

Turner Valley Water System

Water Works Advisory Committee
Open House Presentation
July 28, 2011



Agenda

- System Description
- Approval Amendments
- Reservoir Monitoring Program
- Ongoing Work & 2011 Studies
- Summary



Turner Valley Water System

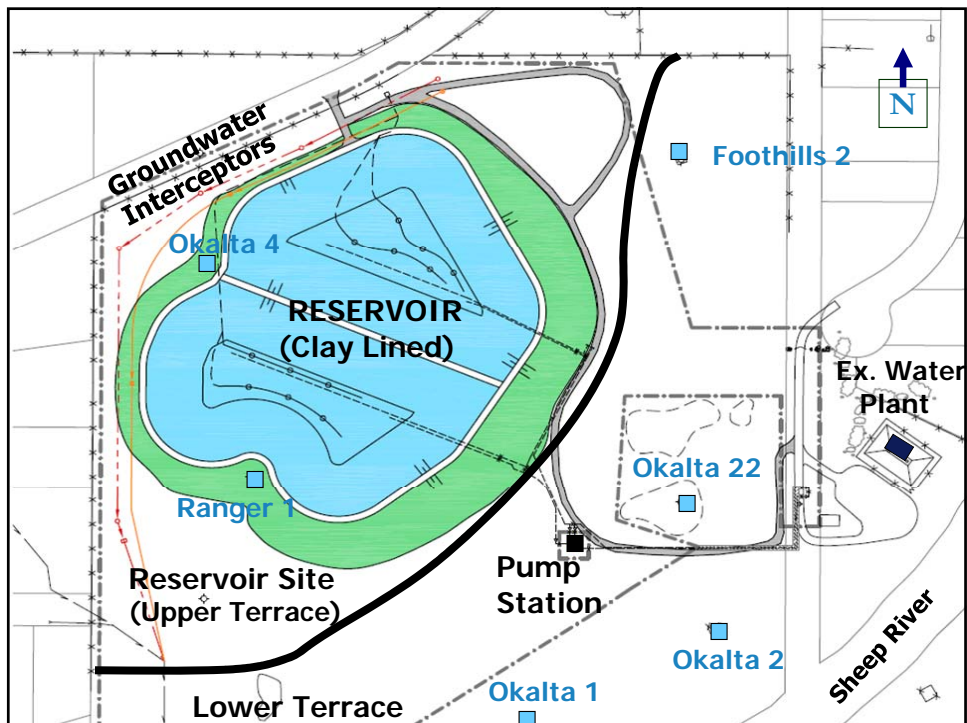
- ❑ Three Primary Wells (No. 5, 7, 8)
- ❑ 2 - 20 M Gal reservoir cells
- ❑ Raw Water Pump Station
- ❑ Water Treatment Plant
- ❑ SCADA Controls & Monitoring
- ❑ Distribution Pipes
- ❑ Elevated Treated Water Reservoir

Water Wells & Licence

- ❑ Wells 5, 7, 8 Operate
- ❑ Raised above flood level
- ❑ Wells 3 & 4 Back Up
- ❑ Wells 2 & 6 Not Used
- ❑ Considered "Surface Source"
- ❑ Capacity +/- 3,000 Population
- ❑ Diversion Licence Limiting Factor

Raw Water Reservoir

- 2 - 20 M Igal reservoir cells
- Raw Water Pump Station
- Aeration System
- Fed in series from Wells
- Each cell mitigates 2 drought years
- Reservoir can serve >3,500 people with the existing wells
- Drainage berm (2011)



Water Treatment Plant & SCADA

- 2 – 2,450 m³/d trains
- Direct Filtration Process
- Design Population 2,800
- Room for Third Train to Popn > 4,000
- Chlorine Contact Tank
- SCADA System (2011)
- Fed from Reservoir or Wells

Distribution System

- +/- 28 km of Pipe
- Mostly 200 mm PVC
- Mostly installed in 1960s to 1970s
- 500,000 lgal Elevated Reservoir
- High Delivery Pressures

Proposed Amendment #1

- **Request One Year Extension on WTP Upgrades to 2006 AENV Standards**
 - **From:**
 - Application & Drawings to AENV by Oct 1, 2011
 - Complete Construction by Oct 1, 2013
 - **To:**
 - Application & Drawings to AENV by Dec 31, 2012
 - Complete Construction by Dec 31, 2014
- **Dovetails with Black Diamonds Timing**
- **Allows Look at Regional Initiative**
- **Provides Time for Planning**

Proposed Amendment #2

- **Raw Res GW Monitoring Program**
 - **From:**
 - 19 groundwater wells sampled every 2 months
 - 2 interceptors sampled every 4 months
 - **To:**
 - 18 groundwater wells sampled every 6 months
 - 2 interceptors sampled every 6 months
 - **Abandon redundant well (TVR 1.1)**
 - **Re-drill two wells & deepen (TVR 1.4 & 4.4)**
 - **Replace faulty well (TVR 5.2)**
- **Report Annually (rather than bi-annual)**
- **Add Hydrocarbon Tests in Piped System**

Why?

