



Alternative Water for Beaver Lake

November 19, 2009

Briefing updated Dec 09

- **Report to the BLA membership on Board evaluation of water project**
- **Determine a path forward**

- Starting June 2008 BLA Board of Directors set out to:
 - Fully evaluate the Water Project costs and scope
 - Attempt to move pipes away from the dam (Commissioners' concern)
 - Attempt to gain clear right of way for project
- Findings
 - Very little information and few requirements actually documented
 - **Source:** Office, email, and website search
 - Contract with engineers **did not have clearly defined** statement outlining **scope** of entire project
 - No guarantee from engineers on the following:
 - No guarantee system will pump 2000 gallons per minute (gpm)
 - **No guarantee** system will **remove any and all minerals** that could cause **discoloration** of our lake
 - **No guarantee** system will **remove any harmful or dangerous minerals** before entering the lake
 - **No guarantee system will be designed and approved** by all local, state and federal agencies

Source: Board email with Engineers, April 18, 2008, and Sept 2008 Board minutes

- **Finding: Purpose not clear through history- examples:**
 - **Long-term goal: Obtain new source of water to maintain the level of the lake**
 - **Source:** From 3 separate meeting minutes, Water Restoration Task Force, March 2006
 - **Three objectives, 1) Safe water, 2) Adjusting the lake level; 3) feed the water plant**
 - **Source:** From January 2007 Board Minutes
 - **Concern over lake levels and for ability to obtain drinking water from the lake**
 - **Source:** From Broad presentation to association Sept 2007
 - **Possess the ability to control the lake level to within 10" of full pool at all times which will allow all property owners access to the lake at all times and provide the Association and community a secondary water source for household use which is within the Health & Human Services guidelines**
 - **Source:** From November 2007 Board Minutes

Purpose of Well Project Continued

- This project provides an **alternative** or 2nd **water supply** for our community.
 - **Source:** From Board Letter Sent to Home Owners ≈ December 2008:
- As we move forward into the upcoming years, this well project will play a vital role in the **maintenance**, cleanliness, and habitat stability **of the lake**, as well as providing a **crucial secondary water source** for our drinking water facility
 - **Source:** From Assessment Letter March 28, 2008
- **This is not a water project to keep the lake full. This is a project for a secondary water source**
 - **Source:** Campaign material, ≈ April 2008

Will the People Vote or the Board Vote?

- Finding
 - Position changed
 - The (Water Restoration Project) committee agreed unanimously that ... the **board** needs to **ask all the members for a vote**
 - **Source:** Beaver Lake Association, Water Restoration Project Minutes, March 11, 2006
 - BLA **Board agreed unanimously** to the Committee agreement (recommendation to the Board)
 - **Source:** Beaver Lake Association, Water Restoration Project Minutes, March 18, 2006
 - In response to the question, “**Should the Beaver Lake Board or the members make the decision** to commit the funds for the Water Restoration Project,” **task force voted 9 to 4 to let the Board make the decision**
 - **Source:** Beaver Lake Association, Water Restoration Project Minutes, March 25, 2006
 - Following Board minutes stated that if anyone has questions, they should request a copy of the water project minutes
 - **Source:** April 2006 Board Minutes

Amount of Water Available for Pumping

- **Board requirement for well water supply source of approximately 2,000 gpm capacity**
 - **Source:** Scope of Work, Snyder and Associates Contract (draft – never signed)
- **Finding**
 - A sustainable yield of 1,700 gpm was estimated for a pumping well
 - **Source:** Groundwater Source Evaluation from Layne-Western, Oct 31, 2006
 - **Would a second well be necessary?**

