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October 27, 2015

CN Thornton Yard Geobag Sludge Management - Sustainability Initiative

Presented at

Railroad Environmental Conference

Introduction

"Sustainability is **not a problem** to be solved ….
…. it's a **future** to be created." Dr. Rob Abbott

Managing risks and maximizing opportunities

- Cost Reduction
- Resource Efficiency
- Energy Use and Reduction
- Waste Management & Minimization
- Enhanced Worker's Health & Safety

Overview

- Keystone Environmental assisted CN in developing an alternate sludge management system that allows CN to save over $100,000 in sludge management costs in 5 years at the Thornton Yard.

- The new system reduces energy usage, chemical consumption and health and safety hazards.

- It extends the lifespan of the sludge management system and increases the system efficiency.

Background

- CN Thornton Yard in Surrey, BC, Canada.
- 91 hectares and contains a locomotive repair center, fuelling systems, and a locomotive wash.
- Process wastewater generated at the yard is sent to an on-site wastewater treatment plant (WWTP).
- WWTP Sludge settles in settling tanks. Before this project, it was processed by a filter press, then off-site disposal.

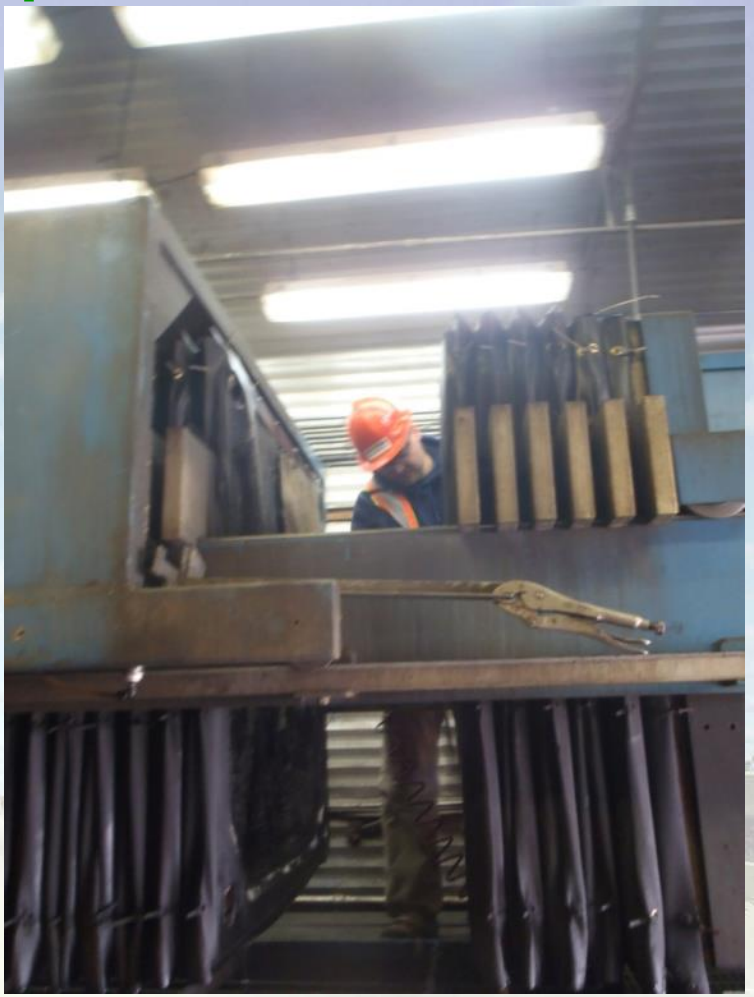
Background

- Keystone Environmental began full time operation of the WWTP in March 2012 and identified several upgrades and operational changes to improve efficiency & reliability.

- The existing filter press required a lot of operator time and maintenance. It was repaired frequently.

2012 Filter Press Operation

- > 280 hrs/year to operate
- Physical labour (H&S concerns)
  - Pinch points
  - Moving equipment
  - Overreaching
  - Sludge handling
- Average $8,000/yr maintenance
- Average $1,000/yr chemicals
- Average $600/yr electricity



Objectives

- Simplify the sludge dewatering process
- Reduce operating and maintenance costs
- Improve health and safety conditions
- Reduce operator sludge handling
- Improve system reliability and operability
- Reduce maintenance and repairs

Improved Sludge Management System

- Cost benefit analysis for an alternate sludge management system demonstrated multiple economic and environmental benefits while improving operator's safety.