- Better Information Today
- Favourable Groundwater Monitoring results over past four years
- Improved Baseline Data Now
- No Impacts from Oil & Gas Shown
- Liner Seepage Typically Over 13 Months
- More Studies Identify Sources
- Better Use of Town Resources
- Improve Distribution System Testing
- Testing Will Still Continue

Raw Water Reservoir Monitoring

HISTORY

Reservoir Timeline

- 2002 Study identifies need for reservoir
 - 12 test pits excavated
 - Current site chosen
- 2004 Phase 1 Environmental Site Assessment
 - 6 wells: active gas (2); dry (2); abandoned oil (1) & gas (1)
 - Okalta 22 contamination – OWA committed to remediate and costs; doing ESA
 - Contamination down gradient from reservoir site
- 2005 Geotechnical Subsoil Investigation
 - 9 test holes - Clay suitable for Liner

Timeline

- 2005 Orphan Well Phase II ESA (Okalta 22)
- 2005/2006 Design & AENV Approval
- September 2006 to November 2007 - Construction
 - More testing on-site during construction.
 - Tests showed no contamination on *"reservoir site"*
 - 19 Groundwater Monitoring Wells installed around site.
 - Contamination found in lower terrace around Okalta 22 – has now been remediated by Orphan Well Association
 - Pump station location & pipe installation revised based on local impacted soil conditions encountered near Okalta 22.

Timeline

- January 2008
 - EAB Hearing

- July & August 2008
 - Reservoir Filled
 - Permeability Testing
 - Initial Commissioning of Pump Station

- October 2008
 - Renewed Waterworks Approval

- March 2009 – Start-up of Reservoir
 - Continued Monitoring of Water Quality



Construction Sampling

- Independent samples taken by:
 - CNRL – Remediation of Ranger No. 1 and Okalta No. 4 completed
 - OWA – Investigation of Okalta No. 22

- Soil and water samples collected throughout construction



Soil and Groundwater Results

- Prior to & During Construction on “Reservoir Site”
 - Water Samples
 - 40 water samples
 - 2,985 individual water parameter tests
 - 11 health-based exceedances detected
 - 10 re-sampled with no exceedance, 1 not able to re-sample
 - Exceedances likely due to turbidity
 - Soil Samples
 - 59 soil samples
 - 2,139 individual soil parameter tests (no exceedances)
 - Includes Third Party Sampling (CNRL)

Soil and Groundwater Results

- Prior to & During Construction on Lower Terrace
 - Water Samples
 - 20 water samples
 - 722 individual water parameter tests (18 HB exceedances)
 - Soil Samples
 - 142 soil samples
 - 3,567 individual soil parameter tests (196 HB exceedances)
 - Includes Third Party Programs (Orphan Well Association)
 - Area around Okalta 22 now remediated by OWA

Permeability Testing – Summer 2008

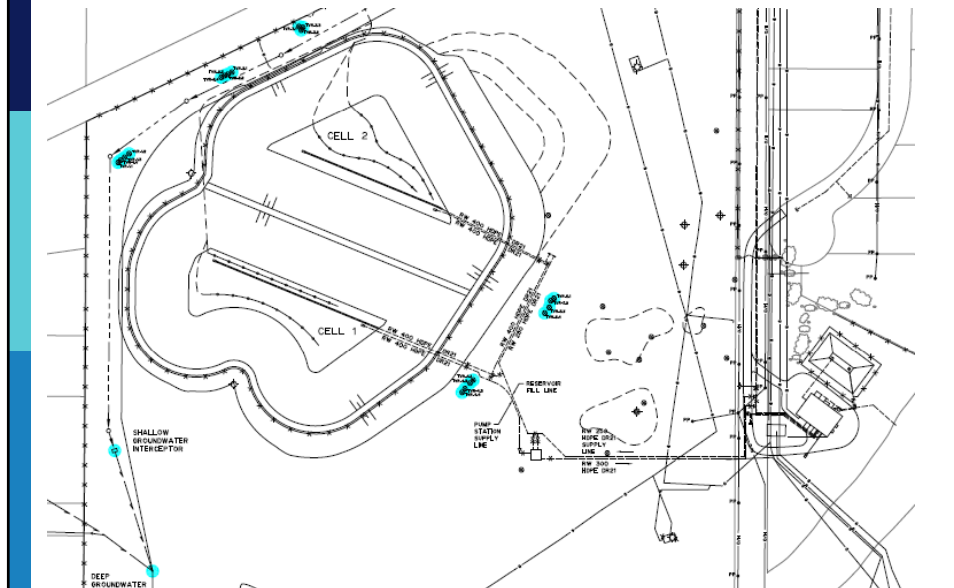
- ❑ Daily readings as per “Permeability Testing” procedure approved by AENV
 - Water level (2 staff gauges each cell)
 - Rain gauges (2)
 - Temperature (2)
 - Modified Pan Evaporation Test
 - AENV shallow lake evaporation data
- ❑ Test completed twice on each cell
- ❑ Required Permeability Achieved ($>1.0 \times 10^{-6}$ cm/s)