Cost to Construct the Project

- The last project cost publicly identified by the Board was **\$1,500,000**
 - **Source:** BLA Board of Directors Meeting Minutes, April 17, 2008
- Finding
 - Estimated cost **did not include**
 - **Costs for construction services, integration to WTP, O&M, and land access leases**
 - **Source:** **Items missing** from the Preliminary Engineering Report, Snyder & Associates, December 10, 2006
 - Current estimates
 - **Cost to construct pipe from well to lake: \$104,400**
 - As planned, construction was to be accomplished by BLA staff – normal, day-to-day jobs would go **unfinished; Commissioners requested paid contractor do work**
 - **Source:** September 2008 Board minutes
 - **Cost to integrate project into WTP: \$25,000**
 - Electrical/valves at well head and WTP + software integration
 - **Yearly estimated cost for O&M: \$61,492**
 - **Additional contingency of \$18,687**
 - **Source:** BLA Office
- Total **unadvertised** cost for project: **\$1,709,579 + cost of land access**
- Assessment of \$600 covered \$979,200 – **Source** BLA letter, March 28, 2008
- Costs of remainder uncovered **\$709,579 + cost of land access**
- **In April 2008, total bill would have been over \$1000 per lot; more for any cost growth**

- Periodically stressed that well project is for a secondary water source
 - An immediate need to **bring in safe water from an outside source** to fill the water towers to maintain adequate water public consumption needs of the Beaver Lake residents
 - **Source:** Letter approved by BLA Utility Committee for forwarding to the BLA Board, November 7, 2006
- Finding
 - In response to a member question, “**what the cost would be to revamp the water plant** to receive well water, the Board President stated that the Board has **not given any directive to estimate the time or amount for connection** purposes.”
 - Costs for piping, construction, valves, and integration to the WTP **not considered, not planned**
 - **Source:** BLA Board of Directors Meeting Minutes, November 15, 2007, the meeting that voted in the well project

- **Source:** BLA presentation at the gym, September 21, 2006
 - Option A – Transmission from Well to a Settling Pond Near Dam
 - Option B – Transmission from Well to Settling Pond at the North West Cove
 - Option C – Transmission from Well Directly Into the Lake
 - Option D – Connect to Rural Water District
 - Option E – Water Management
- Findings
 - Options A, B, & C **assumed right of way which never existed**
 - Option E – not viable, didn't fulfill any of the goals
 - Option D – Rural Water District (RWD) in Murray contacted ≈ April 2006 to explore connection feasibility
 - **RWD accomplished feasibility study – connection was possible**
 - **Source:** RWD 2006 Beaver Lake Connection Study, April 24, 2006
 - **There was no follow-on visit by BLA – study was never picked up;** Next contact with RWD was by the 2008-2009 BLA Board, June 25, 2008

- **Finding**

- O&M never estimated in engineering estimate of \$1.5M
- Board anticipated \$4,000 per month
 - **Source:** BLA presentation, September 21, 2006
- Current office estimate: \$5,124.33 average monthly cost
 - Cost includes: Power, pipeline mnx, building, chemical, pump repair/replace, insurance, easement, taxes
 - **Source:**
 - Office estimate
 - Engineering assumption for cost of pump in operation for 8 months (monthly costs are annualized)

Well Project Program Costs Today

- **Finding**

- **Current construction cost estimate**

• Step Aeration Concrete Sedimentation Basin	\$203,319
• Does not include cost to buy the land	
• Transmission Main including construction	\$563,102
• Well	\$281,515
• Hookup to WTP	\$25,000
• Includes piping, construction, valves, and software integration	
• Annual O&M	\$61,492
• Includes \$10,000 recurring cost for 99 years explained on next slide	
• Other	\$294,941
• Contingency, engineering, OPPD, Inspection, legal/admin	
• Total	\$1,429,369

