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Voisey's Bay Nickel Co. Ltd
Ship's Noise Monitoring

Client: Voisey's Bay Nickel Co. Ltd

Date: 2007

Project highlights:

- **Reviewed literature on impact of ship noise on ring seals**
- **Monitored ship's noise through land fast ice**

Project Description:

As part of its Environmental Effects Program, Voisey's Bay Nickel Co. Ltd. Was required to measure noise emanating from its icebreaking concentrate carrier -MV Umiak as it transited land fast ice in Anaktalak Bay. By establishing the level and extent of sound, a zone of influence could be established to define the zone within which marine mammals (ringed seals) would be affected.

A series of acoustic measurements were recorded at varying distances from the source along the ships track during a winter (March 2007) passage.

The collected data were used to develop a "noise profile" along the shipping route. Results were compared against literature values for threshold effects and these were evaluated in terms of the predictions made in the Project Environmental Impact Statement. Results were within predicted levels.

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Site Laboratory Services
Voisey's Bay, Labrador

Client: (sub-consultant to)
Voisey's Bay Nickel Co. Ltd.

Date: 2004 – 2006

Project highlights:

- **TSS testing**
- **Water quality sampling**
- **Sediment and soil sampling**
- **Documentation and reporting**

Project Description:

A Site Lab and Technical Services were provided during the Mine and Mill Construction at Voisey's Bay Labrador. The Site Lab included apparatus for measuring Total Suspended Solids (TSS) and related water quality parameters.

Georeferenced sample collections were made by technical staff for water (surface, groundwater, effluent) soils (including drill cuttings) and sediments (freshwater and marine).

Samples were collected in accordance with Standard Operating Procedures (SOPs), logged, labeled, packaged and shipped for outside lab analyses. A master database was developed and maintained for compliance reporting associated with permit conditions.

Sikumiut developed and maintained the site Water Quality Laboratory including the implementation of approved quality assurance program.

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Freshwater Monitoring Program
Voisey's Bay, Labrador

Client: Voisey's Bay Nickel Co. Ltd.

Date: 2006 – ongoing

Project highlights:

- **Water quality and quantity**
- **Sediment quality**
- **Benthic macroinvertebrate community**
- **Electrofishing**

Project Description:

The water quality of an ecosystem is critical to the overall health of the system. Baseline studies and continued monitoring efforts of local bodies of water can provide information as to any environmental impact caused by mining operations.

Sikumiut has developed a program to monitor water and other indicators, including sediment and benthic macroinverterbrates, throughout the year. Using an inflatable zodiac type boat, transported via helicopter, Sikumiut is able to sample locations that are inaccessible via roads.

Despite the remote location of the sample stations, Sikumiut is able to complete field work and have samples delivered to analytical labs within a limited time frame, insuring the parameters being monitored have not degraded during shipping time.

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Environmental Effects Monitoring
Program Design
Voisey's Bay Mine and Mill Project

Client: Voisey's Bay Nickel Co. Ltd.

Date: 2003 - 2004

Project highlights:

- **Statistical design**
- **Toxicity**
- **Bioaccumulation**
- **Aboriginal Knowledge**
- **EIS methods**
- **Regulatory Compliance**

Project description:

Sikumiut was contracted by Voisey's Bay Nickel Co. Ltd. to review the Mine and Mill EIS and associated reports, and to develop a Program Design for monitoring. The purpose of EEM is to confirm the accuracy of predictions, as well as the effectiveness of mitigation measures.

The tasks included incorporation of input from government as well as Labrador Inuit Association and Innu Nation. *Sikumiut* developed display material to communicate the ecosystem components and pathways to consider in carrying out a comprehensive design process. Based on the output from this consultation process, as well as using in-house design review, *Sikumiut* identified a series of study subjects, and for each developed testable hypotheses with the associated statistical design. An important ingredient of each EEM study was the need to ensure that natural variability could be accounted for and that cause-and-effects relationships could be detected.

