and treatment of identified
abandoned well sites, and 2)
an evaluation of the benefits of
integrating pre-site assessments
and reclamation prescriptions
into the oil and gas application
process. The key outcomes of
the project include minimizing
environmental impacts of the
oil and gas industry on the land
base, improving reclamation
and forest management results,
and integrating First Nation's
traditional knowledge into oil
and gas processes. In addition,
the project will aid in addressing
some of the key Kyoto Protocol
issues that will impact the oil and
gas industry.

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DEMONSTRATION OF THE APPLICABILITY OF THE MAXXAM ALL-SEASON PASSIVE AIR SAMPLING SYSTEM TO THE MANAGEMENT OF HYDROGEN SULFIDE (H₂S) IN NORTHEAST BC

PROponent:
Maxxam Analytics Inc.

PROJECT PURPOSE:
To demonstrate the unique features and suitability of the H₂S PASS (Passive Air Sampling System) for conducting cost effective and accurate air monitoring in oil and gas areas.

PROJECT SUMMARY:
Environmental regulations require that emissions of hydrogen sulphide be monitored. There are generally two methods of monitoring the gas: active and passive. Active systems are relatively expensive to operate and support. Passive systems, on the other hand, are cost effective and convenient to use. The PASS is a portable and affordable air quality measurement device that allows data collection at more locations than can be serviced with active continuous monitors.

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SUSTAINABLE AND ECO-EFFICIENT TECHNOLOGIES: ECONOMIC GREENHOUSE GAS REDUCING TECHNOLOGIES

PROponent:
Petroleum Technology Alliance Canada (PTAC)

PROJECT PURPOSE:
To facilitate the identification, development and transfer of new greenhouse gas (GHG) reducing technologies. In particular, to achieve a significant economical reduction in the GHG emissions of industry operations by leveraging technology.

PROJECT SUMMARY:
With the Kyoto Accord ratified in Canada, there will be tighter constraints to carbon emissions in the coming years. New technologies to reduce GHG emissions and improve energy efficiency are priorities for governments, industry and the public. PTAC is facilitating the identification, development and transfer of sustainable and eco-efficient technologies with a focus on economical GHG reduction.

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Prophet River Traditional Plant Study (© Kelly Bannister and used with permission).

HEALING THE LAND: AN ELDER'S PERSPECTIVE

PROPOSER:

Monashee Resources Ltd.

PROJECT PURPOSE:

To provide knowledge from the perspective of First Nations' elders on the oil and gas reclamation process.

PROJECT SUMMARY:

The project plays an important role in integrating First Nations' traditional knowledge into the oil and gas site reclamation process. First Nation elders from throughout Northeast BC will contribute traditional knowledge to the site reclamation process through field visits and discussion with Monashee Resources Ltd. This information can then be used to design reclamation methods and techniques that reflect traditional knowledge.

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WELL TEST FLARE PLUME MONITORING PHASE II: MEASUREMENT OF SULPHUR DIOXIDE (SO₂) IN FLARE PLUMES USING THE DIAL METHOD.

PROPOSER:

Canadian Association of Petroleum Producers
(CAPP)

PROJECT PURPOSE:

To field test a DIAL (Differential Absorption Lidar) system on a sour well flare to determine if it can accurately track the well flare plume and accurately measure the sulphur dioxide (SO₂) concentration in a cost effective manner.

PROJECT SUMMARY:

Gas wells are often tested by burning gas through flaring. This produces sulphur dioxide as a by-product. Governments have guidelines concerning ground level air quality when flaring occurs. Cost effective plume tracking and SO₂ measuring devices are required to track air quality. Phase I of this project identified the DIAL technique as the best for remote monitoring of SO₂. Phase II field tested the DIAL System.

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The Oil and Gas Commission administers the SCEK Fund on behalf of the Small Explorers and Producers Association of Canada (SEPAC) and the Canadian Association of Petroleum Producers (CAPP). The SCEK Fund is a broad-based fund that incorporates science and community knowledge while supporting studies that address environmental issues related to the oil and gas industry in British Columbia.