- Cost reduction from last year due to lower oil price

Source: Office estimate

- **Finding**
 - To complete project BLA must cross three areas of land
 - **Area one** – one time easement cost of \$8,800 (not captured in calculations on previous page)
 - **Source:** Board email from former BLA President, June 24, 2008
 - **Area two** – Property owner not interested in selling, will lease land for 99 years beginning at \$10,000 per year with 2% increase every 25 years
 - **\$1,020,402 is approximate cost of 99 year lease**
 - Sensitive information prior to this point due to ongoing negotiations
 - **Source:** Board email from former BLA President, June 24, 2008
 - **Area three** - two options – cross private property or county property
 - Private property owners – no right of way after ~ one year of discussions in person and via registered letters; **Source:** BLA Office
 - County – No use of right of way; **Source:** County Commissioners

At **no** time in the history of the project did BLA
EVER
have clear right of way from well to lake even though BLA spent
≈ \$60,000 on engineering work assuming we had a right of way

- Board refocus efforts – explore **alternate source of drinking water** connection with Rural Water District (RWD)

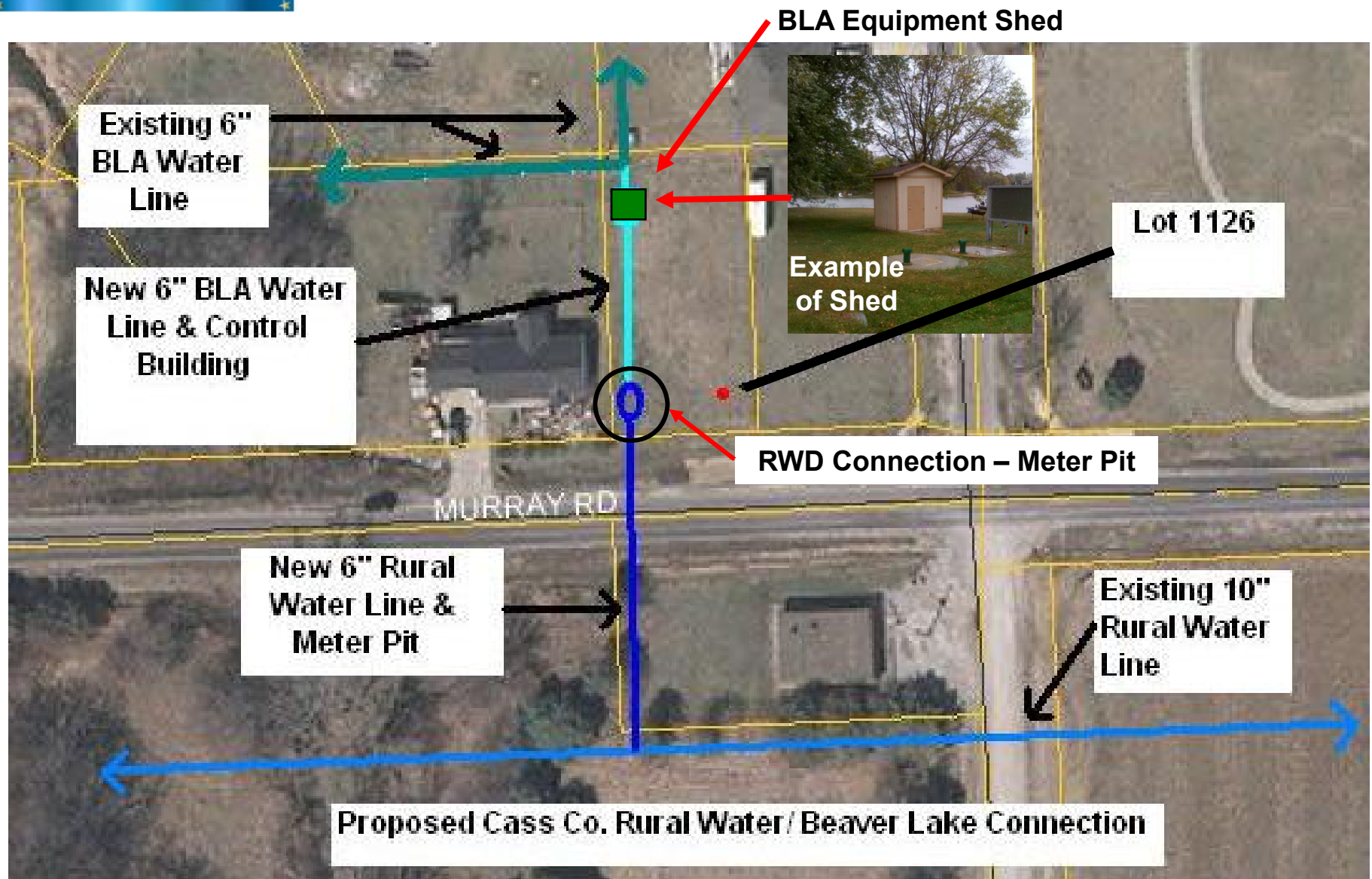
- RWD can supply BLA with an alternate source of drinking water in the event of lake contamination or an emergency to WTP and/or infrastructure – 7.75 million gallons / month
 - BLA Water Production & Usage Analysis shows BLA only exceeded this amount for two months since Jan 2006 (Jul 06 & Jul 07) [Source: WTP data](#)
 - In an emergency situation RWD will cover BLA needs
 - RWD waters comes from 2 RWD wells and from Plattsmouth; RWD currently drilling test wells for a third well [Source: Office discussions with RWD](#)
- 20 year contract – **entire project engineered with certified construction**
- Proposed activity will connect to BLA system near 12th Ave & Murray Rd
 - RWD will furnish, install, operate and maintain, at its own expense, the necessary metering equipment, including a meter house or pit, and required devices for properly measuring the quantity of water delivered and to calibrate metering equipment
 - RWD will place pipe under Murray Road, run pipe to our property, and construct the pit for valves
 - RWD states no additional pressurization required, RWD's towers are higher, will feed our system using gravity
 - RWD water is certified by state just like BLA for water distribution
 - BLA will run connections to RWD system
 - Flush system monthly – normal maintenance
 - Notify RWD when we need to turn the system on

