Multisource Water Management & Treatment During Industrial Facility Construction



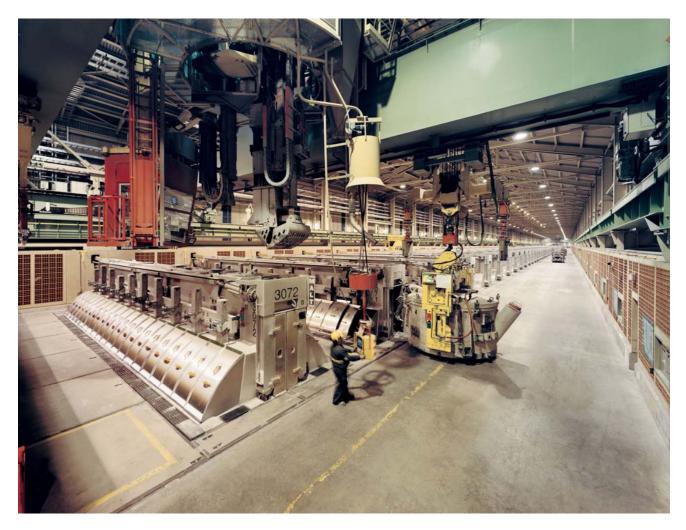
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Kitimat Modernization Project (KMP)





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 <u>Reference Project</u> 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







RioTinto 6



Project Challenges:

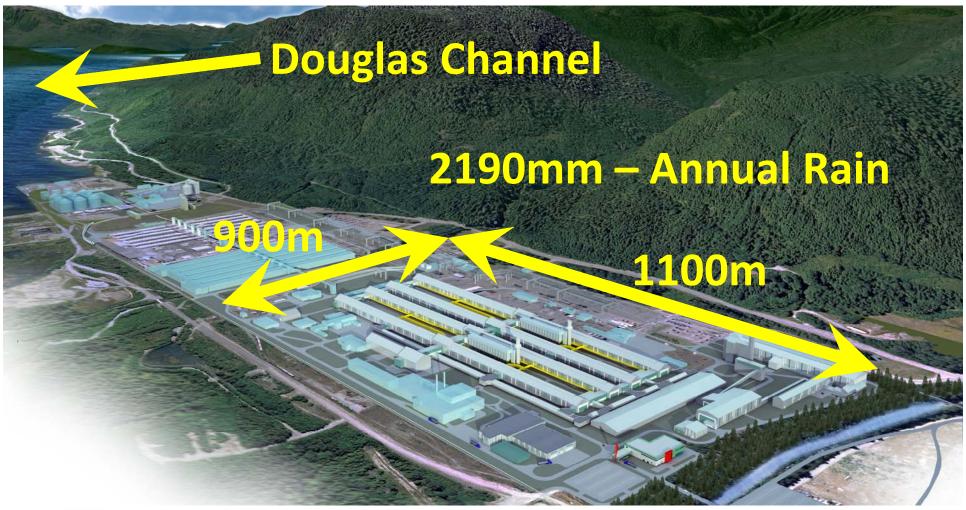
- Challenges, site to site might be similar but
- Solutions are site & water specific.

The Objective - Schedule Driven - "No Excuses Allowed":

Key Challenges			
•	Multiple Water Sources	•	Existing Operations
•	Multiple Contaminants	•	Budget Pressure
•	Multiple Contractors Generating Water	•	Technology Selection
•	Aggressive Schedule	•	Water Discharge Point
•	Water Conveyance over 99 hectares	•	Water Discharge Permit



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:

