Hidden Springs WWTF, A "Green" System

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OUTLINE

- History
- Original System
- 2007 Expansion
- Permit Requirements
- Challenges with Algae
- Performance Data

Hidden Springs Community

- 1844 acre planned 'Rural' community
- 3.5 miles outside of Boise city limits
- On Line in 1998-1999
- Buildout 1,050 connections
- Currently at ~800 connections

- **No surface water for discharge**
- **Tight clay soils**
- **Desire for environmentally responsible approach**

Hidden Springs Area

Hidden Springs Community

- Water provided by area water utility
- Wastewater treated on site with ZERO discharge
- Treated, filtered, disinfected effluent used for irrigation on common areas, school, 'farm', and parks
- First system of its kind in Idaho and remains the largest operating

Original Hidden Springs WWTF

- Two aerated treatment cells (24 feet deep)
- One 19.6 MG storage pond – 3.5 months storage
- US Filter Hydroclear media filter, in line
- Chlorine disinfection with liquid hypochlorite

Original Hidden Springs WWTF

Year	Total Coliform	Turbidity	TSS	Total Nitrogen
	(MPN)	(NTU)	(mg/L)	(mg/L as N)
2004 Average	1.8	0.80	3.6	3.6
2005 Average	1.1	1.1	4.7	4.2

- Periodic violations on effluent criteria. Blamed on algae and the hypochlorite dosing system

Hidden Springs WWTF Expansion

- In 2005, Hidden Springs Development Company reached an agreement with neighboring planned community, Cartwright Ranch
- Hidden Springs Sewer Company to treat for both buildout conditions: 1,525 connections (274,500 gpd)

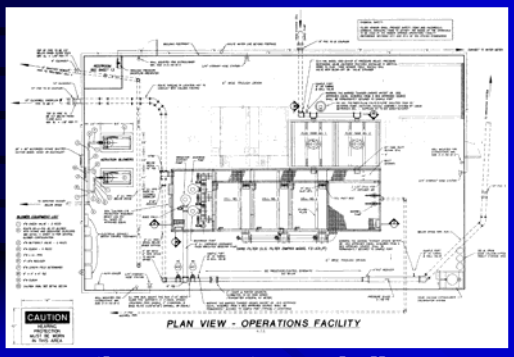
Hidden Springs WWTF Expansion Project Needs

- Owner / Operator / Idaho DEQ happy with existing system
- Needed capacity expansion to accommodate
- Minor system improvements
  - Periodic hits on fecal coliform (2.2/100 mL)
  - Chlorination difficult to regulate (0.5 mg/L residual)
  - Periodic TSS exceedence (5 mg/L monthly)

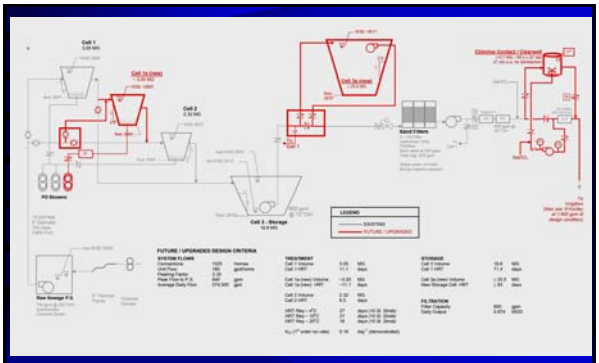
DESIGN

Hidden Springs WWTF Capacity Expansion PER

- Additional treatment volume – One aerated lagoon
- Additional blower capacity – One new blower
- Additional treated/unfiltered water storage
- New filter feed pumps at existing (and new) storage
- Filtration rate expansion



Filter Expansion – Challenge



New Process Flow Diagram

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CHALLENGE

- Build two earthen basins in tight and steep foothill area
- Balance cut and fill

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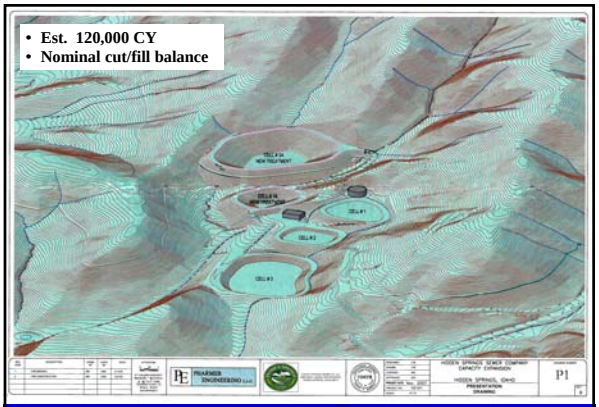

New Basins w/ Existing Topo

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CONSTRUCTION

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Construction

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Final dozer with GPS transceiver and automated blade controls

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Construction 19

Hidden Springs WWTF 20

New Treatment Cell Liner 21

New Treatment Cell 22

New Storage Cell 23

New Blower 24

New Barge Pump (1 of 2)

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Filtered Water Storage / Clearwell
65’ Dia x 30’ swd

