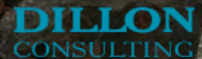


EnviroTech 2019

REMOTE AND NORTHERN CHALLENGES ASSOCIATED WITH IMPLEMENTING A LARGE-SCALE GROUNDWATER MONITORING PROGRAM ACROSS THE NORTHWEST TERRITORIES

April 25, 2019

Beth Cowan, M.Sc., P.Geo

The logo for Dillon Consulting, featuring the word "DILLON" in a bold, blue, sans-serif font above the word "CONSULTING" in a smaller, blue, sans-serif font. A stylized blue line graphic is positioned above the text.

DILLON
CONSULTING

Northwest Territories



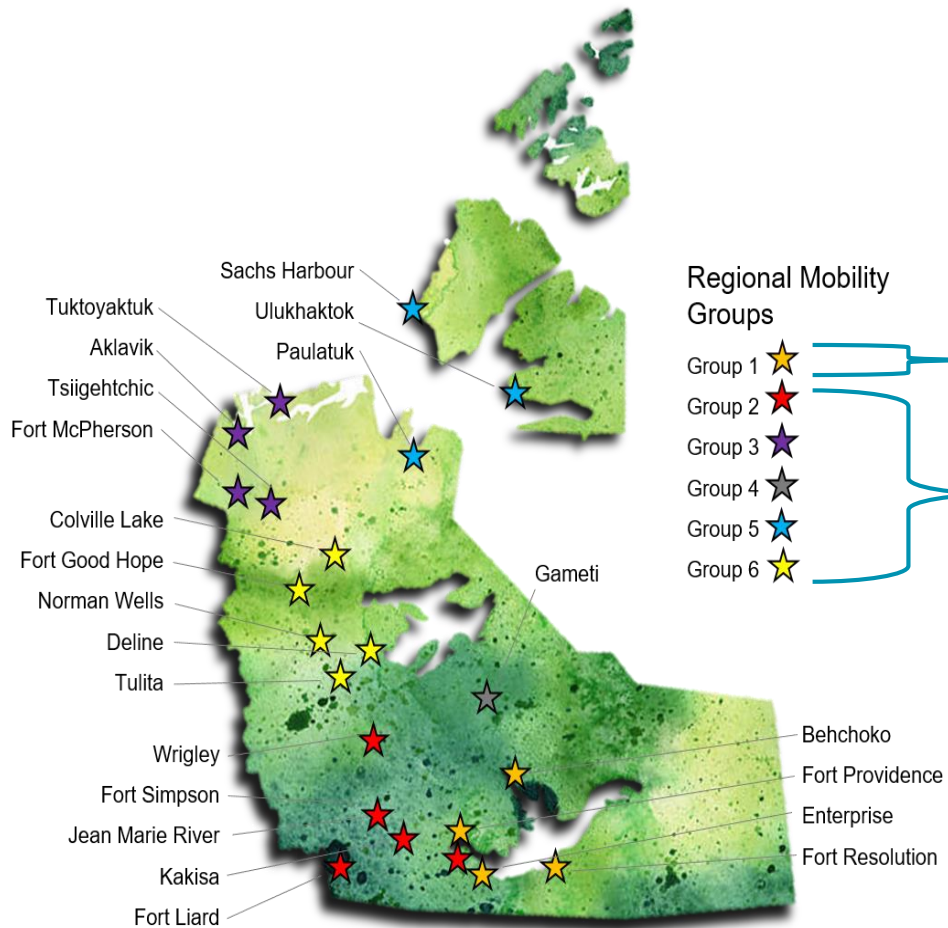
NWT Bureau of Statistics, <https://www.statsnwt.ca/community-data/>

Program Objectives

Program Objectives

- Drill and install monitoring wells to provide a monitoring network in the vicinity of active and decommissioned solid waste and sewage lagoon facilities
- To provide long-term monitoring locations for the assessment of potential impacts to the groundwater and surface water adjacent to the facilities





