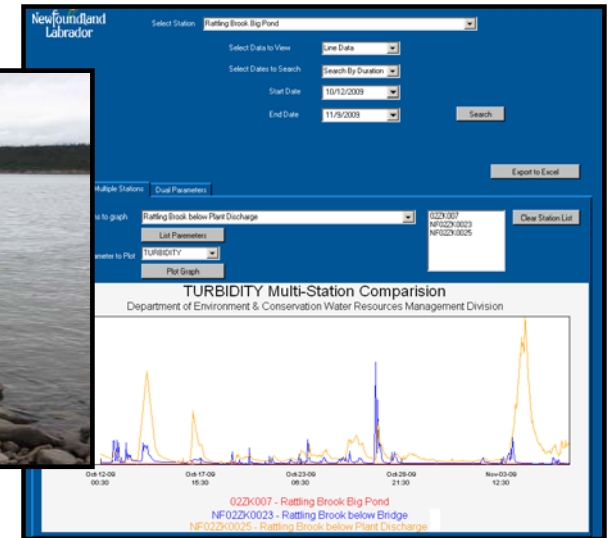
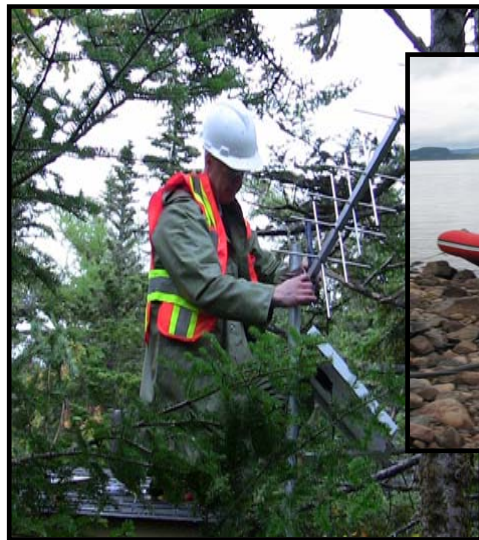


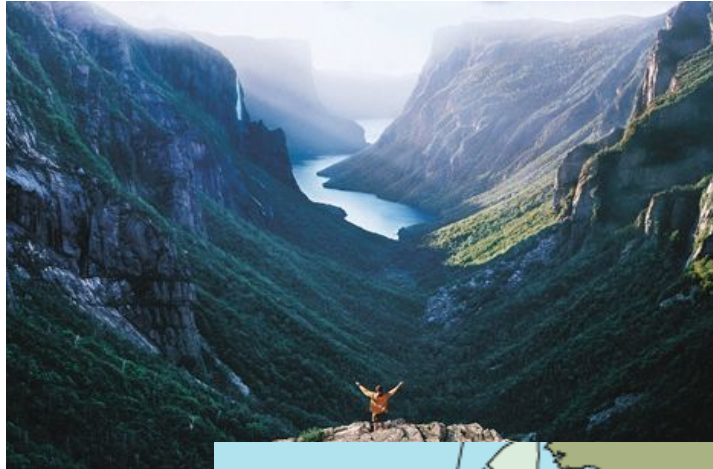


# Effectively Managing Water Resources by the Use of Near Real-Time Water Quality Monitoring in Partnership with Industry



