



Ymir Water Treatment Plant Regional District of Central Kootenay



Project Costs:

Grant Contribution = \$400,000

Community Reserve Contribution = \$200,000

Per user water rates after construction = **UNCHANGED at \$400 per year**

Designed and manufactured by BI Pure Water (Canada) Inc.

Project Lead: Don Nash P.Eng.

RDCK Staff: Rob Lang, Jesse Reel, Dave Rowe, Ken Anderson,
Shanna Eckman, Nicole Ward, Tom Dool.

Contractor: Custom Dozing LTD.



Key Objectives:

- Reduce our carbon footprint and maximize energy conservation
- Apply a triple bottom-line framework that met the financial, environmental and social goals of the community of Ymir and the RDCK
- Build sustainable infrastructure comprised of recyclable material, and energy efficient components
- Utilize construction techniques that had a low environmental impact, thereby reducing the carbon footprint.

Drinking Water Quality:

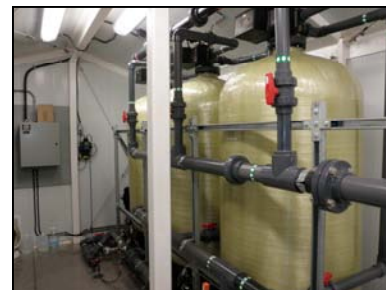
- The facility exceeds the 4-3-2-1-0 drinking water objectives established by the Interior Health Authority
- An analysis of the project was made using RETScreen Clean Energy Project Analysis Software, a support tool to evaluate the energy savings, costs, emission reductions, financial viability and risk for various types of Renewable-energy and Energy-efficient Technologies (RETs).

Energy Conservation:

- Minimum R40 structural insulated panels for ceiling ,R20 for walls
- Energy efficient lighting on motion sensors
- Gravity feed to the raw water pumps and for the distribution system
- Dual raw water pumps for seasonal flows
- High efficiency electrical motors and VFDs installed for flow control
- Solar powered exterior lighting.

Environmental Considerations:

- Utilize low impact construction techniques
- Utilize local resources where possible
- Recharge groundwater with naturally filtered, chemical free backwash water
- Exceed minimum riparian setbacks
- Utilize propane backup power to eliminate risk of liquid fuel contaminating the water supply.





British Columbia May 28, 2008

BI Pure Water (Canada) Inc. has designed and manufactured an energy efficient water treatment plant for the Town of Ymir in the Central Kootenay Regional District (RDCK) in British Columbia. Ymir was known as a booming mining town in the late 1800's.

This "green" facility is one of the first to employ an analysis and design based on Ymir and RDCK's goal – to reduce our carbon footprint and ensure that we are conserving energy where possible. The water treatment plant was assembled and tested at the BI Pure Water facility in Surrey, BC.



The water treatment process includes dual booster pumps, self-cleaning media filters, cartridge filters, ultraviolet primary disinfection and residual chlorination.

The following energy saving items were included in this plant:

- Minimum R40 structural insulated panels for ceiling
- Minimum R20 structural insulated panels for walls
- No windows for security and energy savings
- Insulated door
- Electrical heat with thermostat set to maximum 15 degrees C in winter
- Air exchanger for summer cooling
- Energy efficient lighting – T5 Fluorescents
- Interior lighting to be on motion detectors
- Exterior lights to operate on solar cells
- Gravity feed to the raw water pumps

- Two 5 HP raw water pumps for seasonal flows rather than one larger pump
- VFDs installed for flow control
- High efficiency electrical motors
- Schedule 80 PVC piping rather than stainless steel
- Aluminum checkerplate flooring rather than less durable vinyl.



Energy efficient Structural Insulated Panels mounted on a 12 x 36 foot steel base.

RDCK staff worked with BI Pure Water to design the plant within the budget and the energy efficiency guidelines. The Construction Permit was granted after detailed submittals to BC Interior Health. Don Nash, P.Eng. Manager of Engineering and Environmental Services for the RDCK commented “By working closely with BI Pure Water, we have designed and commissioned a leading-edge water treatment plant.”

BI Pure Water specializes in reviewing water quality test results and prescribing the most cost-effective solution. BIPW Engineers pilot, design, manufacture, install, start-up and commission package water treatment plants. The operators are then trained and the plants can be serviced on a regular basis. BIPW focuses on small and medium-sized water treatment plants to meet the needs of Federal, Provincial and Municipal Governments, Industrial Process, Private Water Systems, Resorts & First Nations.

BI Pure Water package water treatment plants are cost-effective because:

- The water treatment plants are custom Engineered to a specific water analysis.
- The plant can be built in the Port Kell’s factory where the trained staff work.
- Components & parts are readily available.
- The water treatment plant can be leak and flow tested.
- The PLC can be operated and debugged before shipping.

Contact: BI Pure Water at 604 882-6650 or info-bipurewater@telus.net
www.bipurewater.ca

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Climate Change, LEED Buildings & GREEN Infrastructure

Growing a Green Water Treatment Plant

Prepared by Don Nash (Manager, Engineering & Environmental Services, Regional District of Central Kootenay) and George Thorpe (Engineering Manager, BI Pure Water [Canada] Inc.)

EDITOR'S NOTE: This project has been named winner of the 2008 BCWWA Small Water Systems Award. The award will be presented on April 27, 2009

Abstract

A water treatment plant has been designed, manufactured and assembled for the community of Ymir in the Regional District of Central Kootenay (RDCK) in British Columbia. This "green" facility is one of the first small plants to employ an analysis and design based on a triple bottom line framework, meeting the financial, environmental and social goals of the community. The focus was to build sustainable infrastructure, reduce the carbon footprint, conserve energy and ensure long-term financial viability.

