

MPERG Funding Priorities for 2009/2010

Each of the following topics is considered to have equal priority:

1. Medium term assessment of previously funded (and other) mitigation projects.
2. The role of Selenium as a natural source of contaminants in Yukon.
3. Information needs for Mine Closure and Abandonment.
4. Studies related to the avoidance or mitigation of potentially adverse environmental effects of placer mining.
5. Effects and mitigation of permafrost disturbances.
6. Impact assessment of linear disturbances and resource access roads including the development of mitigation and closure techniques.
7. Research in approaches to reduce the direct and indirect effects of Changing Climate regimes on project infrastructure and operations.
8. Research into approaches to reduce the Carbon and Energy Intensity of project developments and operations.
9. Specific issues around hydrocarbon development.
10. Impact of large burns on water quality and terrain hazards.

1. Medium term assessment of previously funded (and other) mitigation projects

Focused study areas of interest include, but are not limited to:

- Monitoring of impermeable mine waste covers at Arctic Gold and Silver tailings site at Carcross, Yukon.
In 2000 (MERG Report 2001-1) and 2001 (MERG Report 2002-3) MERG co-funded two studies which monitored the effectiveness of low permeability covers as infiltration and oxygen barriers to reduce acid generation in mine tailings in the Yukon two years after their installations by Public Works Canada. Continued follow-up monitoring is essential to assess the long term effectiveness of this mitigation technique.
- Monitoring of re-vegetation projects established on mine tailings at three Yukon Sites (Keno Hill, Mt. Skukum and Wellgreen).
In the summers of 2004 & 2005 test plots were established at three non-operating mines (MERG Report 2005-3 and MERG Report 2006-6). Monitoring at this stage (5 years) would be useful in determining a long term assessment on the success of the project.

2. The role of Selenium as a Natural Source of Contaminants in Yukon

Focused areas of study include:

- Research towards determining the natural links between baseline elevated Se values and the level of uptake of organophile (selenium, arsenic, mercury, uranium etc.) elements by local organisms (fish, bugs and plants). It is generally understood that the whole of central Yukon, particularly where underlain by Selwyn Basin, is high in organophile elements with baseline values of mercury and selenium typically exceeding the Canadian Council of Ministers of the Environment (CCME) Sediment Guidelines for the protection of aquatic life. Proposed studies should build on existing research findings.

3. Information needs for Mine Closure and Abandonment

Focused areas of study include:

- Sludge management: Long term water treatment will likely be a requirement at some abandoned mine sites. This could produce large volumes of treatment sludge that needs to be stored such that it remains physically and chemically stable for the long term. Means of transport, storage and management of sludge needs to be investigated.
- Stream Diversions: Climate change and a trend towards more unpredictable and larger magnitude storm events will be major factors in the sizing and routing of permanent water management diversion structures at most closed mine sites. The methodology of predicting these storm events and the subsequent sizing of diversions remains a challenge.
- Bioremediation: The use of various “passive” treatment technologies is being proposed as a possible panacea to provide efficient, cost effective treatment of pit water and metal bearing water discharges. The long term effectiveness of these treatments in a northern environment needs to be investigated.

4. Studies related to the avoidance or mitigation of potentially adverse environmental effects of placer mining

Focused areas of study include but are not limited to:

- Research into the design of restoration stream channels, focusing on what has worked and what has failed in terms of channel stability and the re-establishment of habitat productivity;
- Any research involving bed loading and bed load measurements in placer-mined streams;
- Any research and development (R&D) into impeller designs for trash pumps or effluent pumps and their application (for use in re-circulation systems);
- Any research and /or application information on the use and design of portable silt curtains, silt barriers (fences), temporary devices for the protection of fish habitat and the containment of silt laden water, designed for installation in stream and in **flowing water applications**;
- R&D into cold water, organic based coagulants and flocculants and their application to mining effluent or sediment laden water;
- R&D into gold and heavy particle separation from placer sediments using advanced fluid mechanics and utilizing on hand /on site typical mining equipment in order to improve gold recovery while reducing water use.

5. Effects and mitigation of permafrost disturbances

Focused areas of study include but are not limited to:

- Development of operational guidelines for working in permafrost
- Research into mitigation techniques to minimize permafrost degradation

Experience has shown that even the most low impact exploration activities can have a significant impact on the terrain in permafrost regions. Various methods to minimize these impacts have been developed as a result and documentation of these would be useful. Further investigations toward developing mitigation techniques is also essential.

6. Impact assessment of linear disturbances and resource access roads, and the development of mitigation and closure techniques

Focused studies of resource access as related to its linear footprint:

- Guidelines for road & trail access restriction and closure techniques
- Impacts and mitigation of temporary access
- New ways to operate in areas where traditional approaches are not acceptable due to the cost to the environment
- Data on growth rates and success of regeneration on mining or petroleum generated land disturbances
- The effect of mining or petroleum generated linear disturbances on wildlife in Yukon

7. Research in approaches to reduce the direct and indirect effects of Changing Climate Regimes on project infrastructure and operations

Focused studies in arctic regions:

- Project planning for design, operation and closure in arctic regions affected by changing climates
- Studies to define the types and scope of long term effects of climate change on mining, oil and gas and infrastructure projects. Direct effects in the Yukon will likely be caused by extreme weather events, changes in hydrologic events, permafrost deterioration, and slope destabilization. Indirect effects will be those caused by the added stress on ecosystems components such as vegetation and wildlife values, traditional human activities and human health. Mitigation solutions may require enhanced management actions.

8. Research into approaches to reduce the Carbon and Energy Intensity of project developments and operations

Focused study areas of interest:

- Northern natural resource industries need to begin to examine appropriate technologies which will reduce both their carbon and energy. Many emerging technologies have not been tested in polar or sub-polar environments.
- Guidelines to outline how significant cost savings can be accrued if the appropriate technologies are planned for and installed at project initiation based on existing technologies.

9. Specific issues around hydrocarbon development

Focused areas of study include but are not limited to:

- Effects of downhole disposal of sump wastes
- Guidelines for estimating the energy efficiency of your proposed projects
- Guidelines for minimizing the noise and visual aversion of compression stations (i.e. covered with noise insulated little red barns in Alberta)
- The use of mucking on northern linear features as a mitigation tool

10. Impact of large burns on water quality and terrain hazards

Focused areas of study:

- Monitoring of the environmental impacts of recent forest fires in the Yukon

The Yukon (and Alaska) experienced large fires during the summers of 2004 and the effects were readily apparent in the years immediately following the fires, particularly in areas of discontinuous and continuous permafrost. Of particular interest to the mining industry are the possibilities of increased sediment erosion into streams and the resulting degradation of water quality due or decreased slope stability which could represent threats to infrastructure or persons. MPERG co-partnered in a study which looked at active-layer detachment following the summer of 2004 forest fires near Dawson City, Yukon (MPERG Report 2006-5) and continues to support similar monitoring programs.