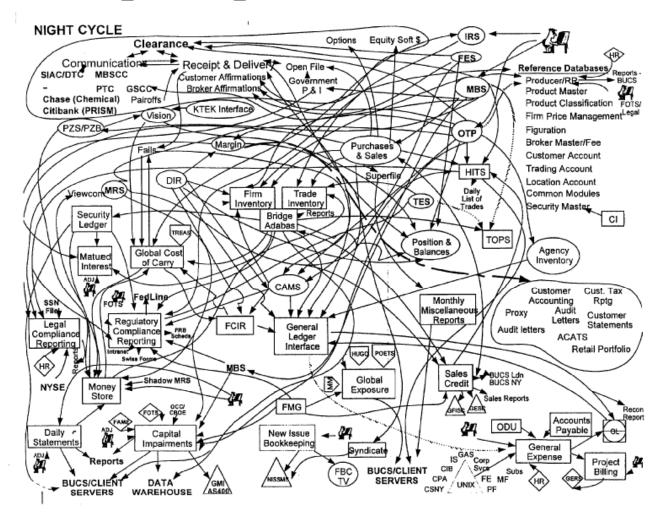
- Surface Water
- Ground Water

Construction Water Management Plan Estimated Treating 1800gpm (Average)



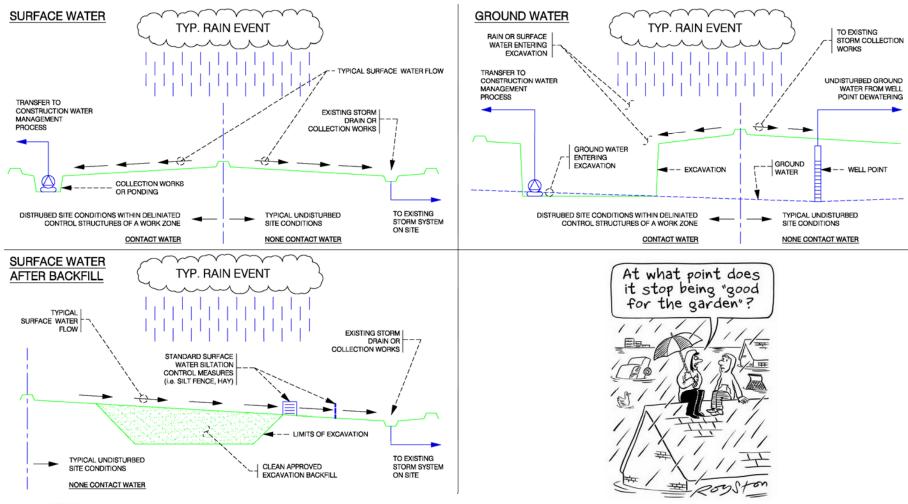


Where from? & How Much Water? OR Cats & Dogs Together.... Create Chaos



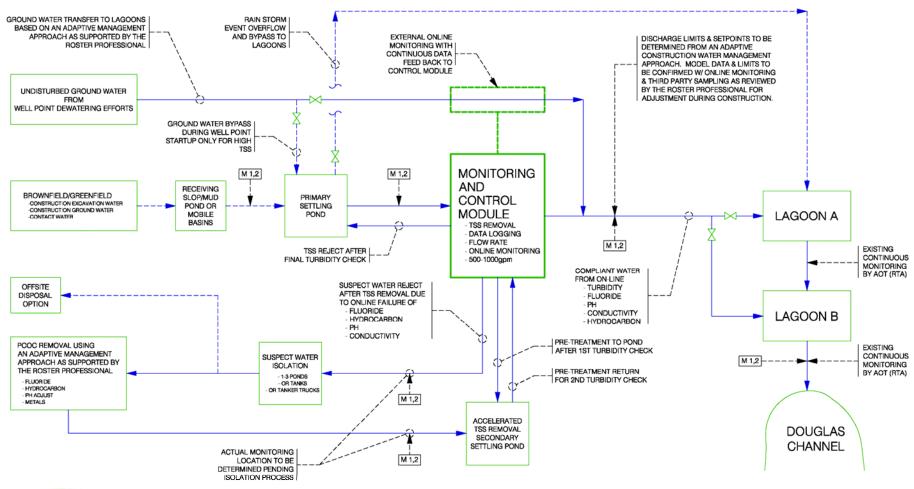


Best Management Practices (BMPs) Team Agreement





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"



