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WATER CANADA THE COMPLETE WATER MAGAZINE

The Invisible Sediment

When clean water reacts…

Presentation for TRIECA
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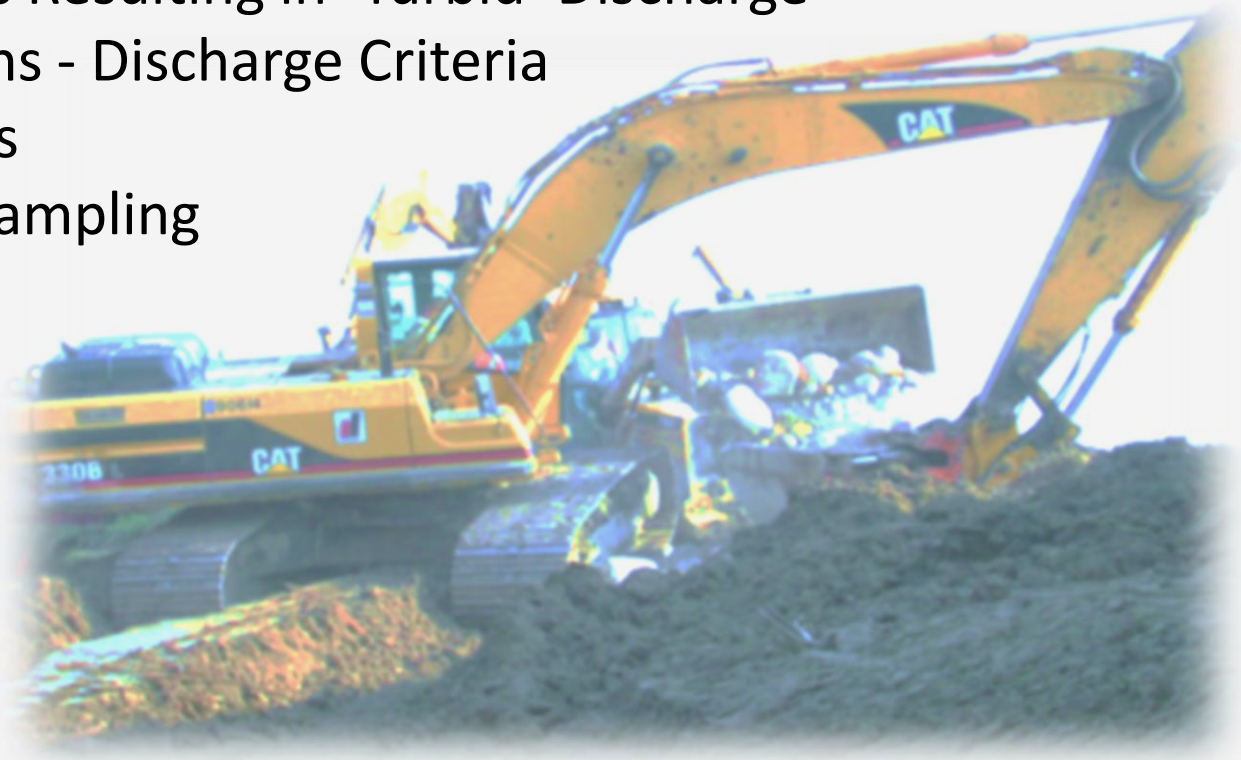
Introduction:

- Construction Dewatering
- Service Installations
- Grouting Operations
- Chemical Reactions Resulting in 'Turbid' Discharge
- Agency Expectations - Discharge Criteria
- Monitoring Options
  - Inspections and Sampling
- Troubleshooting
  the Inevitable



Discharge Options

- Discharge to Infrastructure Meeting criteria?
- Discharge to Environment Meeting criteria - visually?
- Transport Offsite to Approved Facility

Discharge to Environment

Federal Jurisdiction

- Fisheries Act
- CEPA
- SARA
- NWPA

Provincial Jurisdiction

- OWRA
- EPA
- CAA
- ESA
- LRIA

Municipal Jurisdiction

- Sewer Use By-Laws

Dealing with Water

- Dewatering/sumping is often required to complete even simple construction tasks.
  That means there is Discharge.
- Discharge can have chemical reactions with operations such as grouting, concrete pours or simply concrete pipe installation.
- Does the chemical compositions change?
  Is the discharge water still meeting compliance?

