WWSC: IMPROVED SWTP PERFORMANCE BY IMPLEMENTING WA DOH OPTIMIZATION PROGRAM

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WASHINGTON WATER SERVICE CO.

Washington State Department of Health

Environmental Health Programs
Division of Drinking Water

PBT San Juan

- WA DOH offered optimization training to 5 San Juan County Utilities - 2008
- Blakely Island Maintenance
- Eastsound Water – Orcas
- Friday Harbor – San Juan
- Roche Harbor – San Juan
- Rosario Water – Orcas

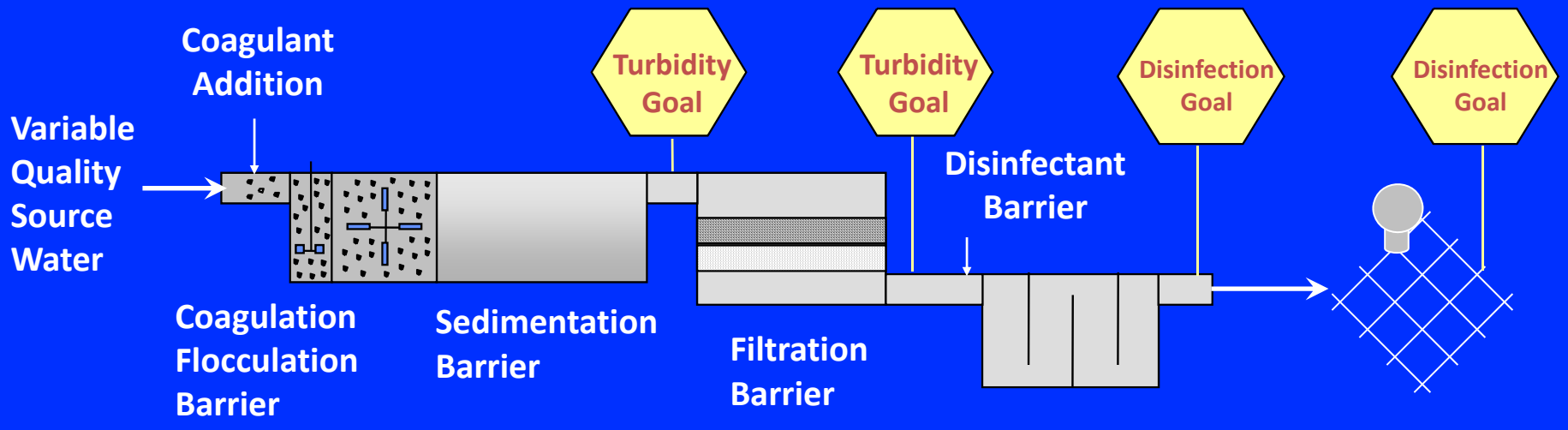
Eastsound
Roche Harbor
Rosario
Blakely Isl.
Friday Harbor
South Pender Island
Saturna Island
Mariette Alderwood
Lummi Bay
Bellingham
Beach
Haven
Eastsound
Waldron
Prevost
Bellingham Bay
Chuckanut
Orcas Island
Dolphin
Rosario
Doebay
West Sound
Olga
Larrabee State Park
Roche Harbor
Urban
East Sound
Orcas
Samish Bay
East Saanich 2
Yacht Haven
Shaw Island
Lakedale
Indian Village
Port Stanley
Friday Harbor
Guemes
Padilla Bay
Lopez Island
Anacortes
Lopez Sound
Decatur
Alexander Beach
Bay View
Saanich
Fidalgo Island
San Juan Island National Historical Park
Richardson
Islandale
Oak Bay
Victoria
Rosario Beach
Dewey
Snee Oosh
Deception Pass State Park
Swinomish Village
La Conner
Ault Field

DOH Goal for PBT San Juan

- Improve Public Health Protection by Improving WTP Performance
- Improve Treatment Performance Through WTP Optimization
- Achieve Optimization through Performance Based Training (PBT)

Optimized Performance Reduces Risk

- Optimization requires treatment <u>beyond regulatory levels</u>
- Focus on multiple barrier strategy to enhance plant performance
  - Particle removal (i.e., turbidity)
    - Coagulation/flocculation + sedimentation + filtration
  - Disinfection



PBT is a Unique Training Approach

- Combines classroom, in-plant, and periodic phone facilitation training components
- Has site-specific implementation focus
- Trainers, facilitators, participants held accountable by long term tracking of performance
- Teaches priority setting/problem solving skills!
- Negative results are part of the process!!