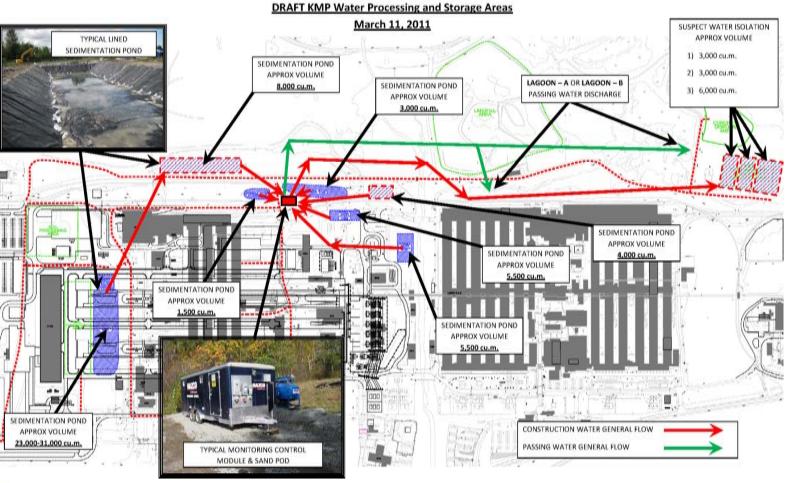
THE PCOC Start Point

The Experienced Environmental Engineer (Roster Professional) gets to pick the start point while protecting the environment