Regional Mobility Groups

- Group 1
- Group 2
- Group 3
- Group 4
- Group 5
- Group 6

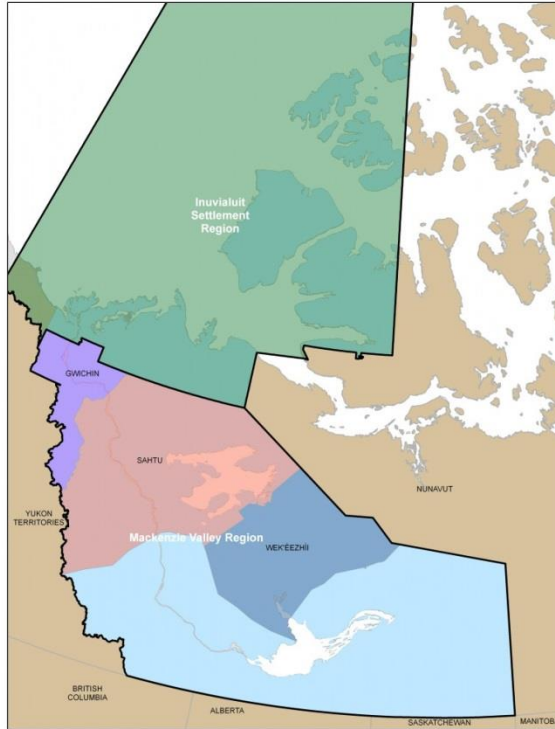
Dillon's Role (2016-2022)

Monitoring & Sampling