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Provision and Installation of Meteorological Stations Voisey's Bay

Client: Voisey's Bay Nickel Co. Ltd.

Date: 2003

Project highlights:

- **Site selection**
- **Equipment specification and ordering**
- **Equipment installation**
- **Documentation**

Project description:

Sikumiut was contracted by Voisey's Bay Nickel Co. Ltd. to carry out a site selection for meteorological stations, to order suitable equipment, including sensors, data storage and communication, as well as (solar) energy source for the isolated stations. The equipment was installed in two locations at the Voisey's Bay Mine and Mill Site. Our field team carried out testing and commissioned, and developed complete documentation, including as-installed station specifications as well as operating instructions.

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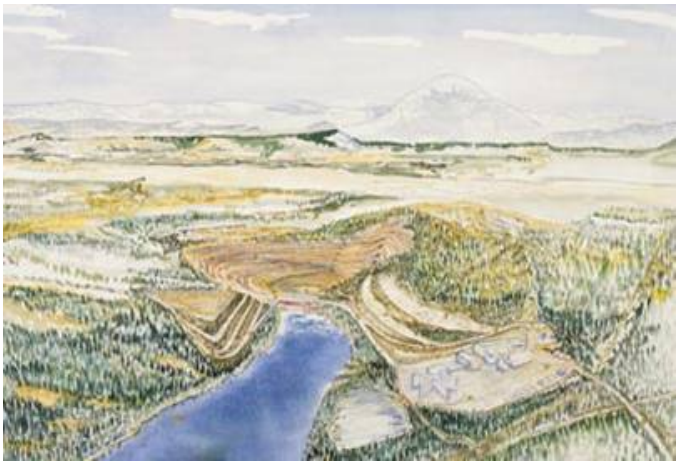
Fish Habitat
"HADD" Quantification
Compensation Plan
Voisey's Bay, Labrador



Client: Voisey's Bay Nickel Co.

Date: 2003 - Ongoing

Project highlights:

- **Fisheries Act compliance**
- **Fisheries surveys**
- **Fish habitat quantification**
- **Engineering Design**

Project Description:

Sikumiut completed habitat quantification for freshwater and marine habitat affected by the construction of the Voisey's Bay Mine and Mill Project. A "HADD" was determined to occur only in freshwater . Our team completed the development of concepts for compensation, and prepared a final Fish Habitat Compensation Plan for acceptance by the Department of Fisheries and oceans. *Sikumiut* then implemented the compensation plan with respect to standing water. The work involved the capture and transfer of a fish population from an affected water body (Headwater Pond – the designated tailings basin) to a nearby, fishless lake. Monitoring for success is ongoing.

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Marine Baseline Sampling
Natural Resource Surveys
Voisey's Bay, Labrador

Client: Voisey's Bay Nickel Co. Ltd.

Date: 2002 – ongoing

Project highlights:

- **Water and sediment quality**
- **Biota sampling**
- **Species identification**
- **Survey methods**
- **Aboriginal Knowledge**

Project Description:

Sikumiut carried out a series of baseline sampling programs to implement environmental effects monitoring for the marine environment in support of the Voisey's Bay Mine and Mill Construction. A program of wildlife surveys was initiated along the Project shipping route, and regular transits are conducted to document the seasonal presence of birds and wildlife.

Sampling was also carried out to document background levels of contaminants in water, sediment and biota. Water and sediment samples were collected in accordance with Standard Operating Procedures. As well, blue mussels were collected and analysed for the presence of hydrocarbon contamination.

Sampling was conducted under challenging weather conditions, and in advance of a well developed infrastructure at site. One of the challenges resulted when conventional sampling equipment was delayed in delivery. Using Inuit ingenuity, one of the team members fabricated a sampling device from stainless steel. The "Joey" grab (see illustration) was effective in producing the desired sediment sample and helped salvage the sampling program.

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