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Developing On-Site Problem Solving Capability

- Think of your plant as a "research facility"
- Utilize problem solving tools
  - Topic development sheets
  - **Document** operational guidelines
  - Special studies
- Recognize dual purpose for tools
  - Develop staff skills
  - Address plant limitations

Performance Based Training - 5 Sessions

1. Adopt goals / develop plant data
2. Develop priority setting and problem solving skills
3. Coagulant control tool development
4. Assess current performance and apply skills/tools
5. Report on success

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Sedimentation Performance Goals

- Turbidity: $\leq$ 2 NTU 95% time when annual average source turbidity >10 NTU
- Turbidity: $\leq$ 1 NTU 95% time when annual average source turbidity $\leq$ 10 NTU

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Filtration Performance Goals

- Turbidity: Combined Filter Effluent ≤ 0.10 NTU 95% time
- Post backwash turbidity
  - With filter-to-waste: Return to service ≤ 0.10 NTU
  - Without filter-to-waste: ≤ 0.30 NTU and return to ≤ 0.10 NTU in 15 minutes

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Disinfection Performance Goals

- CT values to achieve required inactivation of *Giardia* and virus
  - Disinfection ratio
    >1 (CT measured ÷ CT required)
- Disinfection optimization & DBP control not primary focus of this training
- Rosario: Did optimize disinfection process

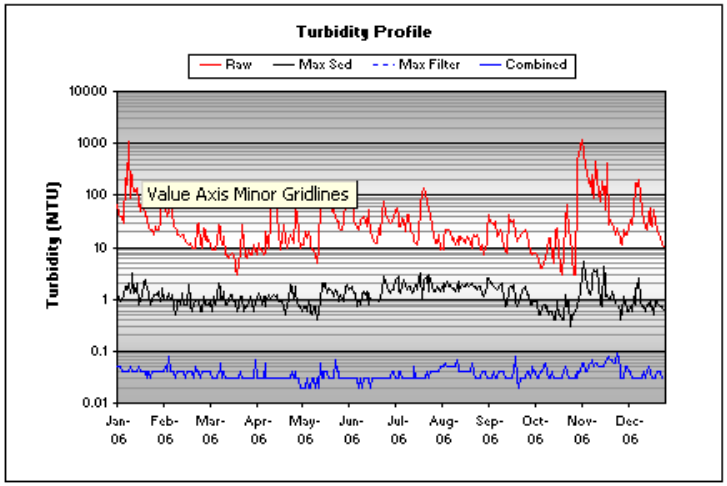
Microsoft Excel - 24850_Ferndale_RawSet&CFE_2006.xls

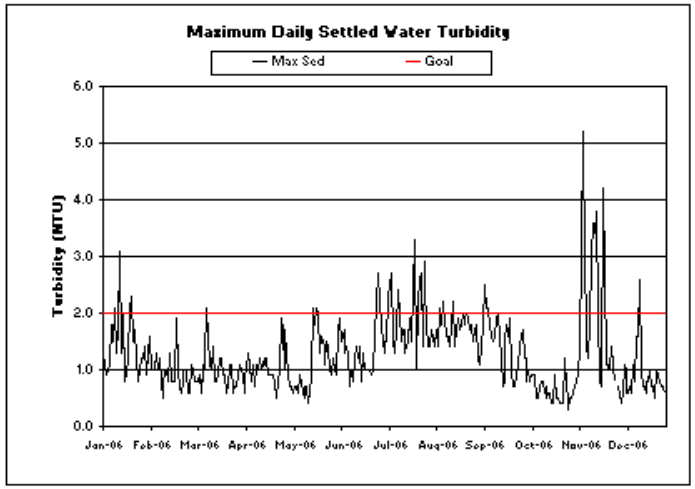
File Edit View Insert Format Tools Data Window Help

AA38

FERNDALE

Treatment Barrier Performance Summary





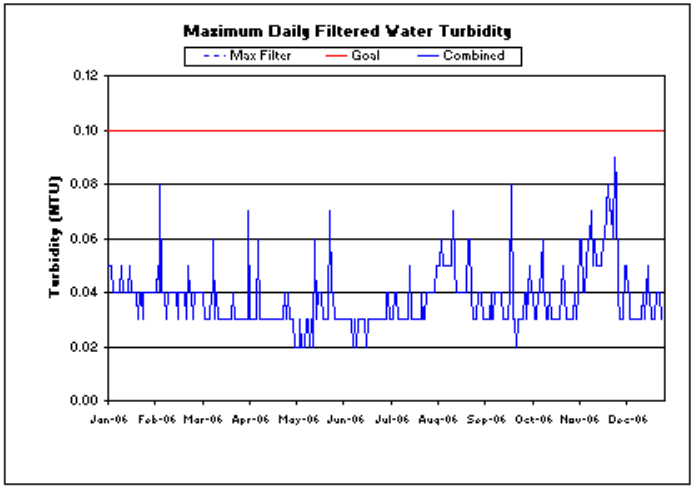
ANNUAL DATA	Avg	Min	Max	RSQ	95%	Opt. Goal	Req.
	NTU	NTU	NTU		NTU	% Values	% Values
Raw Turbidity	53.1	3.0	1152.0	n/a	166.8	n/a	n/a
Max. Settled Turbidity	1.3	0.3	5.2	0.14	2.5	89.6	n/a
Max. Filtered Turbidity						#N/A	n/a
Combined Filtered Turbid	0.04	0.02	0.09	0.034	0.06	100.0	100.0