Drilling, installation,
sampling, and
monitoring

Planning and Logistics

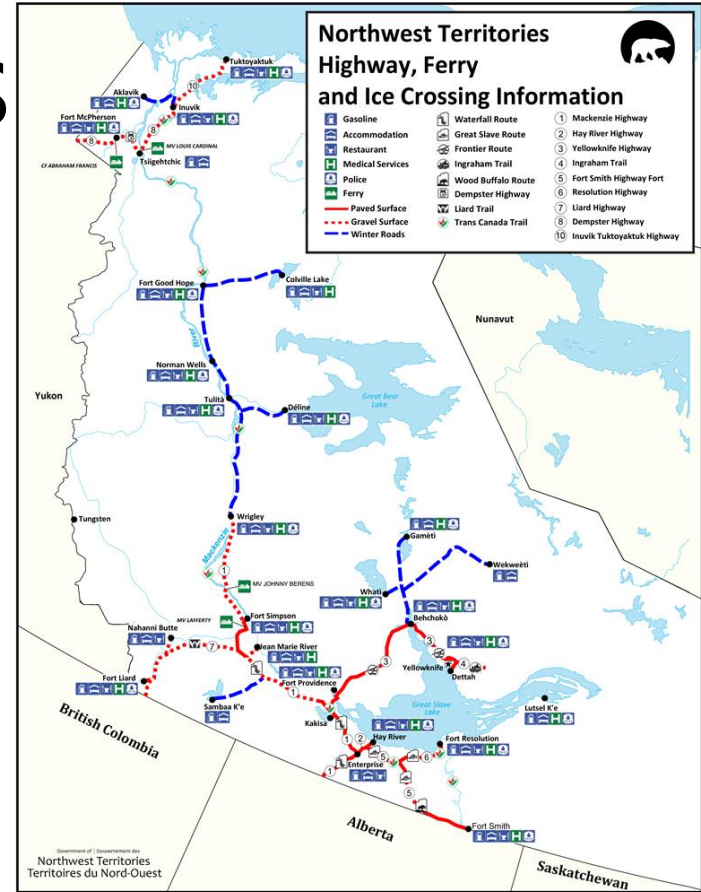
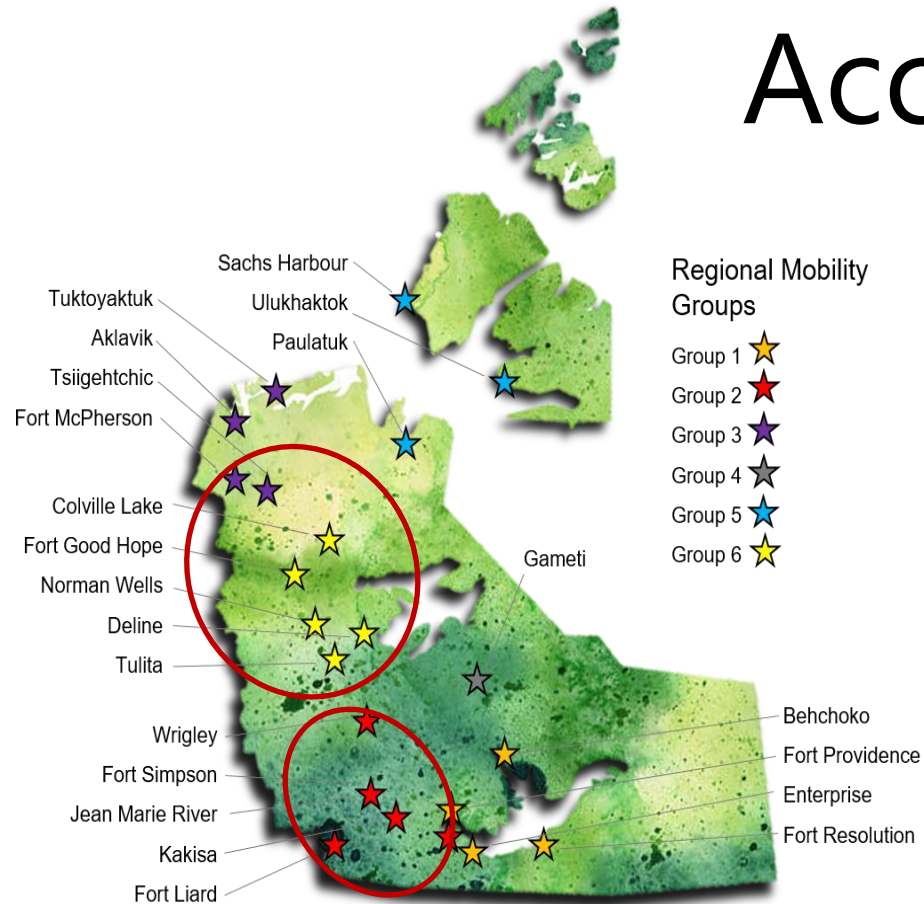
Permitting