Post-Construction Monitoring

- ❑ *Stored Water Quality Monitoring Program*
 - Monthly sampling of reservoir cells
- ❑ *Reservoir Site Groundwater Monitoring Program*
 - 19 monitoring wells every 2 months
 - 2 groundwater interceptors every 3 months
- ❑ *Water Well Monitoring Program*
 - Monthly sampling of wells unless reservoir in use
 - Bi-annual if reservoir in use
- ❑ *Detailed Sampling and Analytical Protocol*
- ❑ *Remedial Action Plan for Specific Possible Contaminants*

Groundwater Monitoring Program



Recent Water & Groundwater Results

- Since Early 2008 on “Reservoir Site”
- Number of Additional Water Samples
 - 411 Water Samples
 - Over 26,000 Individual Water Parameter Tests
 - Monitoring wells, interceptors, water wells, raw water reservoir
 - Seven Health-Based Exceedances (None in Stored Water)
 - HB Exceedances in 2008, 2009, 2010 & 2011
 - Lab suspects false positive; later resampling within guidelines
 - Interceptor – later resampling within guidelines
 - Lab error
 - Plugged screen/sand-pack
 - Well re-development recommended (15 m below res bottom; in bedrock)
 - Well re-development recommended (15 m below res bottom; in bedrock)
 - Latest is being resampled; false positive suspected; poses no health risk
 - Remedial Action Plan Successfully Implemented – No Issues

Off-Site Soil & Groundwater Results

- ▣ Since 2008 on Lower Terrace
- ▣ Third Party Testing Ongoing (Legacy)
- ▣ Orphan Well Association Remediated Okalta 22
- ▣ Only Strip along Legacy Gas Line Remains
- ▣ Reservoir Drainage Berm to go in (2011)

Town Raw Water Monitoring Program

- ▣ Semi-Annual Reporting (Stantec)
 - Feb & Aug reports since 2008
 - Compares results to Guidelines (*Guidelines for Canadian Drinking Water Quality and Alberta Environment Tier 1 Guidelines*)
 - Utilizes statistical method from *Remedial Action Plan* to determine when further action is required.
 - Proposes Changes to the Monitoring Program
 - Recommendations are basis for Amendment at hand

Required by EPEA Approval

- ❑ Remedial Action Plan for Contaminants (done)
- ❑ Reservoir Groundwater Monitoring Program (done)
- ❑ Stored Water Quality Monitoring Program (done)
- ❑ Water Well Monitoring Program (done)
- ❑ Detailed Sampling & Analytical Protocol (done)
- ❑ Source Water Program (done)
- ❑ Facility Risk Assessment (done)
- ❑ Assessment of Waterworks (done)
- ❑ Application for Upgrades (Oct 2011 – UPCOMING)
- ❑ WTP Upgrade Construction (Oct 2013 – DEADLINE)
- ❑ Facility Risk Assessment Update (Oct 2014)

Studies Completed to Date Required by Turner Valley EPEA Approval

- ❑ Assessment of Waterworks System – Immediate
 - UV Disinfection
 - Liquid Chlorine System (Change from gas to liquid)
 - Standby Generator (2011)
 - Process Changes – Pilot
- ❑ Future Items
 - More “Diversion” & “Intake” capacity

Studies Completed to Date Required by Turner Valley EPEA Approval

□ *Source Water Program*

- Approved by AENV November 22, 2010
- Potential Contaminant Sources Listed
- Source to Tap Assessment
 - Promote Removal of Septic Fields
 - Improve Sanitary Collection System
 - Investigate Alternate Water Sources
 - Continue Storm Water Ponds in New Developments
 - Restrict Reservoir Access and Bird Control
 - Land Use Changes to Reduce Risks
 - Continue Regional Co-operation & TVOGG
- Proposed Management Plans
 - *Oil & Gas Inventory*
 - *Groundwater Well Inventory*
 - *Surface Water Inventory*

Studies Completed to Date Required by Turner Valley EPEA Approval

□ *2009 Facility Risk Assessment*

- Edited January 2011 from AENV comments
- Looked at: Source Water, Treatment, Monitoring & Operations
- Waterworks system poses manageable risk based on AENV criteria in Standards and Guidelines
- Risk will improve in the following years with additional planned upgrades

Recent Waterworks System Upgrades

- ▣ Continuous Chlorine Monitoring
- ▣ Continuous Turbidity Monitoring
- ▣ Fencing Well Heads and Raising Operating Well Head Elevations to 1 in 100 year Sheep River flood level
- ▣ SCADA Implemented

Summary

- ▣ Reservoir Site Monitoring – good results
- ▣ Okalta 22 remediated – risk reduced
- ▣ Other Oil & Gas facilities to be inventoried
- ▣ Monitoring Programs will continue
- ▣ Distribution Testing to be enhanced
- ▣ Current Amendment Application
 - Upcoming WTP Upgrades Schedule
 - Changes to Monitoring Program



Questions?