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Spring 2006

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November 2007

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PERMIT REQUIREMENTS

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HIDDEN SPRINGS
LAND APPLICATION PERMIT - HIGHLIGHTS

Area	131 acres
HMUs	4
Application Period	Mar 1 - Oct 31, 8 months
Free Chlorine	1 mg/L
Min Water Tank Depth	3 ft (120 min HRT)
Disinfection Reqmts	2.2 Total CFU/100 mL (7 day avg)
	23 Total CFU/100 mL (instantaneous)
Turbidity	5 NTU, instantaneous

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CHALLENGES

- Unfiltered product water is stored
- System partially nitrifies

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ALGAE

- Algae biomass is ~1% phosphorus
- 1 mg/L phosphorus will support up to 100 mg/L algae TSS
- Actual system phosphorus is ~5 mg/L
- Turbidity challenges
- Disinfection challenges

2007, a difficult year with algae

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Wilder, Idaho

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ALGAE CONTROL

Shoshone, Idaho

Objective to minimize algae to filter

- Chemical addition to ponds
  - Bleach
  - Copper Sulfate
- Pump Intake
- Chemical coagulants
- Pray for Ceri Daphnia

Other Approaches / Solutions

- *Different sand media*
- *Covers on ponds*
- *Filter with positive barrier - membranes*

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PARTIAL NITRIFICATION

- Lagoons nitrify seasonally
- Long detention times results in nitrite present for much of irrigation season
- 5 mg/L chlorine consumption per mg/L nitrite

  $HOCL + NO2^- \rightarrow NO3^{-2} + HCL$

- <u>Sometimes severe chlorine dosing / residual challenges</u>

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RESULTS

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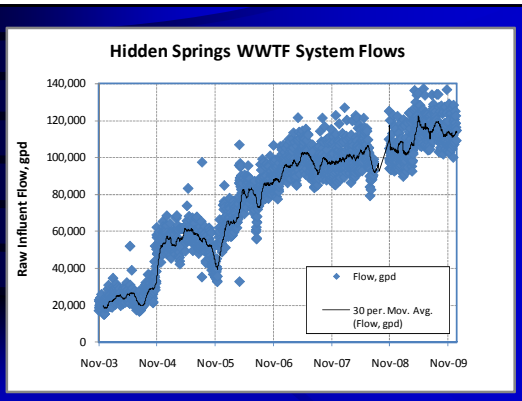

Hidden Springs Influent Flows

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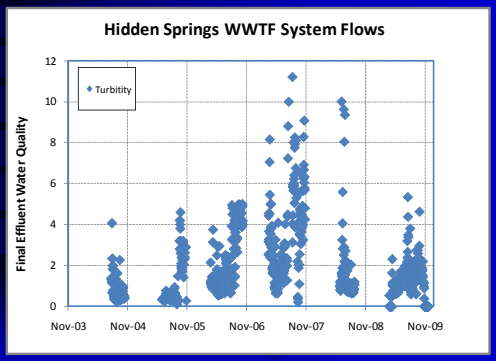

Turbidity

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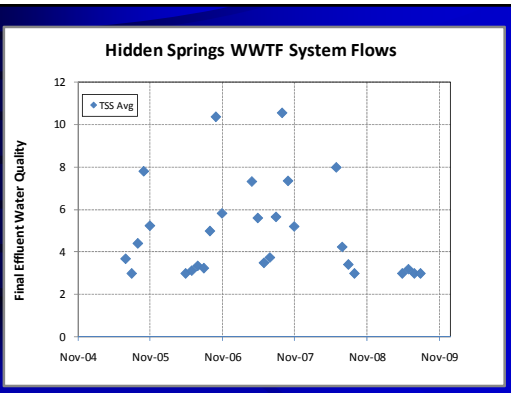

Monthly Average TSS

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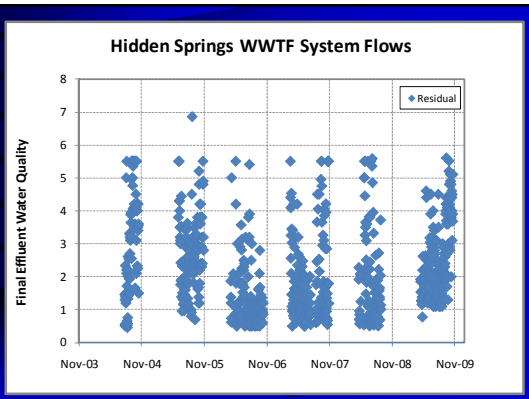

Chlorine Residual

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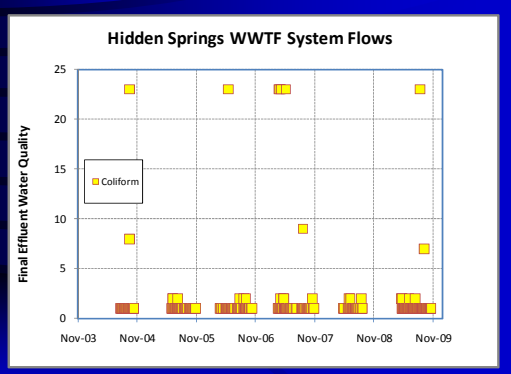

Fecal Coliform

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FINAL THOUGHTS

- Simple System. Easy to operate.
- System operates well, but not perfectly
- Activated sludge system with full nitrification for easier chlorine disinfection/residual
- Partial cover on final lagoon for filtration or membrane system would allow for better turbidity management

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