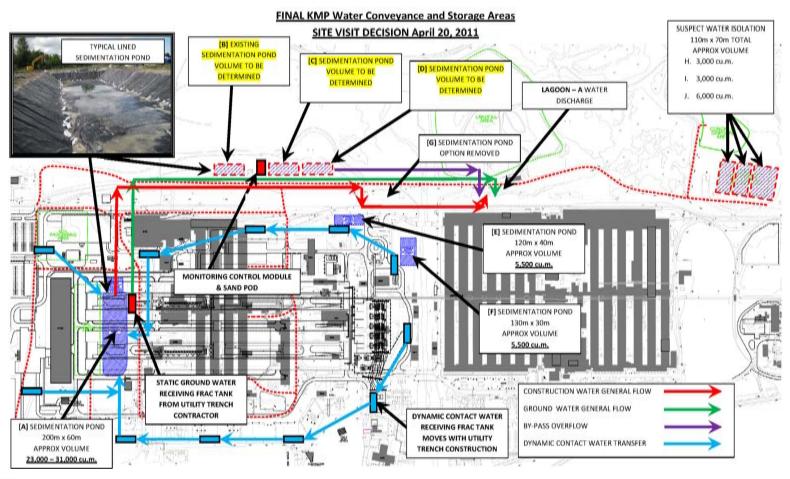


WATER MANAGEMENT – EVOLUTION Water is coming from Everywhere



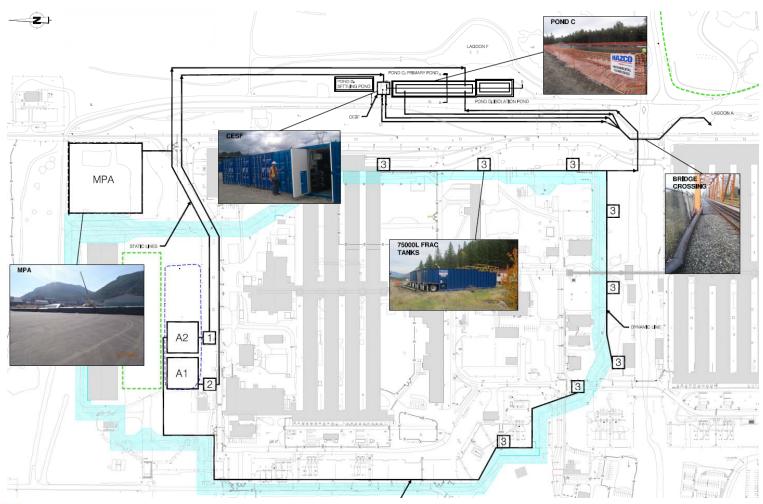


WATER MANAGEMENT – EVOLUTION Develop Static & Dynamic Conveyance



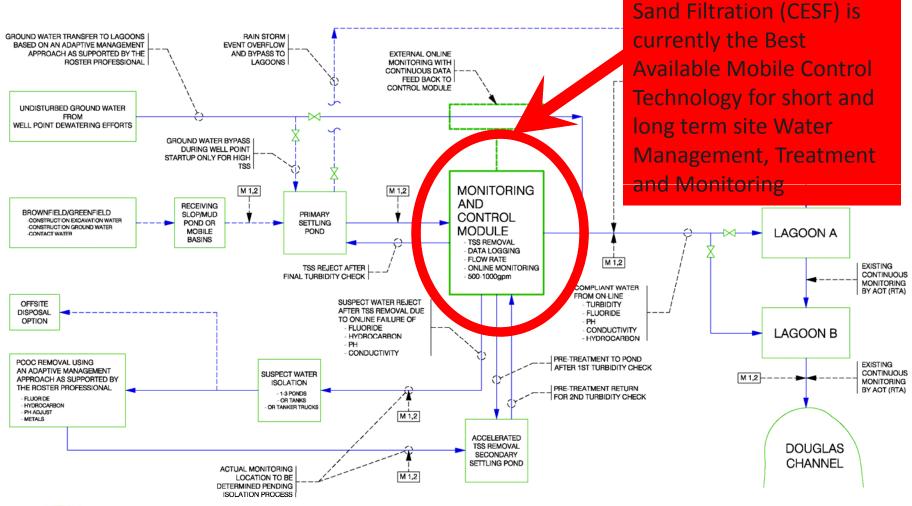


WATER MANAGEMENT – EVOLUTION Final Plan Addressing Site Challenges





TECHNOLOGY SELECTION





Supported by the EPA and

developed in Washington

State Chitosan Enhanced

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



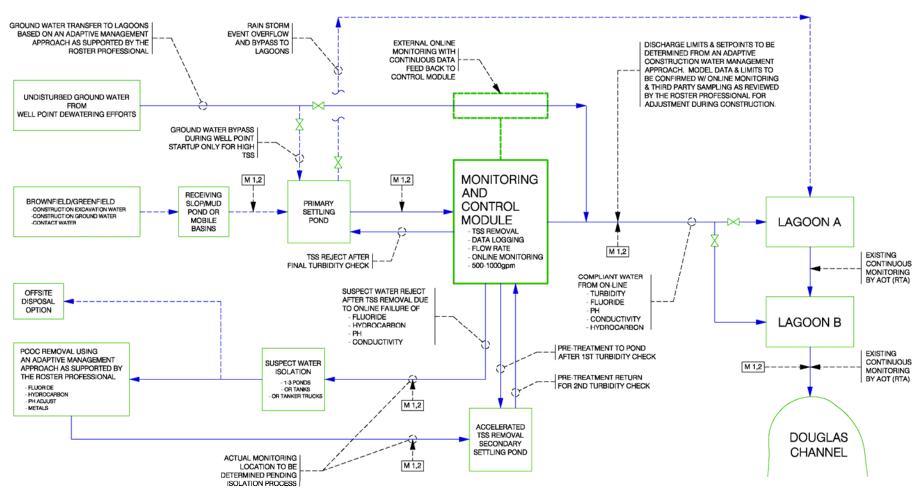


Dynamic and Static Water Management





Initial Concept for Site Wide Water Management





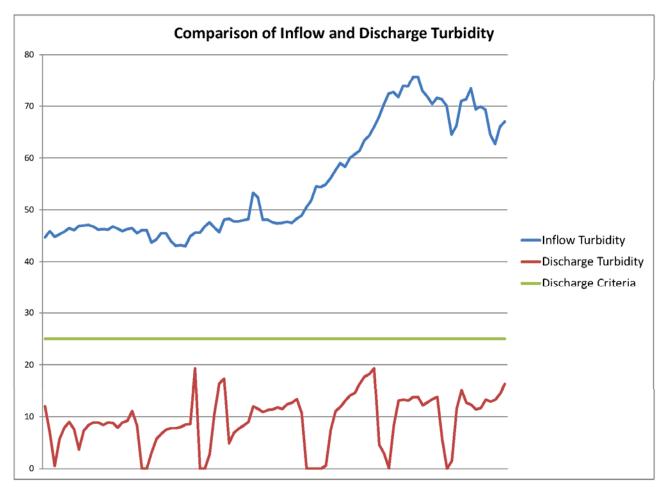