RSQ = Correlation Coefficient for two selected data sets

95% = 95th Percentile value for data set

Opt. Goal = % of values in data set that are less than or equal to the selected optimization turbidity goal

Reg. = % of values in data set that are less than or equal to the regulated turbidity requirement



Optimization Assessment Software - Version 26a

Instructions / DataEntryPaste / DataEntryValues / Summary / OptimizationTrend / LogProfile / MaxSed / Sec

Ready NUM

Start Microsoft Excel - 248... 2:57 PM

DOH and Utility Roles

DOH Regional Engineer (Coach)

- Facilitate PBT Process
- Offer Guidance and Encouragement
- Keep PBT Process on Track

Utility WTP Staff (Team)

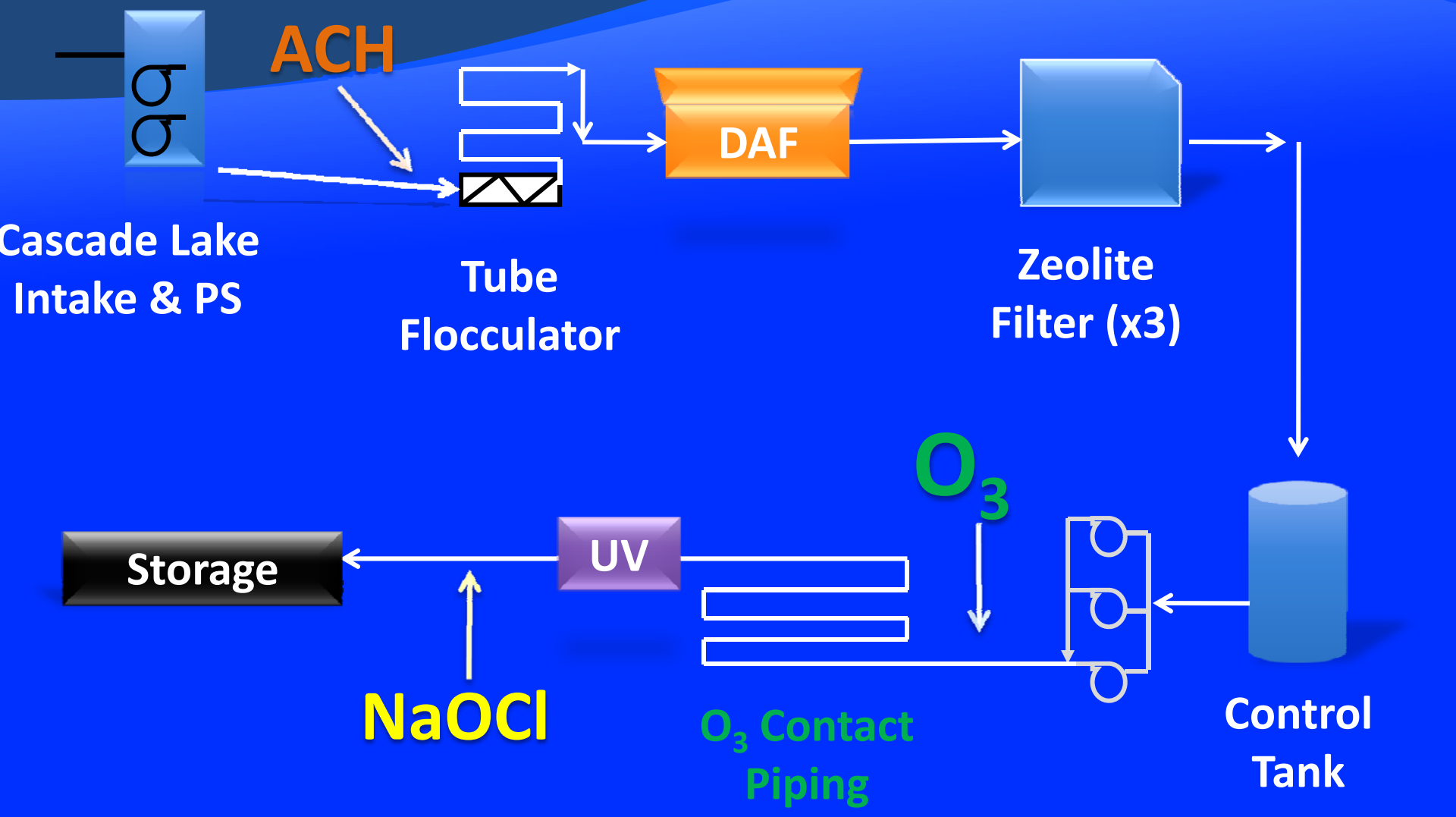
- Utility Does the "Heavy Lifting"
- Monitor WTP Processes, and Collect and Manipulate Data
- Develop and Implement Special Studies
- Develop Conclusions
- *Communicate* Conclusions
- Improve Plant Performance