- The selected option consisted of a Geobag System

- Main attributes of the Geobag System

Sludge Management Upgrades - Steps

- Removal of Filter Press
- Installation of a new wider door
- Modification of piping layout
- Installation of geobag system
- Supply of new roll off bin
- Installation of safety bollards
- Modification of operator platform

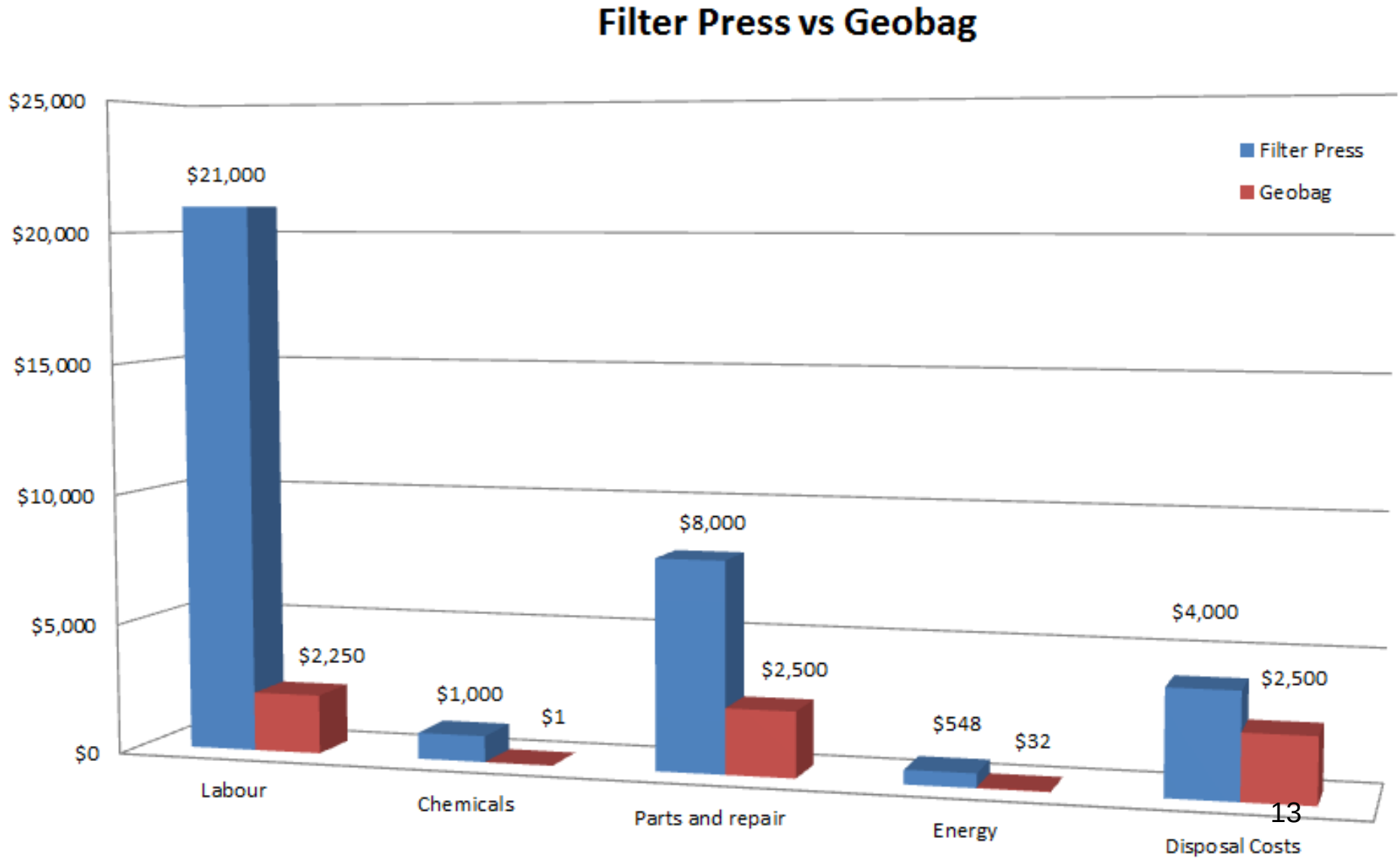
Sludge Management Upgrades - Steps

Upgraded Sludge Management - Geobag

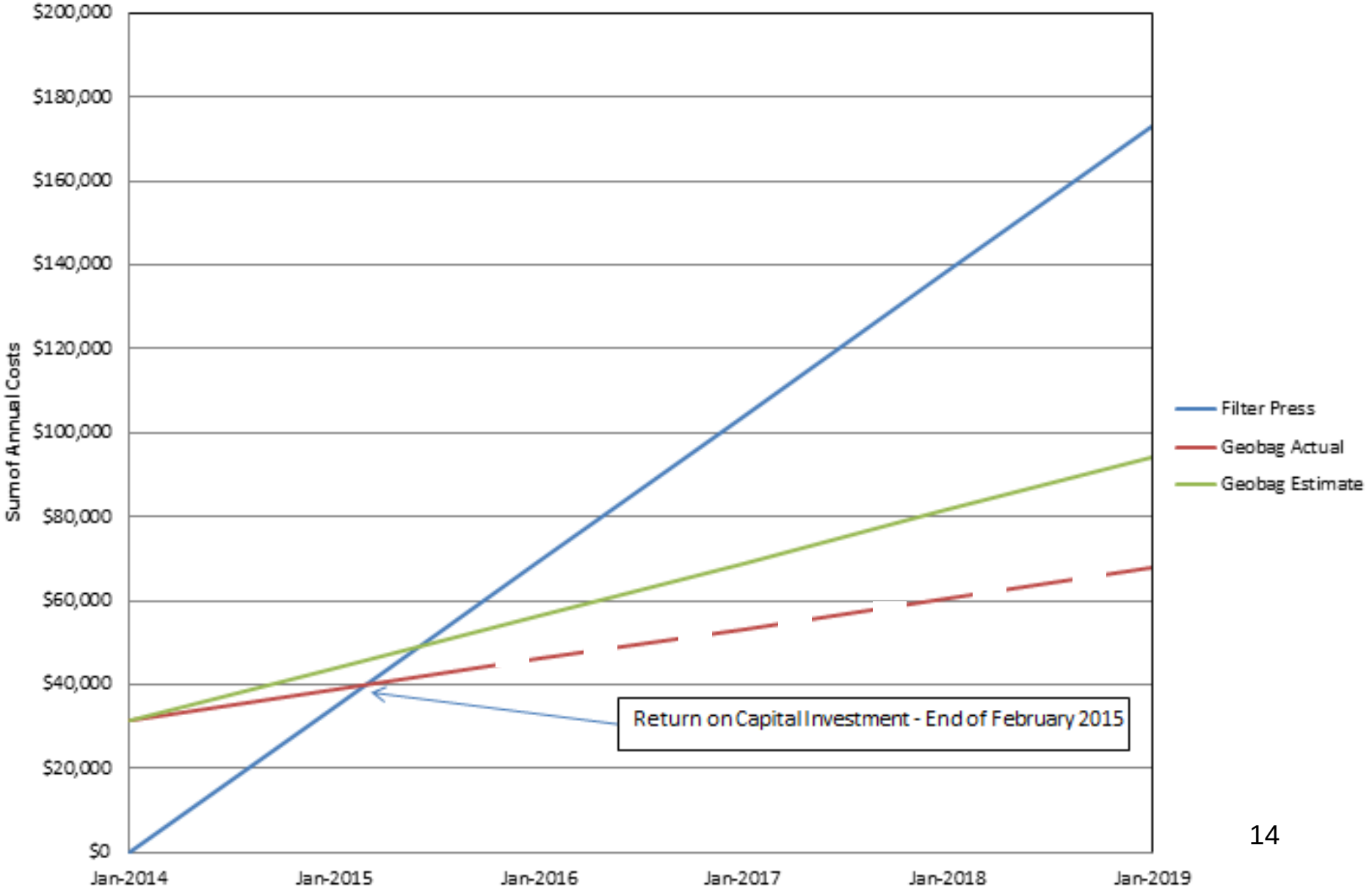
Aug 2015 Performance Metrics

- $2,500/yr maintenance
- $50/yr electricity
- No chemicals
- 80 hours per year of operator time.
- Reduction in disposal costs from $4,000/yr to $2,500/yr

Annual O&M Cost Comparison



Cost Summary for Filter Press vs Geobag System Based on Accrued Annual Costs



Upgraded Sludge Management - Geobag

Aug 2015 Efficiencies

100% reduction in chemical costs

> 90% reduction energy costs

> 85% reduction labour cost

> 65% reduction maintenance costs

> 35% reduction in disposal costs

Conclusions

- Reduced operator hours and equipment down-time
- Reduced maintenance and repairs
- Significant cost savings (>$27,000 per year after ROI)
- Cost savings of $105,000 for the first five years (including the initial capital investment)
- Eliminated existing health and safety concerns

A proven way to manage WWTP sludge in a more efficient manner!

Thank You