- Land Use Permits
- Stakeholder Consultation

<https://www.nwtboardforum.com/process/overview/about-the-nwt/>

Access



<https://www.inf.gov.nt.ca/en/highways>



Installation and Monitoring

Drilling Methods



Track Mounted Drill Rig

Access by Highway and Winter Road



Community Maintenance Equipment

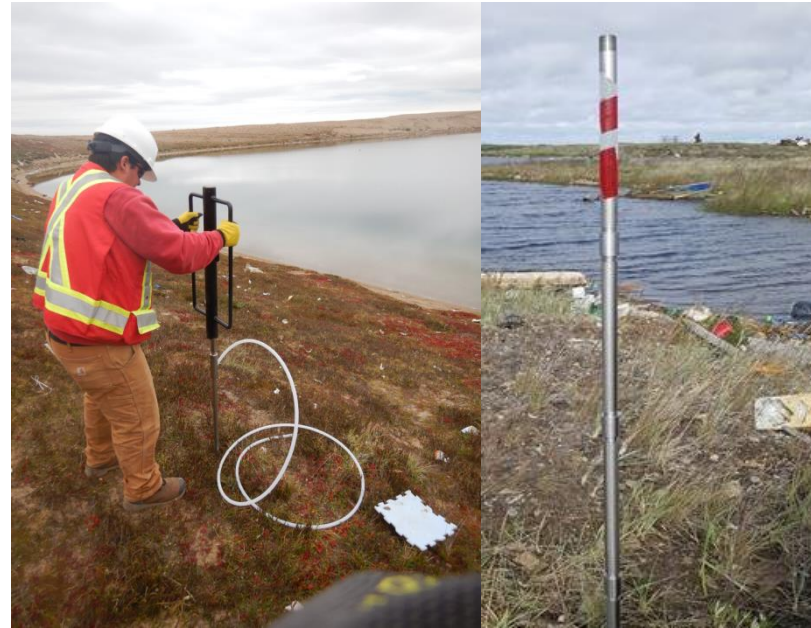
Rented from the Community Government

Installation Methods



Prefabricated Monitoring Wells

Installed in Excavated Test Pits



Drive-Point Piezometer

Manual Installation with Slide Hammer

Sampling Methods



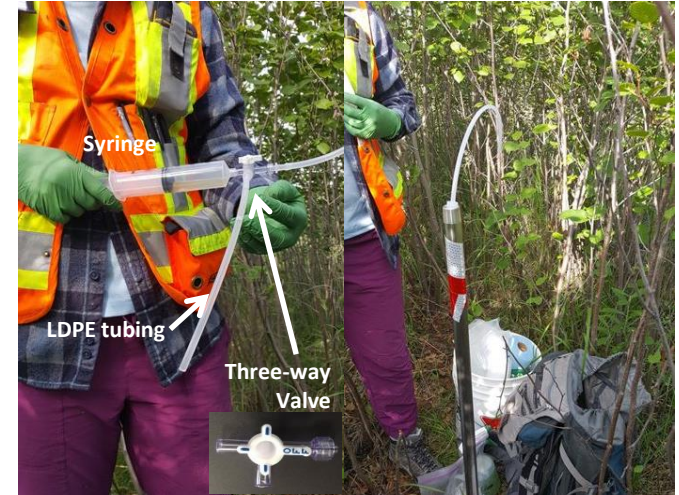
Bailer

Form of sampling Community staff can replicate



Peristaltic Pump

Not enough water for proper Low-Flow and Flow through Cell Sampling



Syringe Method

To augment peristaltic pump for Communities (Provided a backup when the pump didn't get shipped)

Surface Water Sampling



Sewage Lagoon



Solid Waste Facility with marine
influence

Training

Community Training



- Health and Safety
- Sampling Procedures
 - Bailer & Syringe Methods
- Cross-contamination reduction
- Sample Integrity
- Headspace elimination
- Chain of Custody paperwork
- Preservatives

Community Manuals

GROUNDWATER AND SURFACE WATER FIELD SAMPLING MANUAL

PART 1: Health and Safety



When working on-site, the right equipment can make the task safer.

Landfills and lagoons can be dangerous areas to work. **AVOID** stepping on piles of garbage or large debris; they may be unstable at give way.

Help protect yourself by wearing work boots (steel-toed), safety goggles, hard hat and a reflective vest.



Standpipe Monitoring

1. At each well put on a new string.
2. Tie the end of the string to the well, plus an extra meter.
3. Cut the well, exposed end of the string.
4. Tie the bailer down the well.
5. Lower the bailer fills with water.
6. As the bailer fills when it reaches the bottom.
7. Retrieve the bailer when it is full by the stopper at the base.
8. Use the bailer tip/VOC sampler to push the sample into the bottle. Push the sample tip. Field filtration and pressurization.
9. When the sample bottle has been filled, place the stopper in the bottle.
10. Place sampled bottles into the cooler.
11. Discard gloves and sample once you are finished.

PART 3: Sampling Procedures



Chain of Custody

The sampler is responsible for the custody of the samples from the time they are collected to the time they are shipped in the cooler.

Examples of

PART 4: Sample Identification, Transport and Storage

Part 5: Sample Bottle Guide



Bottle numbers and types may vary depending on samples required

Challenges

Permafrost



Wildlife



Road Safety



Black Bear Aware



Grizzly, Grolar
and Polar Bear
Aware

Environment & Health and Safety



Weather extremes

Hottest and coldest temperatures in Canada



Weather Delays and Sampling Issues

(No flights for a week out of Sachs Harbour)