Rosario WTP

Special Studies

Improved Performance

Rosario WTP Schematic



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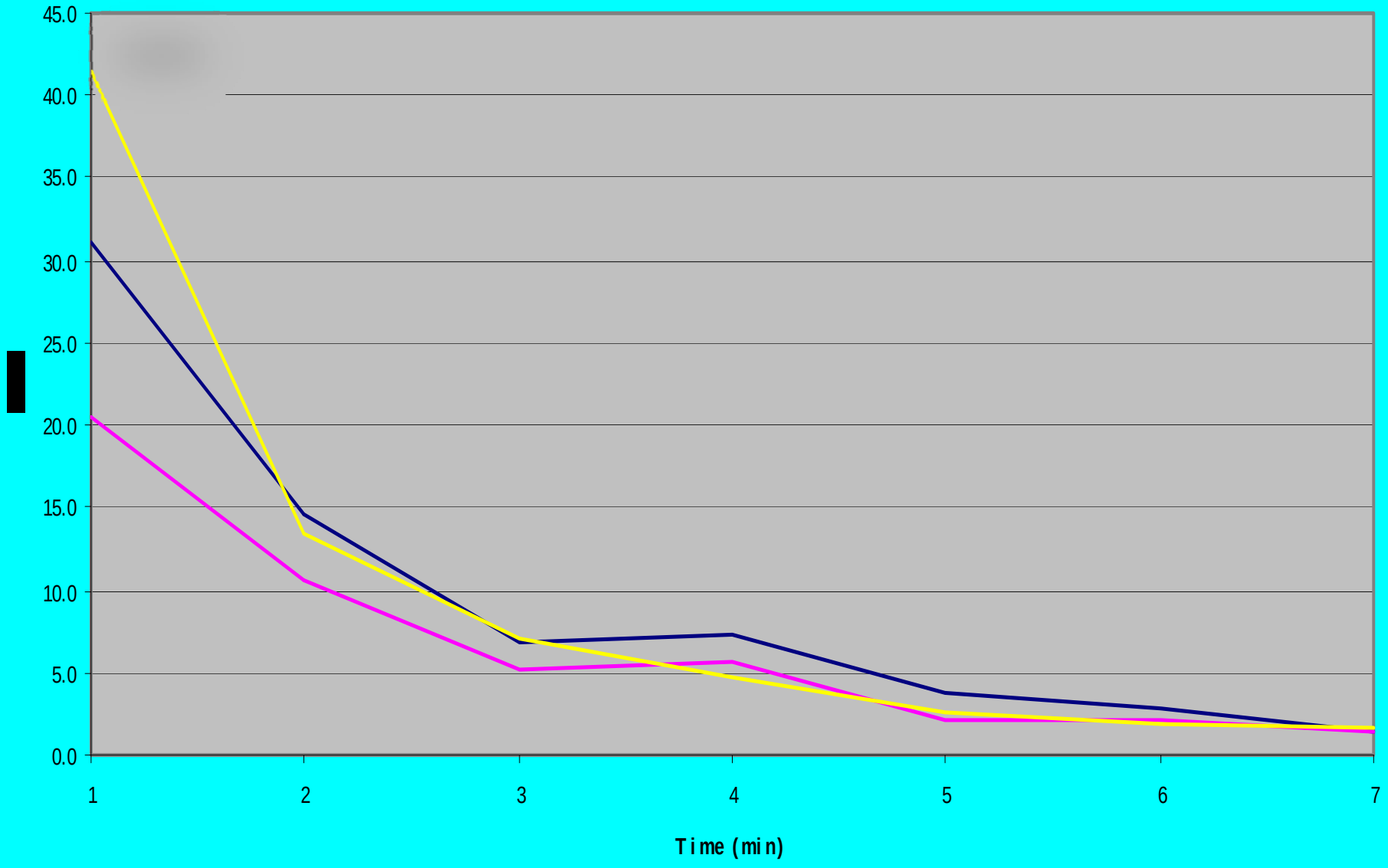
Typical/Normal Conditions

- Stable Raw Water Avg: 1.13 NTU
- Average pH: 7.5
- Coagulant Dose: ACH 8.5 mg/L