2010 National Monitoring Conference  
Denver, Colorado  
April 25<sup>th</sup> – 29<sup>th</sup>, 2010

# Where Is This Real-Time Network?

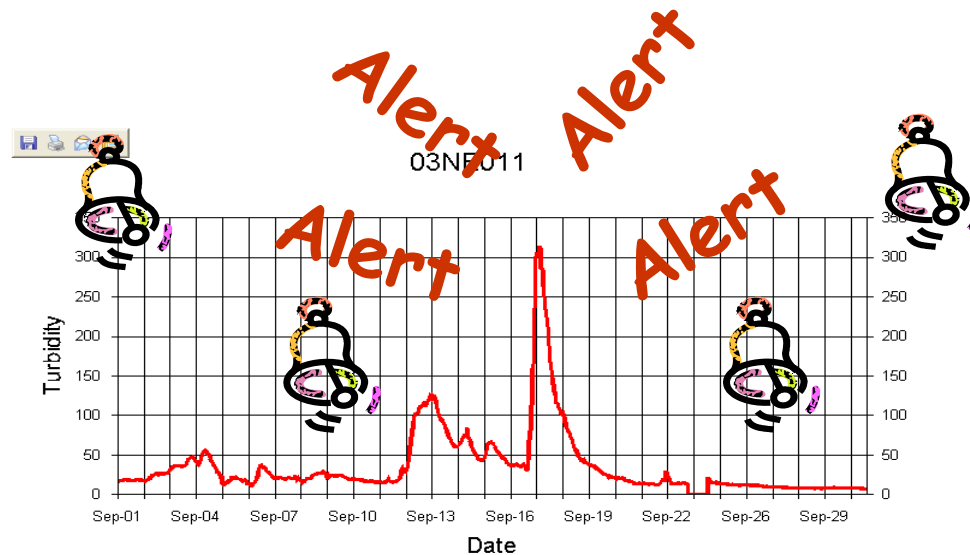


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# NL Real-Time Water Quality Monitoring Network

The main objective of the NL Real-time Water Quality Monitoring Network is to act as an early warning system



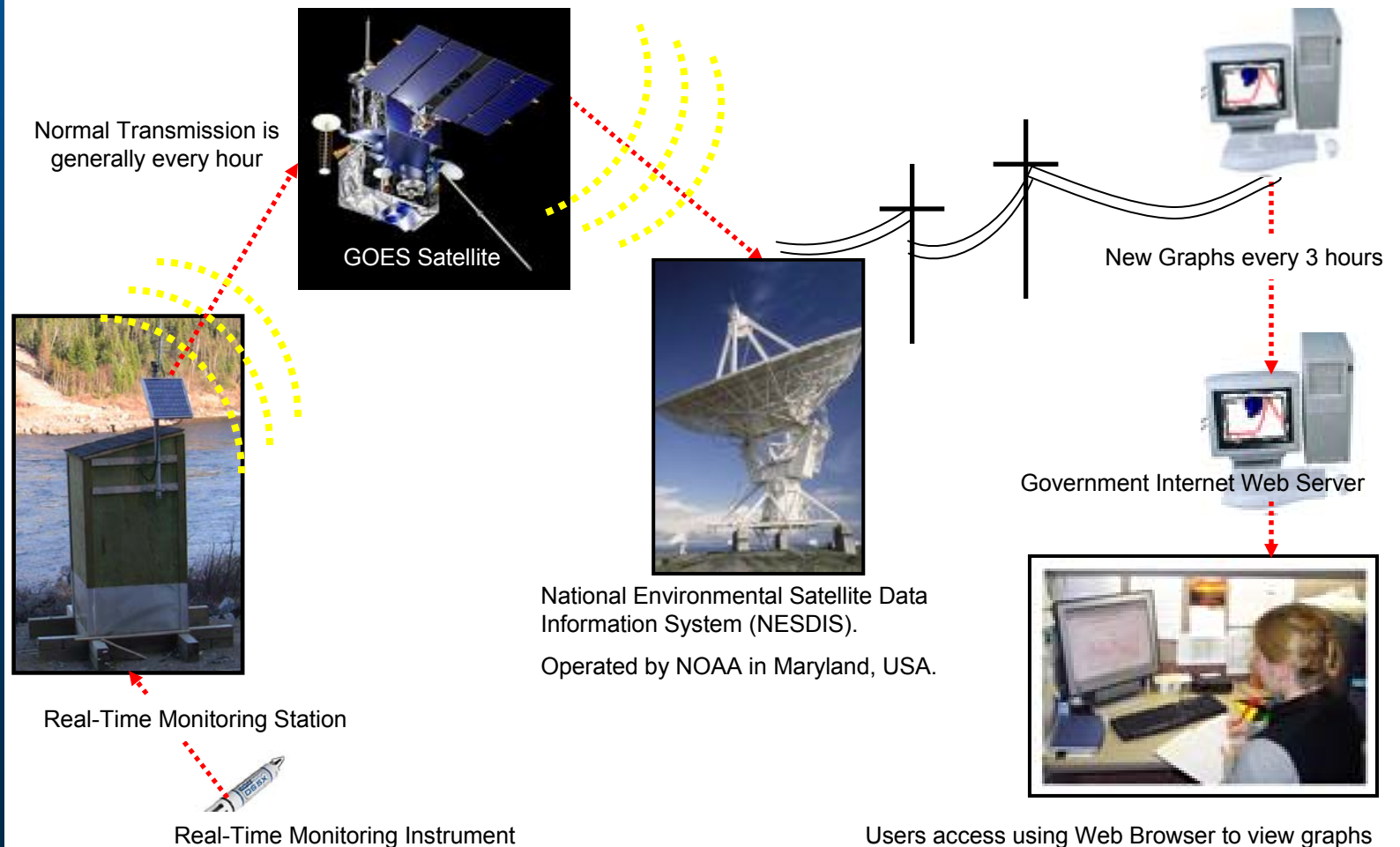
Last Reading: Oct-01-2004 11:41AM Turbidity = 6.9