[Source:](#) RWD letter, June 19, 2009 and multiple office discussions with RWD

- **Furnish BLA with water meeting applicable purity standards of the Health Dept of the State of NE**
- **Will provide 7.75 million gallons/month**
- **RWD will maintain metering equipment**
- **RWD will charge the same water rate per 1,000 gallons as is charged other RWD customers – rates charged by RWD suppliers will be passed equally to all customers**
 - **RWD current charge for 1000 gallons is \$2.76**
 - **BLA current charge for 1000 gallons is \$3.41**
- **Term of contract – 20 years**
- **Amount of water/rates can be reviewed every two years**
 - **Change in rates shall be based on a demonstrable increase or decrease in the costs of performance**
- **Other provisions of this contract may be modified or altered by mutual agreement**

Source: Proposed contract with RWD

- **Alternate source of drinking water in the event of an emergency – faucets work, toilets flush**
 - Lake contamination
 - WTP going off line (fire, tornado, lightning strike, etc)
 - Lightning strike last year brought us within 2-3 hours of running out of water – only had water in the two stems of the water towers
- **Provides the Association and community a secondary water source for household use which is within the Health and Human Services guidelines**
- **Allows Beaver Lake sewer plant/pipe lines to continue functioning**
- **Connection to RWD is “insurance” for BLA**
- **Proactive, prudent risk reduction**



- **\$300,000 one time hookup fee**
 - **Source:** RWD Water Purchase Contract
- **BLA one-time costs to hook up to RWD system**
 - **\$49,870**
 - Breakdown slide 20
 - **Source:** Office estimate
- **Total BLA costs: \$349,870**
 - \$49,870 needed at time of installation
 - \$300,000 spread over 3 annual payments
- **Total BLA O&M costs: \$242/month; \$2,904/year**
 - Breakdown slide 21
 - **Source:** Office estimate