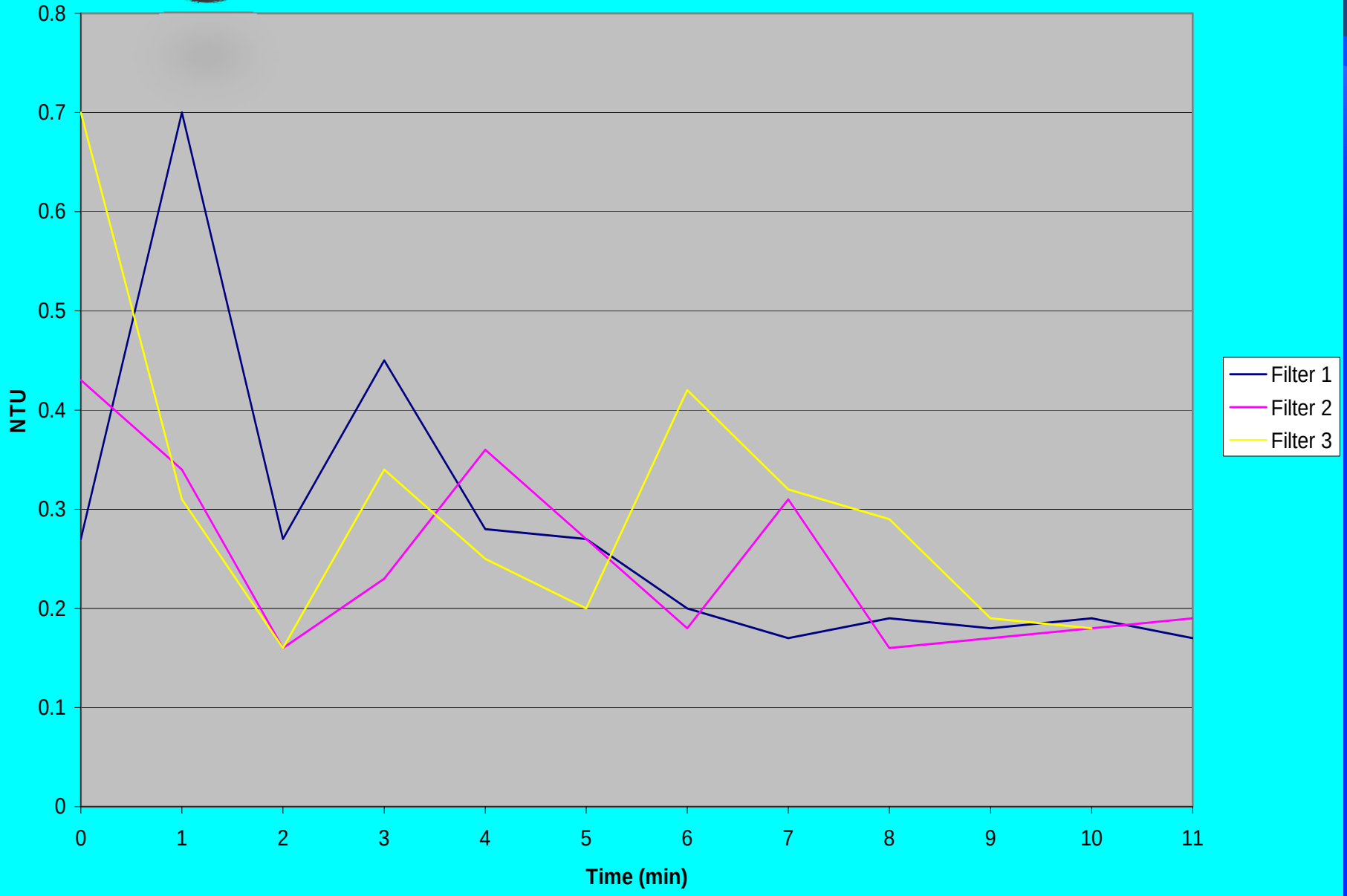
Rosario Special Studies

- Change in CFE Turbidity Monitoring Location
- Filter To Waste Profiles
- Backwash Duration Profiles
- Refill Filter Media