Best Laid Plans

- Groundwater is going to be encountered as a result of your construction activities.
- How are you going to deal with this water?
- What are your discharge options?

All of these details should be ironed out before construction starts!

Construction Activity Resulting in Unexpected Consequences

While discharging your small groundwater inflow into your excavation, you notice a milky white deposition appearing almost out of nowhere.

- *How can this be?*
- *Where is it coming from?*
- *How did this happen?*
- *Am I meeting discharge compliance?*
- *What are the impacts of this deposit on the natural environment?*

What this Can Look Like…

Agency Expectations

- Due Diligence
- 30m from watercourse
- Ongoing monitoring of Erosion and Sediment Controls
- Meet discharge criteria
- Spills Reporting
- Containment and Remediation
- Cleanup

Public Perception

- “Dirty” water leaving the construction site and environmental impacts?!
- Call agency/city to report

So WHAT is this Effluent?

Why is my clean water creating a milky white plume?

- Calcium carbonate ($CaCO_3$) is dropping out of suspension as a result of the interaction with the groundwater seepage and the on-going grouting / cement pour operations

- Calcium is a main component of these products and under certain conditions will precipitate out into a non-soluble mixture.

What are the Ecological Risks?

While calcium carbonate / calcium hydroxide are not directly toxic to fish species, there are several indirect factors that must be considered:

1. Change in pH – a high pH plume can have detrimental impacts on aquatic life. Long term exposure can change the soil and vegetation life as well

2. Deposition – this deposition can cover the bottom of the watercourse, suffocating invertebrates and other creatures that fish depend on. Depending on the substrate it can also fill up voids where spawning would naturally occur

Risk cont'd…

3. Public Perception – a white plume coming from a construction site "Big bad construction at it again!"

4. Clean-up Cost

During this process, pH levels can skyrocket to 10+. PWQO criteria for pH is 6.5 – 8.5, while sewer use criteria varies. Additional water quality monitoring (specifically a pH meter) may be required