FINAL Process for Site Wide Water

Management TYP. RAIN EVENT 6IN DIESEL CONTACT WATER FROM THE WEST SIDE OF CONSTRUCTION AREA NON CONTACT WATER



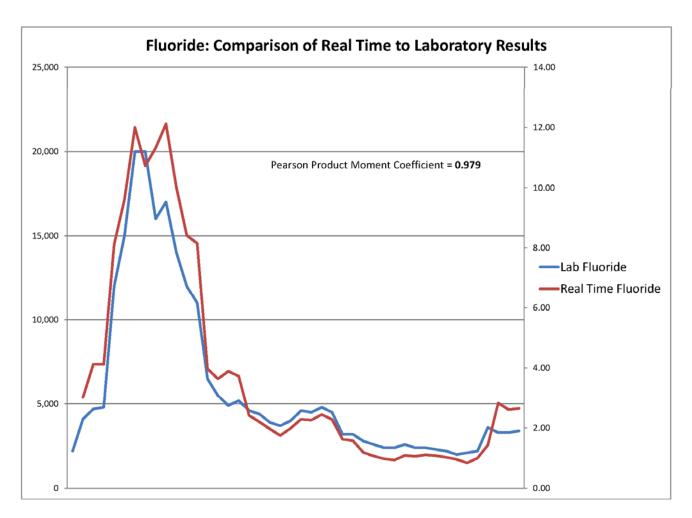
1 - STATIC CONTACT WATER RECEIVING FRAC TANK, SEE DETAIL

Inline Monitoring & Data Collection Inflow Turbidity Vs Outflow



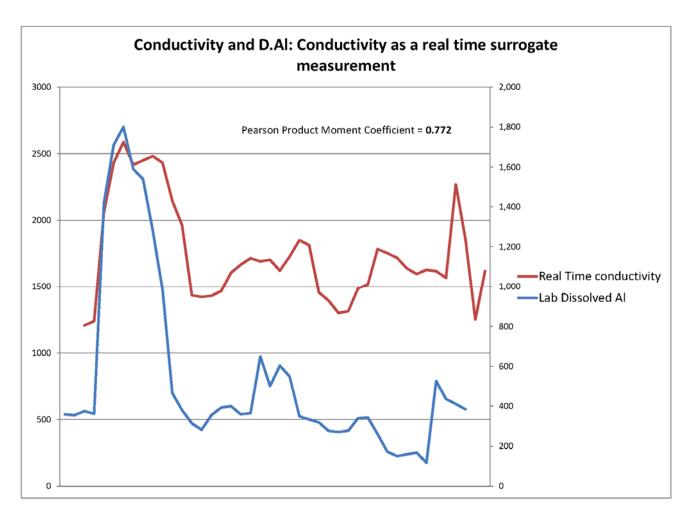


Inline Monitoring & Data Collection Inline Fluoride vs Lab Fluoride



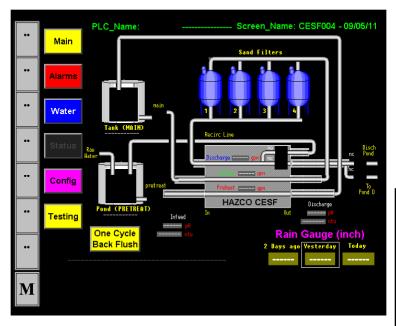


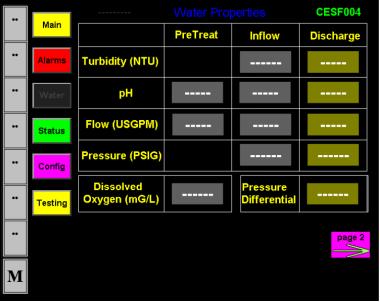
Inline Monitoring & Data Collection Conductivity vs Lab Dissolved Aluminum





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