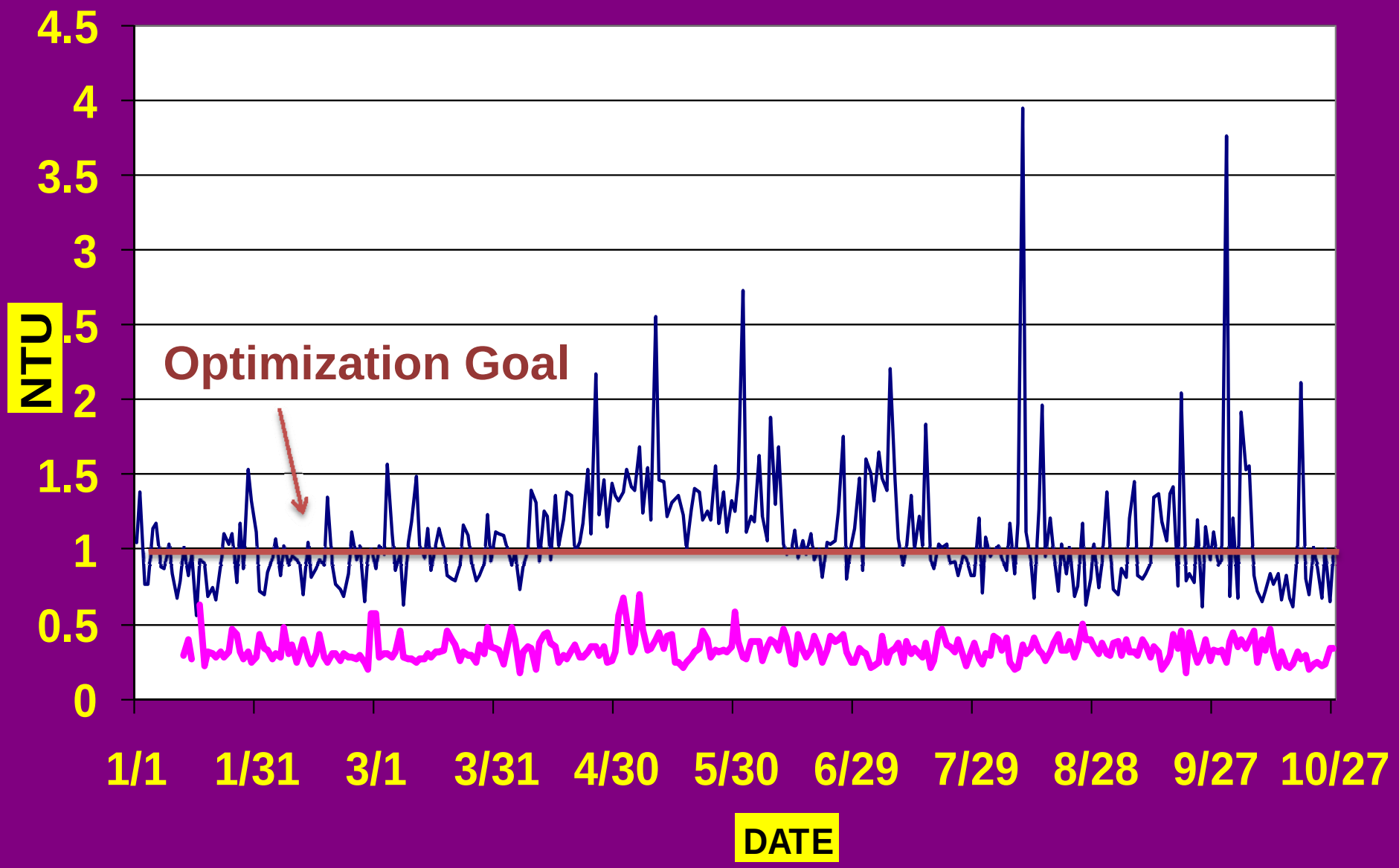
WWSC Rosario WTP BW NTU PROFILE 4-5-2009 (105 sec Air Scour)



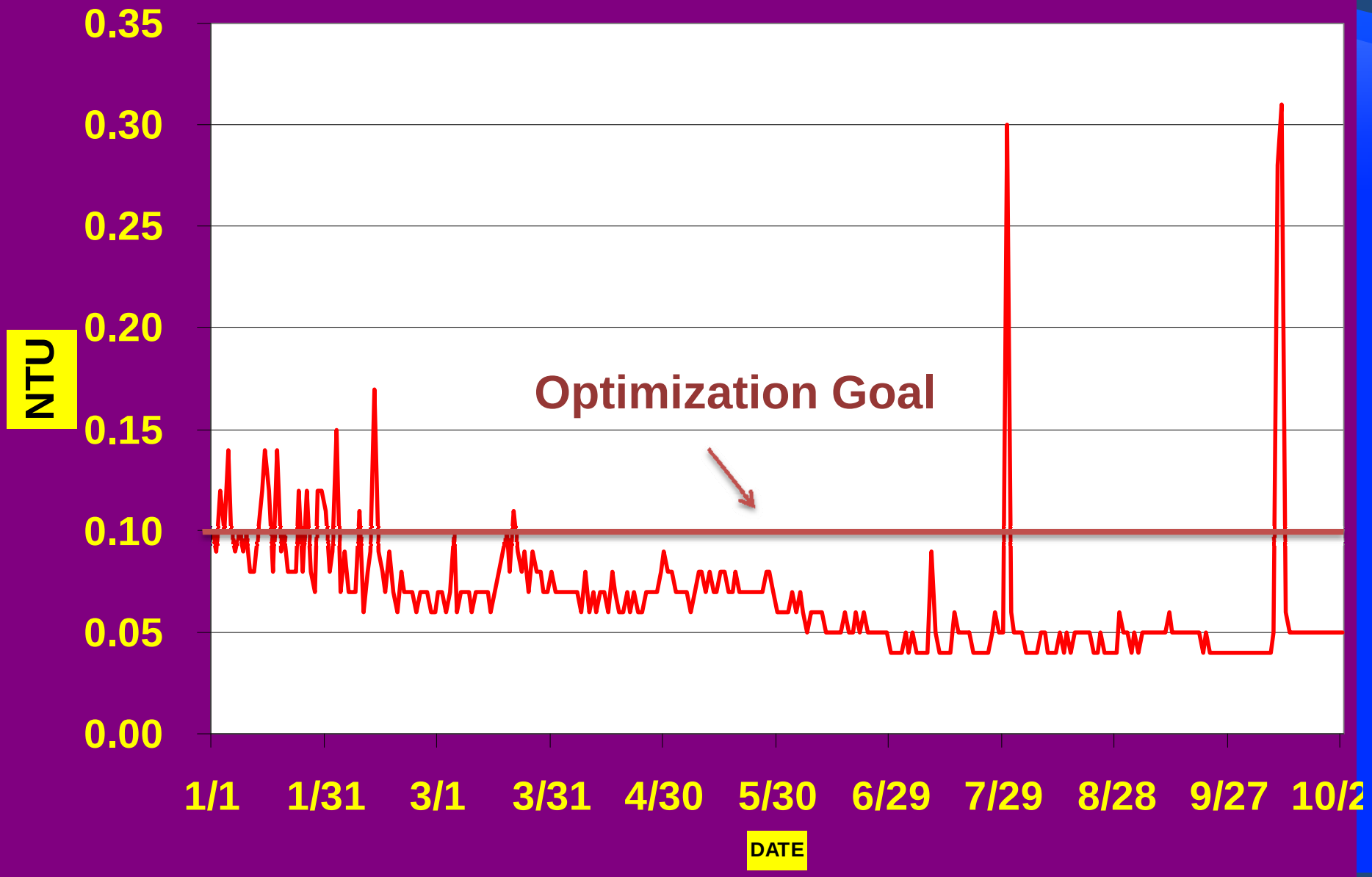
WWSC Rosario WTP FTW Profile 4-6-2009 Running 220 mode