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Use this system to reassure anyone that has concerns about the impacts of various projects on water resources

# Real-Time Communication for NL Network



# Can Government and Industry Work Together??

**Absolutely!!**

This program is not  
punitive in nature;  
government and industry  
work together to  
minimize impacts on the  
environment

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# Real-time Network in NL

Network consists of:

- 4 stations - provincial government (3 stations established; 1 station under construction)

- 22 stations – industry partnership (17 stations established; at least 5 additional stations under construction summer 2010 & 2011)

- 3 stations – federal government partnership (3 stations established)



**Teck**





Partnership between government and industry can minimize the impact to aquatic ecosystems due to surrounding development

- Case Studies -

# Case Study – Vale Inco NL Ltd. Voisey's Bay

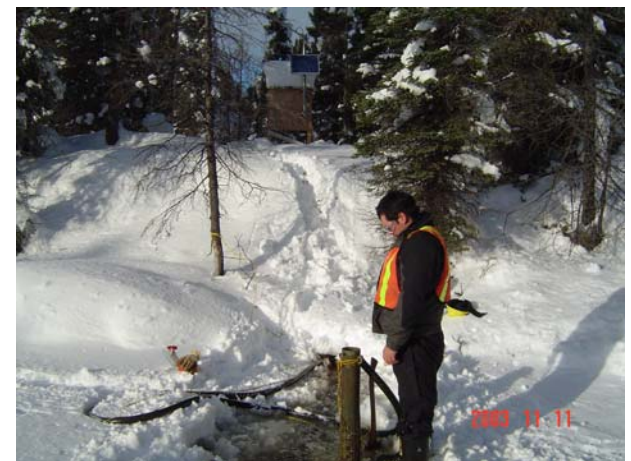
- ▶ In 1993 one of the most substantial mineral discoveries of Canada in the last 40 years was made at Voisey's Bay, Labrador.
- ▶ A bowl-shaped ore deposit (known as the "Ovoid") has surface dimensions of approximately 800 m by 350 m, extends to depths of about 125m and is currently being mined using open pit methods.
- ▶ Concentrator produces a high-grade nickel concentrate, a mid-grade nickel concentrate and a copper concentrate.