BLA Costs to Connect to Rural Water

Cost Estimates for Cass Co Rural Water Connection					
Item	QTY.	Unit	Unit Price	Extension	Comments
6" PVC Pipe	150	LF	\$6.00	\$900.00	
6" valves	5	Ea	\$500.00	\$2,500.00	
6" Mech Tee	1	Ea	\$450.00	\$450.00	
6" Mech Coupling	2	Ea	\$225.00	\$450.00	
6" Ch. Valve	1	Ea	\$700.00	\$700.00	
Fire Hydrant	1	Ea	\$2,500.00	\$2,500.00	
Fiberglass Pit/Lid	1	LS	\$3,800.00	\$3,800.00	In Ground
Cl. Building	1	LS	\$3,400.00	\$3,400.00	Wood or Fiberglass
Cl Analyzer	1	LS	\$2,800.00	\$2,800.00	
Cl Inj. & Scale	1	LS	\$2,300.00	\$2,300.00	
Power OPPD	1	LS	\$4,000.00	\$4,000.00	One time hook up
Lot Purchase	1	LS	\$3,500.00	\$3,500.00	If needed
Mag meter	1	LS	\$6,400.00	\$6,400.00	Flow pace Chl.
Electrical	1	LS	\$3,000.00	\$3,000.00	Wiring & Controls
Sub Total				\$36,700.00	
Contingency 10%				\$3,670.00	
Permits				\$2,000.00	State & County
Engineering				\$7,500.00	RWD Engineer
Labor				\$3,000.00	Contracted
Estimated Total				\$49,870.00	

One time charge – Source: Office estimate

Beaver Lake Association		
Rural Water Connection Project		
O & M		
Power		\$40.00
Pipeline		\$5.00
Building		\$10.00
Chemical		\$35.00
Electrical		\$5.00
Equip. repair/ replace		\$15.00
Ins.		\$45.00
Easements		\$0.00
Taxes		\$20.00
Water usage		\$67.00
Total per month		\$242.00
Total per Year		\$2,904.00

Recurring charge – Source: Office estimate

Recommendations on Paying for Project If We Move Ahead

- **One time assessment of \$218.46 to be added to July 2010 billing cycle – can make one time payment**
or
- **Assessment payment of \$18.20 per quarter beginning July 2010**
 - **Assessment to run for 3 years – 12 billing cycles**
 - **\$18.20 per quarter x 4 quarters is \$72.82 per year**
 - **\$72.82 per year x 3 years is \$218.46 total assessment**
 - **Assessment will cover cost of the project installation and hookup fee**

Source: Office estimate – All costs are approximate (may be small change depending on costs of pipe and valves at time of purchase, etc.)

Activity	Schedule*	Projected Date Complete
Board Vote to send issue to membership for decision	Start	November 2009
If Approved		
Vote for approval by BLA		May 2010
If Approved		
Approval of Cass Co. RWD #1 Board	1 Month from approval	June 2010
If Approved		
Start Engineering Design	Same Month as approval	June 2010
Finish Engineering Design	3 Months from approval	August 2010
State Review Complete	4 Months from approval	September 2010
Start Construction	4 1/2 Months from approval	September 2010
Complete Construction	6 Months from approval	November 2010

Source: RWD letter, June 19, 2009 and multiple office discussions with RWD

* All schedule times are approximate

- **In accordance with the BLA By-Laws, Article II, Section II**

- **Motion to call for inclusion with May 2010 election for the BLA membership to decide the following question:**
 - **“Shall BLA enter into a renewable 20-year contractual agreement with Cass County Rural Water District #1 for installation and access to an alternate source of drinking water to be paid for with a special assessment of approximately \$218.46 per lot**
 - **To be paid either by a one-time payment of approximately \$218.46 due with the August 2010 billing cycle, or**
 - **With quarterly assessments of approximately \$18.20 per quarter for three years commencing with the August 2010 billing cycle”**

- **Board motion carried for inclusion in the annual election**
 - **All members in good standing will have an opportunity to vote**
 - **Can vote by secret absentee ballot or in person in the annual election, May 2010 from 1:00 p.m. to 3:00 p.m. at the Clubhouse**

- An alternate source of drinking water has been discussed for years
- This is an opportunity for the association membership to decide the issue and move forward

Questions

Can RWD Towers fill BLA Towers?