RAW, SETTLED NTU



CFE TURBIDITY



$PERFORMANCE BENEFITS$

- *SHORTER FILTER TO WASTE TIME*
- *SHORTER BW TIME, LOWER BW RATE*
- *EXTENDED FILTER RUNS*
- *LOWER FINISH NTU*
- **H20 SAVINGS @ 120 GPM: 0.13 MG/MO**
- **O3 CALLOUT SAVINGS: $4500/YR**
- **O3 MAINT SAVINGS: 72 HRS/YR**

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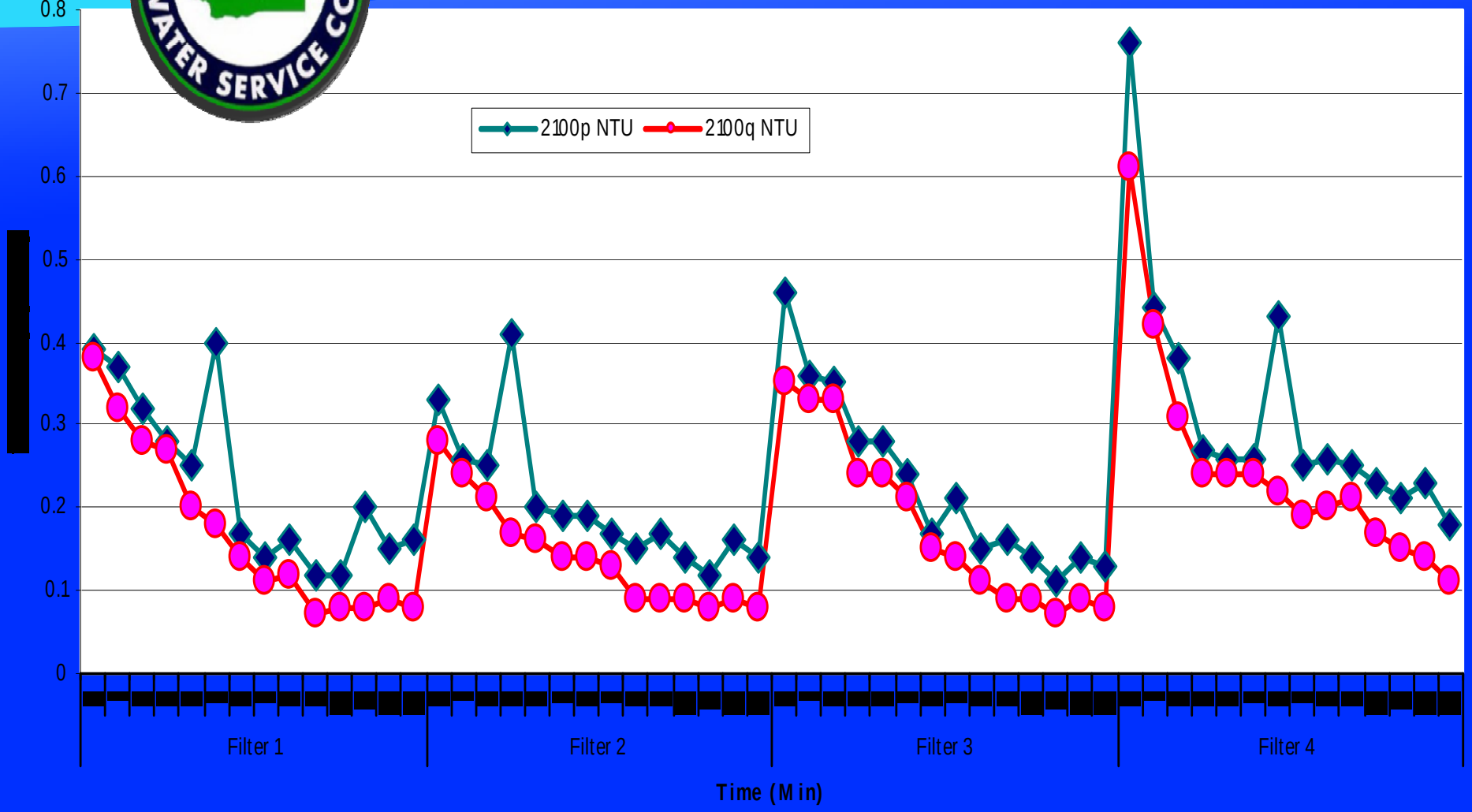