# Case Study – Vale Inco NL Ltd. Voisey's Bay

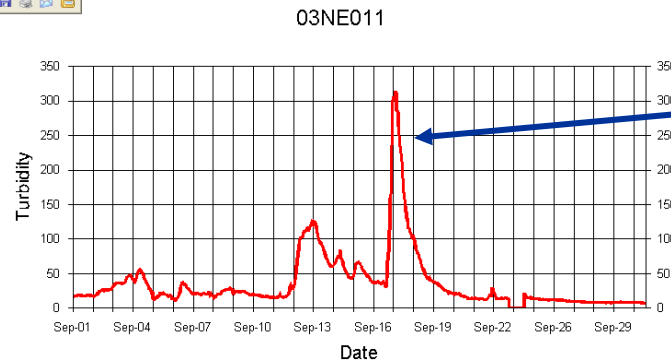
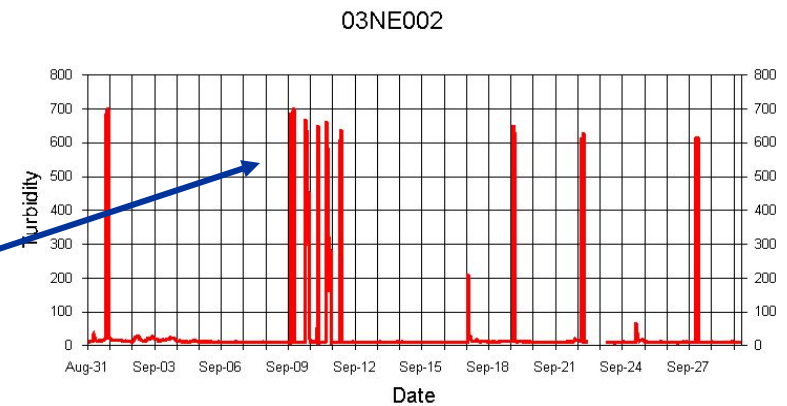
- ▶ There are a total of five real-time water quality monitoring stations within the network.
- ▶ 4 surface water quality monitoring stations:
  - Upper Reid Brook
  - Lower Reid Brook
  - Tributary to Lower Reid Brook
  - Camp Pond Brook
- ▶ 1 groundwater quality monitoring station (to be established Summer 2010):
  - Well at Tailings Dam



# Case Study – Vale Inco NL Ltd. Voisey's Bay

- ▶ Able to identify and address water quality issues much more quickly minimizing the damage to the aquatic ecosystem.

Increased turbidity due to dewater activity and failure of settling pond pump at Camp Pond Brook station (Sept-Oct. 2003) during mine construction activities; instituted mitigative measures



Increased turbidity at Lower Reid Brook station due to surface runoff from construction activity in the ovoid area (Sept. 2004); instituted mitigative measures

Last Reading: Oct-01-2004 11:41AM Turbidity = 6.9

# Case Study – Vale Inco NL Ltd. Long Harbour

- ▶ New hydrometallurgical process developed by Vale Inco – “hydromet” process
- ▶ Able to process the nickel concentrate directly to metal products without first having to smelt the concentrate.
- ▶ Vale Inco has selected a site near Long Harbour, NL as the location for the processing plant.
- ▶ More economical and environmentally friendly since the sulphur dioxide and dust emissions associated with a smelter are eliminated.
- ▶ The process will also yield more of the valuable cobalt which is lost to a great extent in the smelting process.



# Case Study – Vale Inco NL Ltd. Long Harbour

- ▶ Engineering, procurement and environmental planning for the processing plant in Long Harbour began in 2006.
- ▶ Initial construction began in April 2009 and is expected to be completed by February 2013.
- ▶ 3 surface water quality monitoring stations:
  - Rattling Brook Big Pond  
(established Oct. 2009)
  - Rattling Brook below Brook  
(established Dec. 2006)
  - Rattling Brook below Plant Discharge  
(established Oct. 2009)
- ▶ Additional water quality monitoring stations will be established as the project moves further into construction and operation.