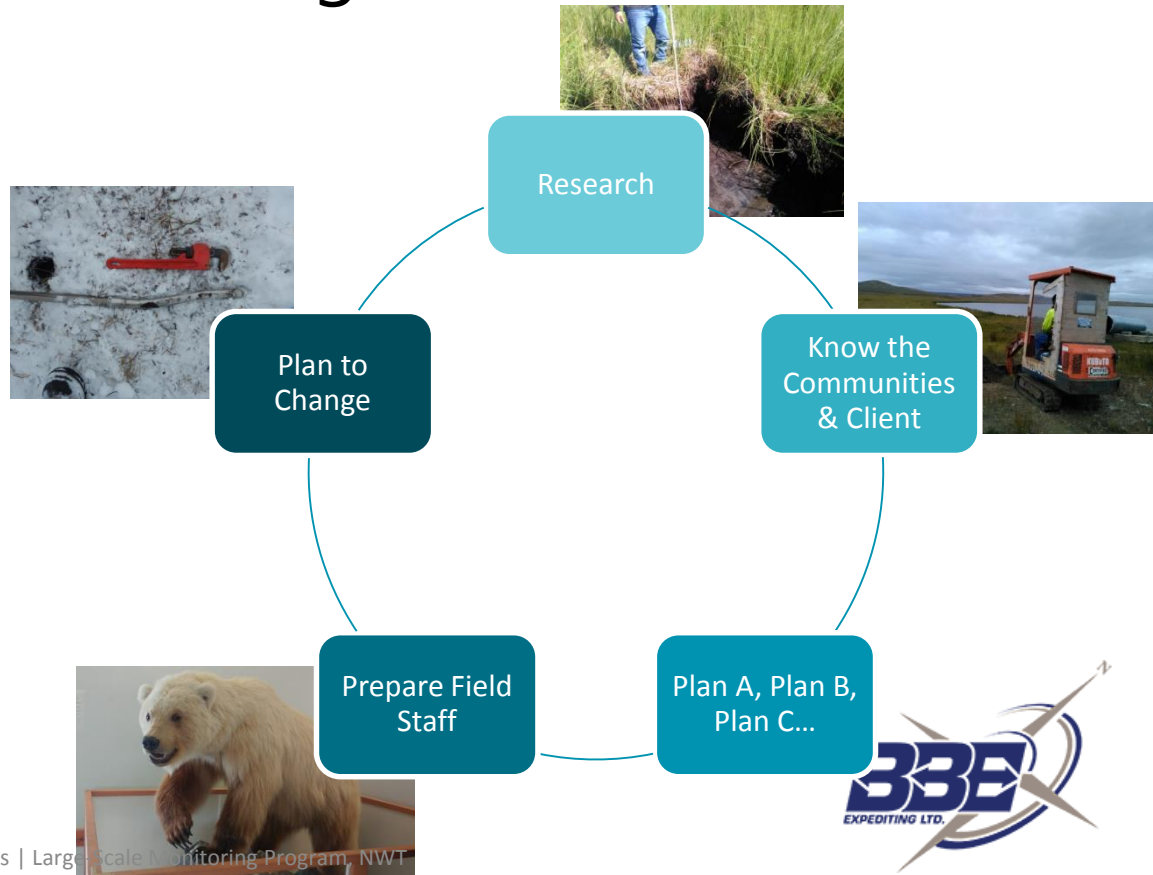


Closures

Ferries and road closures

Lessons Learned

Logistical Framework



Thank You

- **Community Governments of the Northwest Territories**
- **Hunters and Trappers Associations of the Northwest Territories**
- **Airlines of the North (Previously mentioned)**
- **Northwest Territories Community Foremen and Facility Operators**

- **Parminder Virk – Maxxam Analytics**
- **Judy Mah – Taiga Environmental**
- **Tom Clarke – BBE Inuvik**
- **Clean Harbors**
- **Northtech Drilling**

My Team of Field and Logistics Staff:

- **Brittany Armstrong**
- **Crystal Sabel**
- **Jennifer Spencer-Hazenberg**
- **Ceileigh Burns**
- **Barb Petrunic**
- **Erin Nelson**
- **Andrew Hounsell**
- **Andrew Russell**
- **Brittany Caissie**
- **Madison Warren**
- **Brad MacLean**

Equipment & Resources



Availability of Resources



Cost of Resources



Closures