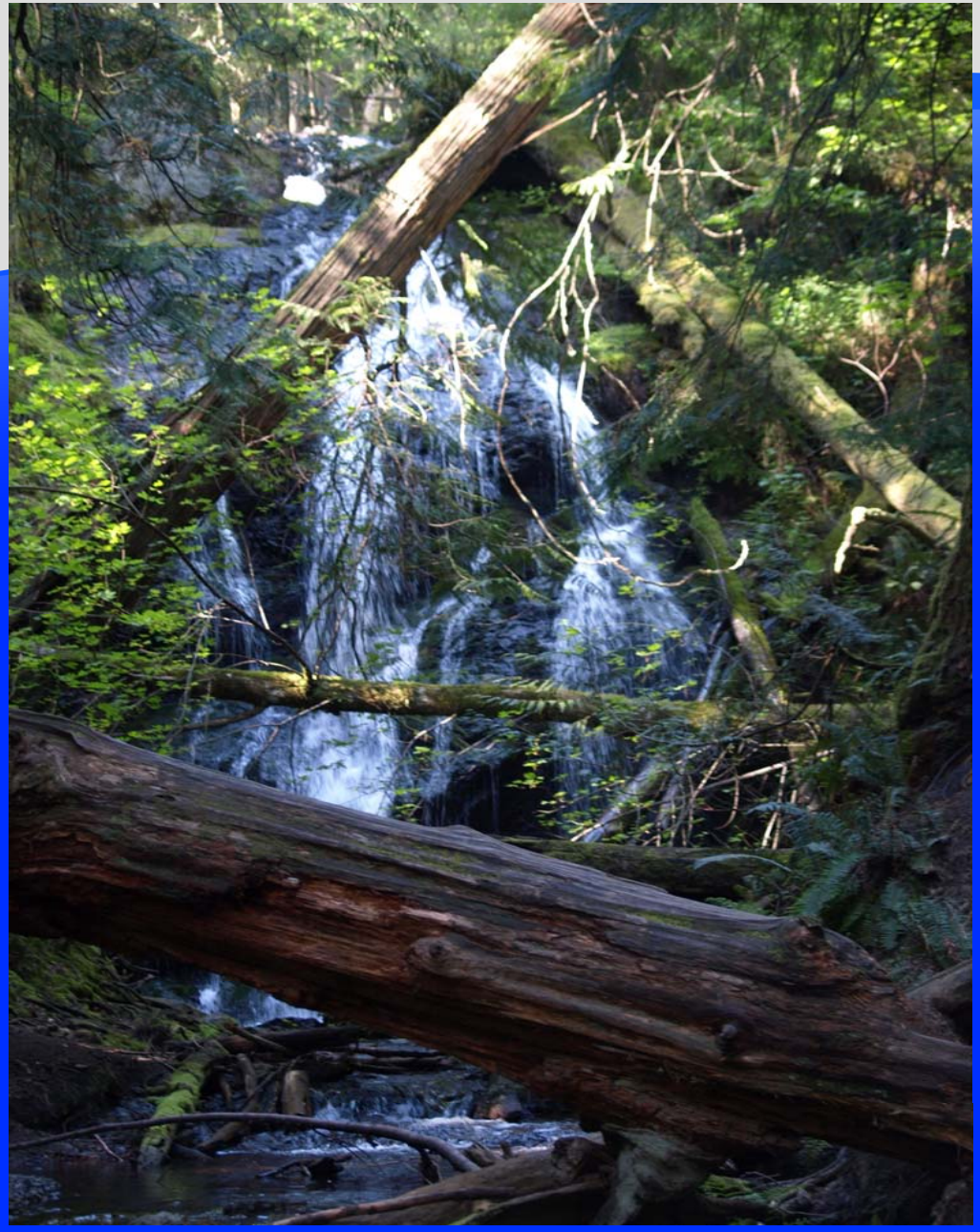
Rosario WTP FTW Profile 10 May 2010

Regulatory Turbidity Performance Limit: 0.30 NTU
Voluntary Optimization Turbidity Performance Limit: 0.10 NTU



Other PBT Benefits

- BRING PLANT TO DESIGN CAPACITY OF 220 GPM, UPGRADE OF 280 GPM
- INCREASED UNDERSTANDING OF PROCESS
- COLLABORATIVE EFFORTS BETWEEN OPERATORS, ADMINSTRATORS, REGULATORS