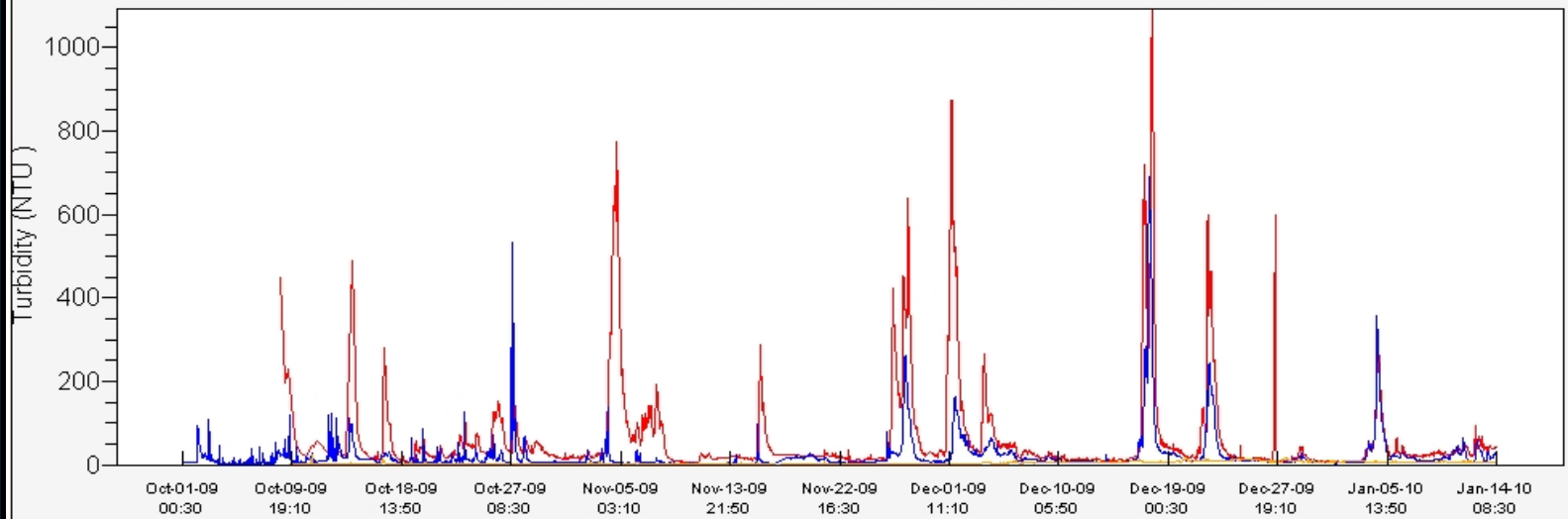
# Case Study – Vale Inco NL Ltd. Long Harbour

Throughout the fall months, construction continued onsite and coupled with the high precipitation, turbidity values were peaking frequently.



## TURBIDITY Multi-Station Comparision

Department of Environment & Conservation Water Resources Management Division



NF02ZK0025 - Rattling Brook below Plant Discharge

NF02ZK0023 - Rattling Brook below Bridge

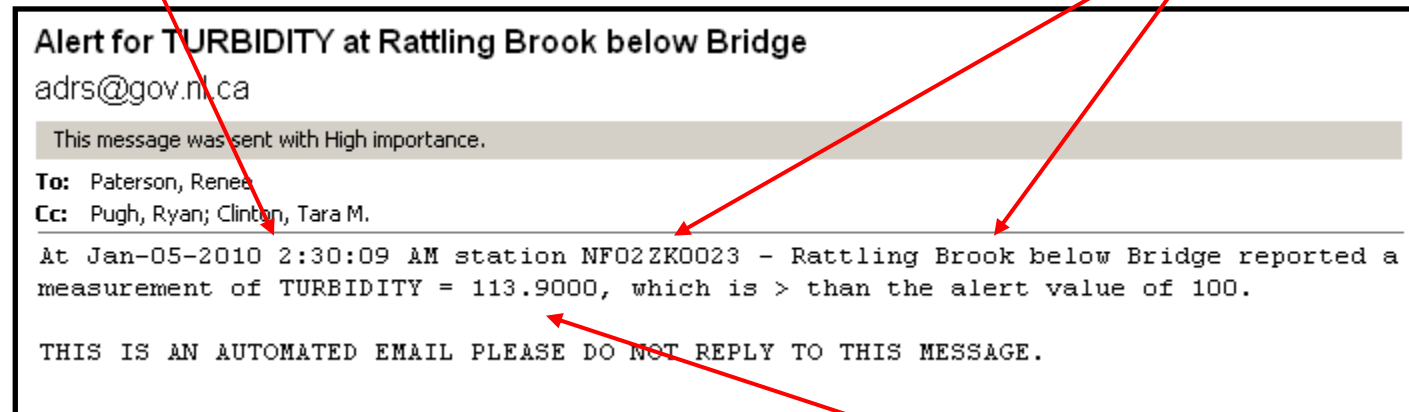
02ZK007 - Rattling Brook Big Pond

# Case Study – Vale Inco NL Ltd. Long Harbour

- ▶ Implemented an auto-alert system (through email) that notifies industry and government personnel when turbidity values have risen above a specified trigger.

Date and Time

Station Number & Name



Turbidity Value Recorded

- ▶ In Dec 2009, auto alert system identified high turbidity for several days on site. With this knowledge Vale Inco NL decided to temporarily stop work and focus on water management issues.