- BLA water towers have 300,000 gallon total capacity; taking water elevation readings from the two systems at the closest point, the RWD towers water level is 73 feet higher than BLA water towers level; at full flow, RWD towers can fill BLA towers in less than an hour

• **Source:** JEO Consulting Group, Inc letter to RWD, April 24, 2006 and Schaum Fluids in Motion

Verticle pipe position, pressure created by height differential, outflow pipe diameter: Calculate flow velocity, volume

Definitions, constants and formulas:

Q = Flow Rate (ft³ per minute)

d = diameter of the hole

r = d/2 radius of the hole

A = Cross sectional pipe area=area of a circle

$A = \pi * (r)^2 = \pi * (.5*d)^2$

$\pi = \pi = 3.141592654 \quad 3.1415927$

v1 = the flow velocity at the surface

v2 = the flow out the hole

g = accel of gravity(32 ft/sec²)

$Q = A*(v2-v1)$

p1 = the atmospheric pressure at the surface

p2 = the atmpospheric pressure at the depth

h1 = depth of water at surface

h2 = depth of water at hole

1 ft³ = 7.48 gallons

7.48

Input Data:

h1 = depth of water at surface[0] 0

h2 = depth of water at hole[16] 73 feet

d = diameter of hole[1] 6 (inches. Used for solving for the flow)

A = cross sectional area of hole[1] 28.27433 (in². Derived from above)

The Bernoulli equation (theorem):

$p1(m/p) + \frac{1}{2}mv^2 + mgh1 = p2(m/p) + \frac{1}{2}mv2^2 + mgh2$

where m is the mass of fluid considered

p is the density of the fluid

p1, v1, and h1 are the presure, speed , and height at one point in the stream

p2, v2, and h2 are the presure, speed , and height at another point.

Toricelli's Theorem (Velocity of outflow):

velocity = $(2gh)^{1/2}$ (square root of 2gh)

Assumptions

(p2 - p1) the difference in Atmospheric pressure is negligible (i.e. zero)

v1, the flow at the surface, is zero

The Bernoulli equation then becomes: $v2 = (2g*h)^{1/2}$

Solve for v2, the Velocity coming out the hole

$v2 = (2g*h)^{1/2}$

v2 = 68.35203 ft/sec

4101.122 ft/min

Solve for Q, the Flow volume coming out the hole:

$Q = A*v2$

A = 28.27433 in²

A = 0.19635 ft²

v2 = 4101.122 ft/min

Q = 805.2534 ft³/min

Q = 6,023 gal/min

Q = 361,398 gal/hr

Q = 8,673,545 gal/day

Estimated Well Project O&M

Beaver Lake Association		
Wellhead Project		
O & M		
	year	monthly
Power	\$40,800.00	\$3,400.00
Pipeline	\$1,200.00	\$100.00
Building	\$300.00	\$25.00
Chemical	\$600.00	\$50.00
Electrical	\$1,800.00	\$150.00
Pump repair/ replace	\$2,400.00	\$200.00
Ins.	\$2,400.00	\$200.00
Easements	\$10,000.00	\$833.33
Taxes	\$1,992.00	\$166.00
Total	\$61,492.00	\$5,124.33

Engineering assumption for cost – pump is in operation for 8 months of the year

Source: Supplement To Preliminary Engineering Report, Snyder & Associates, January 2, 2007

Note: Yearly cost covers 8 months operation / monthly figure is annualized