Multisource Water Management & Treatment During Industrial Facility Construction

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Kitimat Modernization Project (KMP)
Project Highlights:

1) How did we get selected
2) Project challenge
3) Investigation and problem definition
4) Planning, design & implementation
5) Operational details
Kitimat Modernization Project (KMP)

- One of the largest construction projects in Canada today
- $3.4 Billion upgrade to the existing smelter
- Tervita, formerly HAZCO proposed a plan for demolition water treatment
- Opportunity developed into multi-source water management
Kitimat Modernization Project (KMP)  
Water Treatment Evaluation & Selection  

- Burnaby Lake Reference Project 200,000 cu.m Sediment removal & 1000gpm Water Treatment / Environmental Discharge  
- Burnaby Lake Tour During Bid Evaluation to show Tervita had Experience with Mobile Water Treatment
Kitimat Modernization Project (KMP)
Water Treatment Evaluation & Selection

• $18Million Burnaby Lake project won the 2011 APEGBC Environmental Award for Design Construction and Monitoring
• Tour Demonstrated Tervita could treat, monitor & discharge to environment using temporary mobile equipment
• Guaranteed discharge compliance with supporting data logging
Kitimat Modernization Project (KMP)
Water Treatment Evaluation & Selection

Tervita Sole Sourced to provide a Total Site Wide Construction Water Management Solution for Bechtel & Rio Tinto Alcan.

**Solution Included:**

1) Water Management Design
2) Implementing Best Management Practices
3) Facilitated Development of Construction Water Management Plan
4) Ministry of Environment Approval
### Project Challenges:

- Challenges, site to site might be similar but ....
- Solutions are site & water specific.

### The Objective – Schedule Driven – “No Excuses Allowed”:

#### Key Challenges

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<td>Existing Operations</td>
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<td>Water Conveyance over 99 hectares</td>
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Site: 2190mm Annual Precipitation
99 hectares (1100m x 900m)
Sources of Water:
- 2190mm Annual Precipitation
- North Coast Technical Term “It Rains Cats & Dogs”

Precipitation Contributes to:
- Surface Water
- Ground Water

Construction Water Management Plan
Estimated Treating 1800gpm (Average)
Best Management Practices (BMPs)
Team Agreement

SURFACE WATER
TYP. RAIN EVENT
TRANSFER TO CONSTRUCTION WATER MANAGEMENT PROCESS
COLLECTION WORKS OR PONDING
DISTRIBUTED SITE CONDITIONS WITHIN DELINATED CONTROL STRUCTURES OF A WORK ZONE
CONTACT WATER
TYPICAL UNDISTURBED SITE CONDITIONS
NONE CONTACT WATER
TO EXISTING STORM SYSTEM ON SITE

GROUND WATER
TYP. RAIN EVENT
TRANSFER TO CONSTRUCTION WATER MANAGEMENT PROCESS
GROUND WATER ENTERING EXCAVATION
EXCAVATION
WELL POINT
UNDERWATER GROUND WATER FROM WATER TABLE
DISTRIBUTED SITE CONDITIONS WITHIN DELINATED CONTROL STRUCTURES OF A WORK ZONE
CONTACT WATER
TYPICAL UNDISTURBED SITE CONDITIONS
NONE CONTACT WATER
TO EXISTING STORM COLLECTION WORKS

SURFACE WATER AFTER BACKFILL
TYP. RAIN EVENT
STANDARD SURFACE WATER SEDIMENT CONTROL MEASURES (i.e. Silt Fence, Mat)
LIMITS OF EXCAVATION
TYPICAL UNDISTURBED SITE CONDITIONS
NONE CONTACT WATER
CLEAN APPROVED EXCAVATION BACKFILL
TO EXISTING STORM SYSTEM ON SITE

At what point does it stop being “good for the garden”? 

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BMPs and Team Agreement lead to a Site Wide Management Process
Potential Contaminants of Concern (PCOCs)

Primary PCOCs:
- TSS (Total Suspended Solids)
- Aluminum
- Fluoride

How much of which goes with how much water and from where...?

“Chasing the P-COC”
THE PCOC Start Point

The Experienced Environmental Engineer (Roster Professional) gets to pick the start point while protecting the environment.
WATER MANAGEMENT – EVOLUTION

Water is coming from Everywhere
WATER MANAGEMENT – EVOLUTION
Develop Static & Dynamic Conveyance
WATER MANAGEMENT – EVOLUTION
Final Plan Addressing Site Challenges
CHITOSAN ENHANCED SEDIMENTATION LEACHING (CESL) is currently the Best Available Mobile Control Technology for short and long term site Water Management, Treatment and Monitoring.
Even Bigger Challenges – Making Everyone HAPPY!

- Stakeholder Management
  - Rio Tinto Alcan Plant Operations
  - KMP Team
  - Bechtel
  - Kitimat Community
  - Haisla First Nations
  - British Columbia Ministry of Environment
  - SNC Lavalin Environment
A Balanced Approach - Adaptive Management to Comply with Discharge
Solution:

- Adaptive Management Approach (AMP)
- Innovation - Advanced in-line monitoring
- Best Available Control Technology - CESF
- Control Scheme
Surge & Settling Pond Construction
Best Available Mobile Control Technology
Dynamic and Static Water Management
Initial Concept for Site Wide Water Management

Ground water transfer to lagoons based on an adaptive management approach as supported by the roster professional.

Undisturbed ground water from well point dewatering efforts.

Brownfield/greenfield construction excavation water, construction ground water, dewatering water.

Receiving silt/mud pond or mobile basins.

Primary settling pond.

TSS reject after final turbidity check.

Suspect water reject after TSS removal due to online failure or FLUORIDE, PH, CONDUCTIVITY.

Suspect water isolation for fluid, solids, or tanks or tanker trucks.

Accelerated TSS removal secondary settling pond.

Monitoring and control module:
- TSS removal
- Data logging
- Flow rate
- Online monitoring
- 0.0105gpm

Discharge limits & setpoints to be determined from an adaptive construction water management approach. Model, data, and limits to be confirmed with online monitoring & third party sampling as reviewed by the roster professional for adjustment during construction.

Monitoring
- Compliant water from online line
- Turbidity
- Fluoride
- PH
- Conductivity
- Hydrocarbons

Pre-treatment to pond after 1st turbidity check

Pre-treatment return for 2nd turbidity check

Existing continuous monitoring by AGT (RTA)

Existing continuous monitoring by AGT (TPA)

Douglas Channel

Lagoon A

Lagoon B

Site Wide Water Management

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FINAL Process for Site Wide Water Management
Inline Monitoring & Data Collection
Inflow Turbidity Vs Outflow

Comparison of Inflow and Discharge Turbidity
Inline Monitoring & Data Collection
Inline Fluoride vs Lab Fluoride

Fluoride: Comparison of Real Time to Laboratory Results

Pearson Product Moment Coefficient = 0.979

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Inline Monitoring & Data Collection
Conductivity vs Lab Dissolved Aluminum

Conductivity and D.Al: Conductivity as a real time surrogate measurement

Pearson Product Moment Coefficient = 0.772
Water Treated to Date 47,130,000 gal
HMI Touch Screen
Multisource Water Management & Treatment

There is Available Mobile Technology in this market place to address simple and complex Site Wide Water Management, Treatment & Monitoring

The Technology is Commercially Proven and Robust

The Technology is Applicable and Adaptable to:

- Land development
- Mining
- Oil and gas
- Industrial & Commercial Facility Construction or Expansion
Questions?