# Case Study – Vale Inco NL Ltd. Long Harbour

- ▶ Government in partnership with industry is continually working to improve the situation by:
  - monitoring the aquatic ecosystem hourly
  - alerting to water quality events to allow timely response
  - establishing settling ponds to combat the sediment
  - educating subcontractors and on-site personnel to report/respond immediately to water quality events



# Case Study – Nalcor Energy Lr. Churchill Project

- ▶ The Churchill River in Labrador is a significant source of renewable, clean electrical energy; however, the potential of this river has yet to be fully developed.
- ▶ The existing Churchill Falls generating station, which began producing power in 1971, harnesses about 65 % of the potential generating capacity of the river. The remaining 35 % is located at two sites on the lower Churchill River, known as the Lower Churchill Project .
- ▶ The Lower Churchill Project is the most attractive undeveloped hydroelectric project in North America.





# Case Study – Nalcor Energy Lr. Churchill Project

- ▶ The Project consists of two sub-projects:
  - Generation
  - Transmission
- ▶ The Lower Churchill Generation Project's two proposed installations, **Gull Island** and **Muskrat Falls**, will have a combined capacity of 3,074 MW and can provide 16.7 Terawatt hours of electricity per year.
- ▶ The joint Federal and Provincial environmental assessment process was initiated for the generation project in December 2006; continues to date.