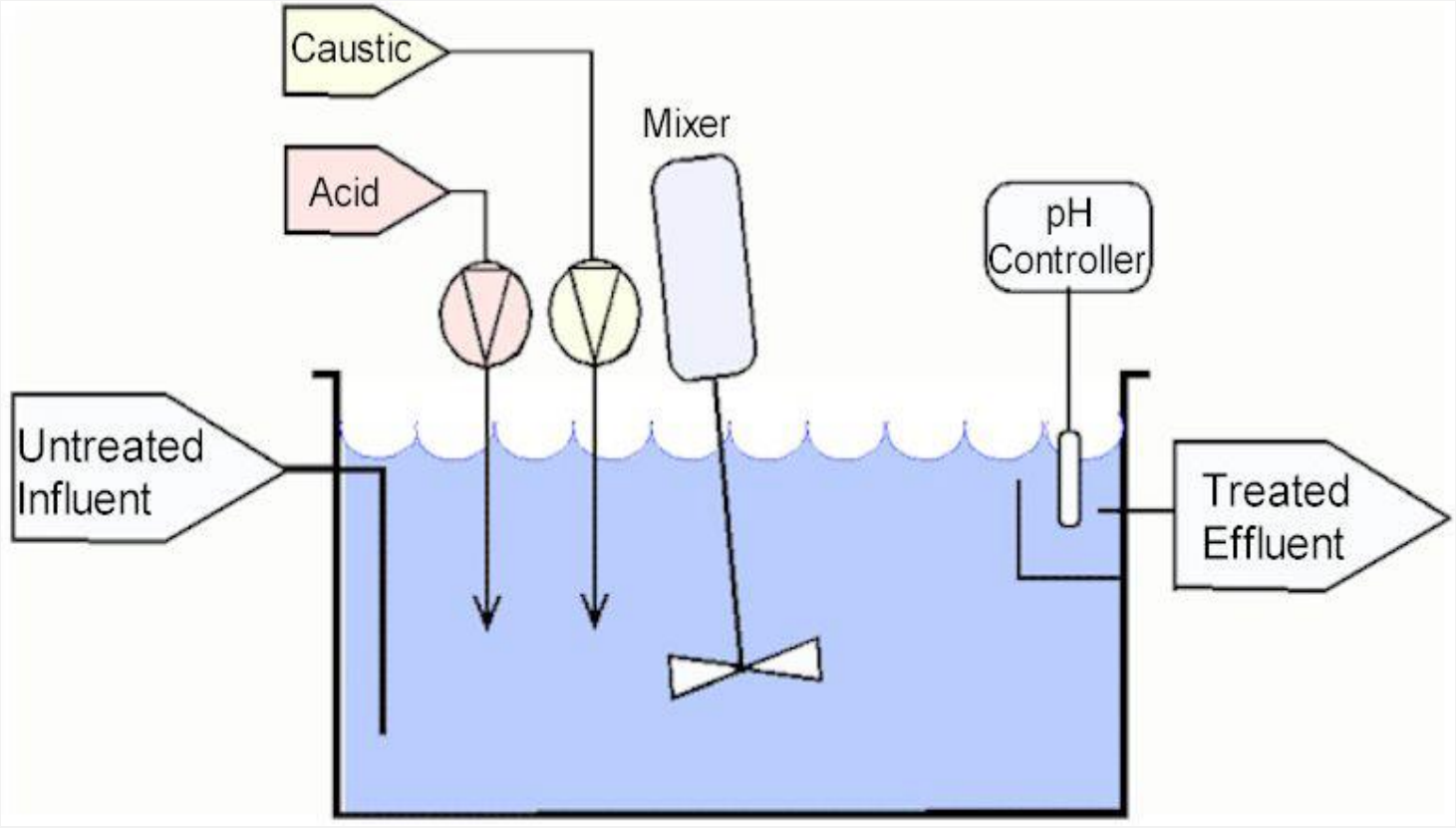
***** No PWQO or sewer use criteria for calcium *****

The Front Line – Mitigation Strategies?

- Typically when we see these instances of deposition appear they are under conditions where flows, specially groundwater in most cases, are discharged into natural environments
- Filtration regardless of water quality, monitoring of discharge, prediction of possible occurrences
- Limestone riprap – reduce pH, allows calcium to precipitate on the rock instead of in the environment
- Space – if you have it, use it! Precipitate on site in riprap, filter bags, geotextiles if possible

When typical treatments are not enough…

In larger scale projects with greater dewatering requirements, additional filtration tanks and pH adjusters may be required.



On-Going Monitoring

- pH monitoring of discharge effluent to meet criteria
- Water / soil sampling to ensure no hydrocarbons are entering the natural environment in conjunction with calcium precipitate
- Is the calcium depositing in the environment having an effect on plant life / aquatic life by suffocating? How long will it persist in the natural environment? Is clean-up required?

Clean-up

Should a large spill occur, cleanup and/or restoration of the creek may be required.

Things to remember:

- Permits (EC, MOECC, MNRF, CA, City etc.)
- Means and Methods?
- Monitoring and Reporting

Troubleshooting the Inevitable

Providing Mitigation Strategies prior to implementation of typical construction activities that result in this chemical reaction.

Does this happen everywhere? All the time?

- Identify activities such as grouting, cement pours on site while dewatering / sumping activities are occurring
- Ensure that all discharge waters are properly treated to meet applicable criteria.
- On-going monitoring of discharge waters, specifically when directed to natural environment to minimize impacts.

Questions?