Introduction

The Town of Ymir, once a booming mining town, is a small community of about 200 people; amenities include a hotel, general store, and a seasonal cat skiing operation. The catalyst for building a new water treatment plant in Ymir was a failure to meet drinking water standards due to bacteriological contamination from wildlife. The community's water had been on

permanent boil water advisory. There are 106 water service connections in the community and this is expected to grow to 150 connections in the next 15 years. The community demonstrated its commitment, imagination and desire to finance a sustainable water treatment plant using the triple bottom line approach.

Triple bottom line is an integrated approach incorporating economic, environmental and social objectives so that each enhances the attributes of the others. A holistic, closed-loop design approach created synergies and helped achieve the project's sustainability goals.

Green Building

Project goals for building sustainable infrastructure

- Design to a LEED Silver or LEED Gold rating
- Provide energy savings equivalent to a Model National Energy Building Code of Canada building
- Satisfy BC Interior Health requirements

- Satisfy the needs of the community
- Find free energy sources and employ energy reduction techniques
- Reduce carbon footprint and ensure energy conservation where possible
- Utilize local materials and resources to complete the facility where practical
- Complete the project within the financial constraints established
- Minimize the impact on the local environment.

Site development

- All site work was completed using local services, equipment and contractors
- Construction management was performed internally by the RDCK personnel
- Timber was sold to local saw mills and revenue used to offset project costs
- Special attention to site planning and remediation
- Sedimentation ponds ensure all water is naturally filtered to ground
- Propane as a back-up power supply reduces the risk of environmental damage
- No site works were completed in stream, minimum riparian set backs were established, and, where possible, these setbacks were exceeded.

Site design

The RDCK Environmental Services Coordinator was involved with all stages of the project to ensure that all environmental issues on site were addressed. Site restoration and rehabilitation activities were considered high priority.

Building design

Structural insulated panels (SIPs) for walls and roof create a well insulated and air tight building envelope. The main advantages of SIPs are the high R-Value and low levels of air infiltration providing 50%-70% savings compared to the



The water treatment process includes dual booster pumps, self-cleaning media filters, cartridge filters, ultraviolet primary disinfection and residual chlorination.

Canadian Model Energy Code (MEC) building. The building was assembled and tested at the factory and shipped to site on one truck to minimize material wastage and to reduce the project carbon footprint.

Water efficiency

- New pipes were oversized for future expansion so as not to require underground utilities to be excavated and replaced. Internal expansion is also possible.
- SCADA ensures that only water that is needed will be drawn into the facility and waste water is minimized due to self-cleaning media filters
- The treatment process does not use chemicals; all wastewater can be directed to the sedimentation/infiltration ponds for treatment.
- Level switches in the existing reservoir prevent overflow and the emergency reservoir overflow has a de-chlorination chamber.

Indoor environmental air quality

To facilitate safe and easy maintenance and to provide additional air exchange for the building if needed, a mechanical ventilation system was installed.

Energy efficiency

In order to meet the terms of the RDCK climate action charter energy efficient building materials and components were integrated into the design of the facility. All materials for construction were considered from a closed loop perspective as well as opportunities for life cycle savings. The facility was designed to be de-constructed (end of life) so the majority of the material could be put back into the resource stream.

Carbon credits/footprint

The main focus at this facility was to minimize energy consumption so that the long term operational and maintenance costs and energy needs are manageable. This facility features a small photovoltaic solar panel that provides some power to the building. Maximizing water and energy conservation reduces the overall carbon footprint. Reducing GHG emissions (by reducing energy and water consumption) will

therefore reduce the amount of carbon credits the RDCK will have to purchase in the future.

Green design process

The success of this project can be attributed to the collaborative approach taken with committed stakeholders. The green design process incorporated the community, stakeholder objectives, costs, energy, water, site, materials and indoor air quality. The building met the cost expectations of the community and included the purchase of carbon filters for each homeowner to further polish the water and to facilitate the removal of chlorine at the point where the water enters the household for those home owners that still had concerns about the use of residual chlorine in their drinking water. The cost for the installation and future maintenance was agreed to be born by the members of the community.

Water treatment process design

Quartz Creek has exceptional water quality for a surface water source. As well, elevation differences provided gravity flow to the plant and gravity flow to the end users. Pilot testing was utilized to confirm the process selected and to predict operational costs. The process consisted of efficient Grundfos booster pumps, self-cleaning media filters, 5 micron and 1 micron absolute cartridge filters, R-Can SUVAM ultra-violet primary disinfection and Accu-Tab Calcium

Hypochlorite residual chlorination. The facility exceeds the 4-3-2-1-0 drinking water objectives established by the Interior Health Authority for drinking water. An analysis of the project was made using RETScreen Clean Energy Project Analysis Software. This is a decision support tool to evaluate the energy savings, costs, emission reductions, financial viability and risk for various types of Renewable-energy and Energy-efficient Technologies (RETs).

Conclusion

In the future, carbon regulations, as well as rising energy costs, are going to create a need for a financial, social and environmental integrated approach to all infrastructure projects. "Green" water plants may have a higher capital cost but are cost-effective over the life cycle when O&M costs and other costs are added in. This particular facility saved considerable up front capital by employing the triple bottom line perspective. Water systems like Ymir demonstrate the effectiveness of stakeholder collaboration to achieve common sustainability goals. The triple bottom line approach is an effective way to build sustainable infrastructure, reduce the carbon footprint, conserve energy and ensure long-term financial viability. Future facilities will incorporate new and existing technology and could produce more energy than the water treatment plant consumes. Now that's green! 💧

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