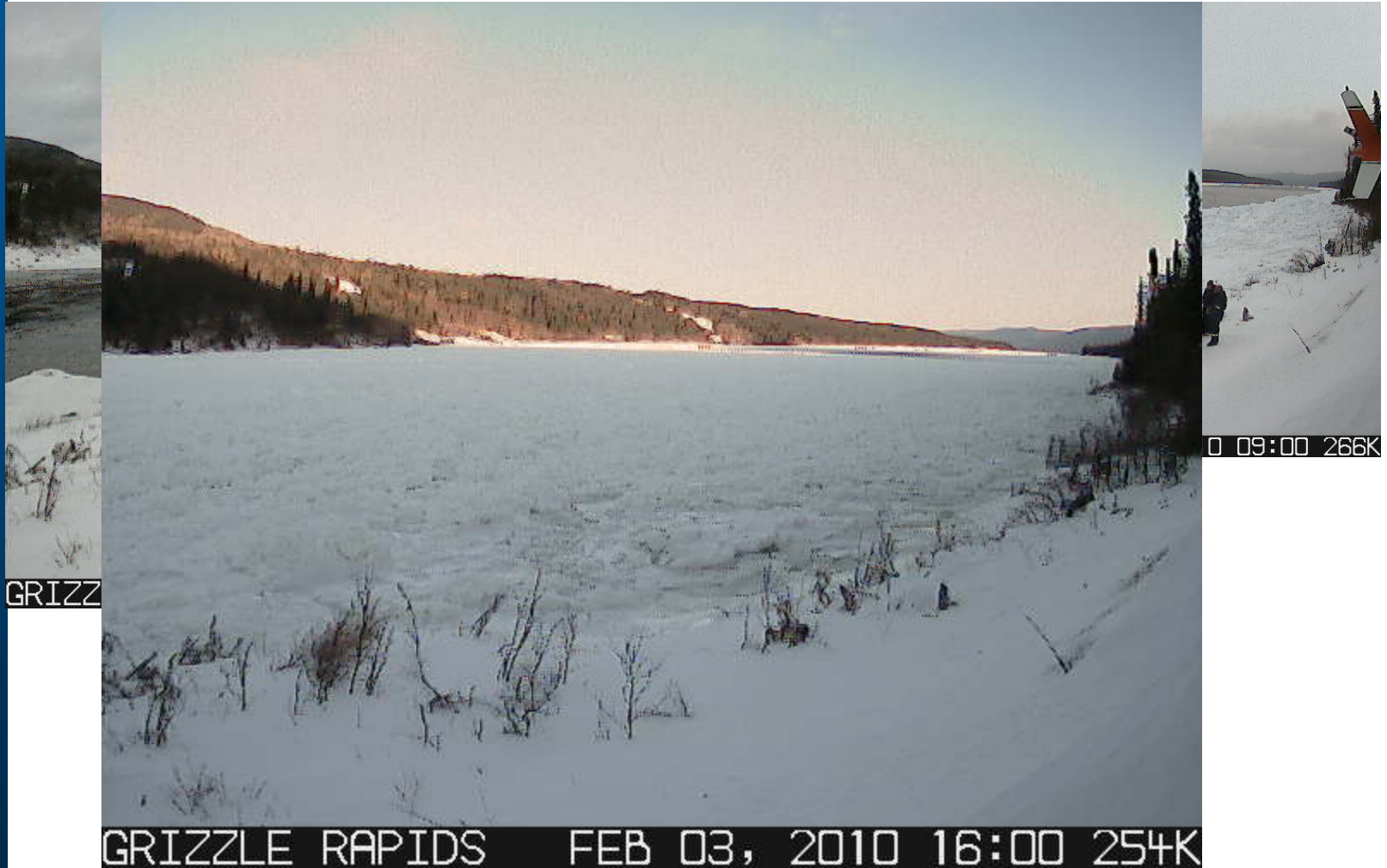


# Case Study – Nalcor Energy Lr. Churchill Project

- ▶ There is a total of six real-time stations established on the Churchill River to date:
  - 4 real-time water quality and quantity stations
  - 2 real-time water quantity stations
- ▶ There will be three additional stations established on the Churchill River over the next two years.
- ▶ The overall aim of the network is to collect baseline water quantity and quality information prior to construction.
- ▶ Testing new technologies such as real-time cameras; iridium communication; automated GHG monitoring systems; etc.

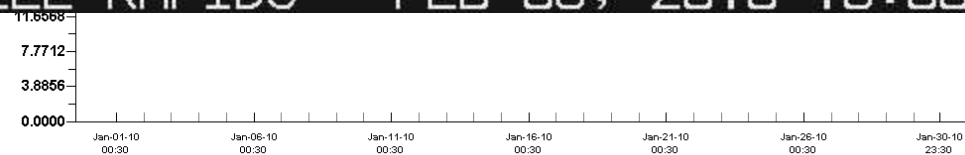


# Case Study – Nalcor Energy Lr. Churchill Project



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# Conclusions / Path Forward

- ▶ Government agencies and industries can definitely work in partnership to proactively minimize impacts to aquatic ecosystems due to development.
- ▶ The NL Real-Time Water Quality Monitoring program is an example of successful partnership and stakeholder engagement.
- ▶ Will continue to partner with industry (through the EA process) to ensure the province's ambient water resources are proactively being assessed and protected.
- ▶ Will continue to improve and re-evaluate the current real-time water quality monitoring program (ie: new protocols; improved QA/QC; timely reporting; etc.)
- ▶ Will continue to test and introduce new technologies to provide value-added products to partners.



# New Technology

## Instrumentation

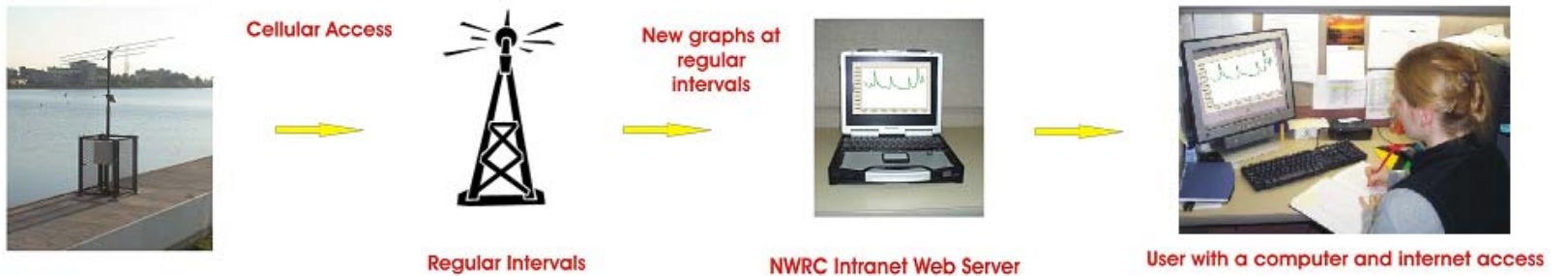


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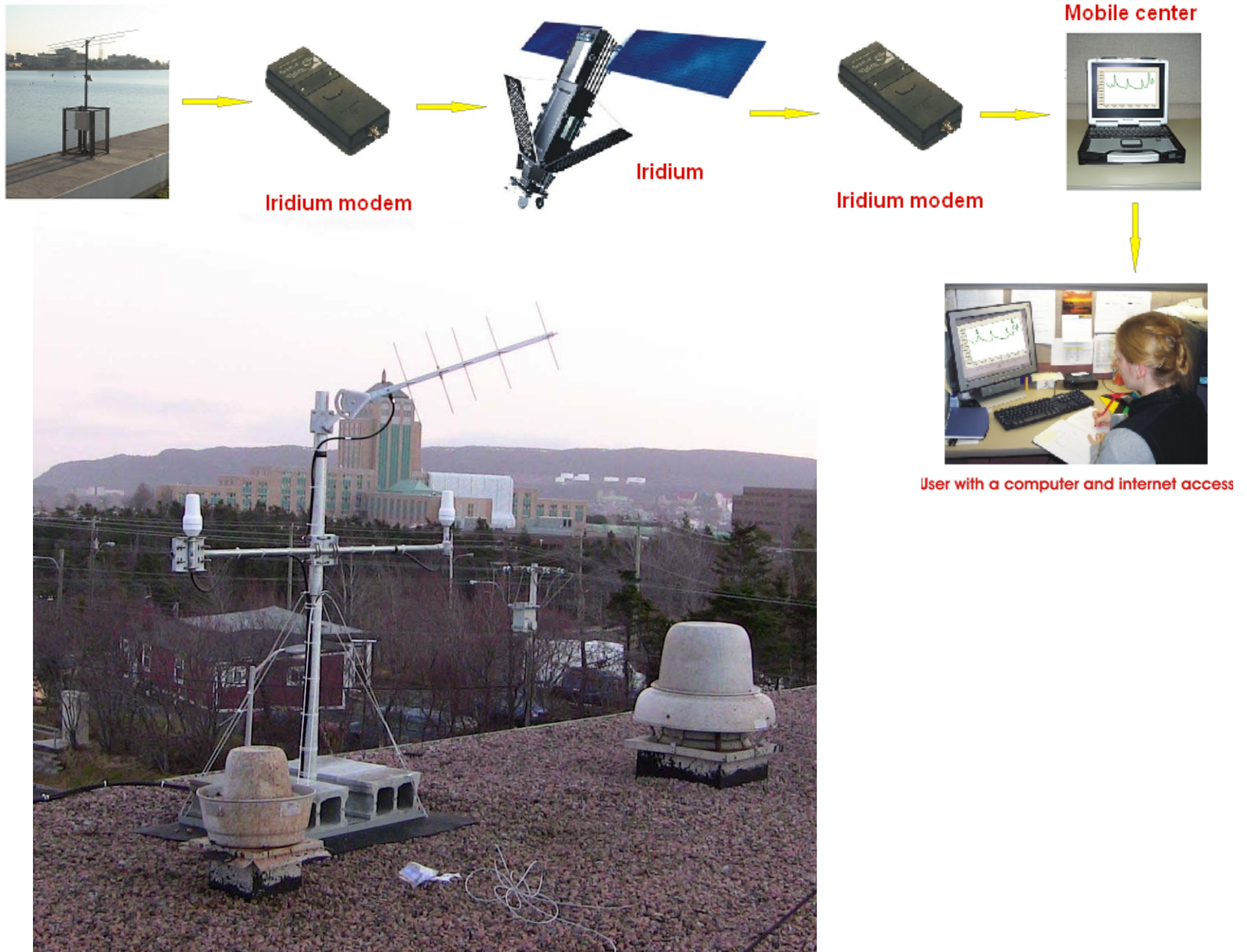
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# New Technology

## Communication Options



# New Technology



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3rd Real-Time Water Quality Workshop  
to be hosted in  
St. John's Newfoundland & Labrador  
in June 2011

All Are Welcome!!!

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# Thank You

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