

# American Water Resources Association

## *Washington State Conference*

October 4, 2011 – Seattle, Washington



## **Wastewater Management**

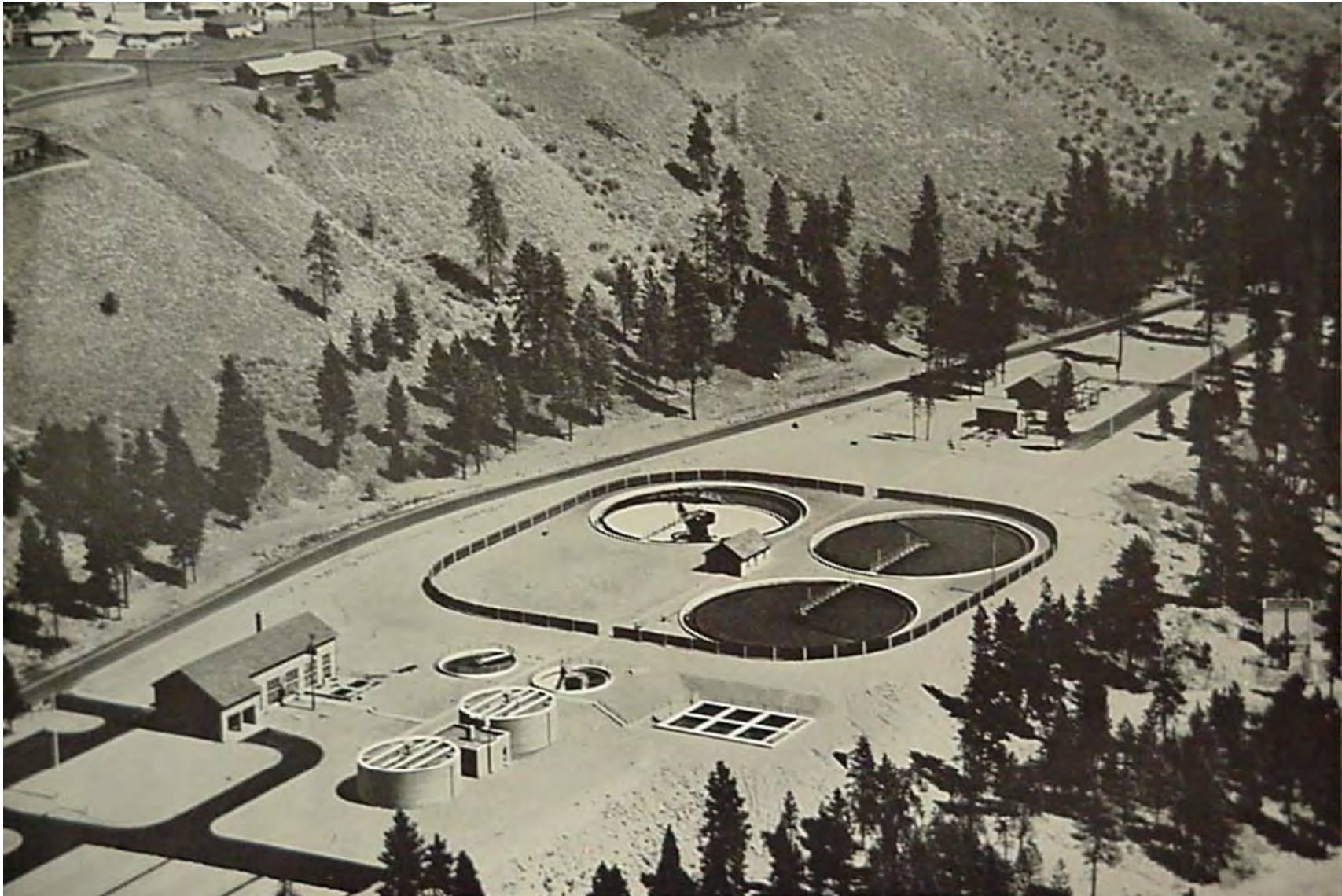
Reducing Phosphorus Loading to  
the Spokane River & Long Lake...

### *An Overview*

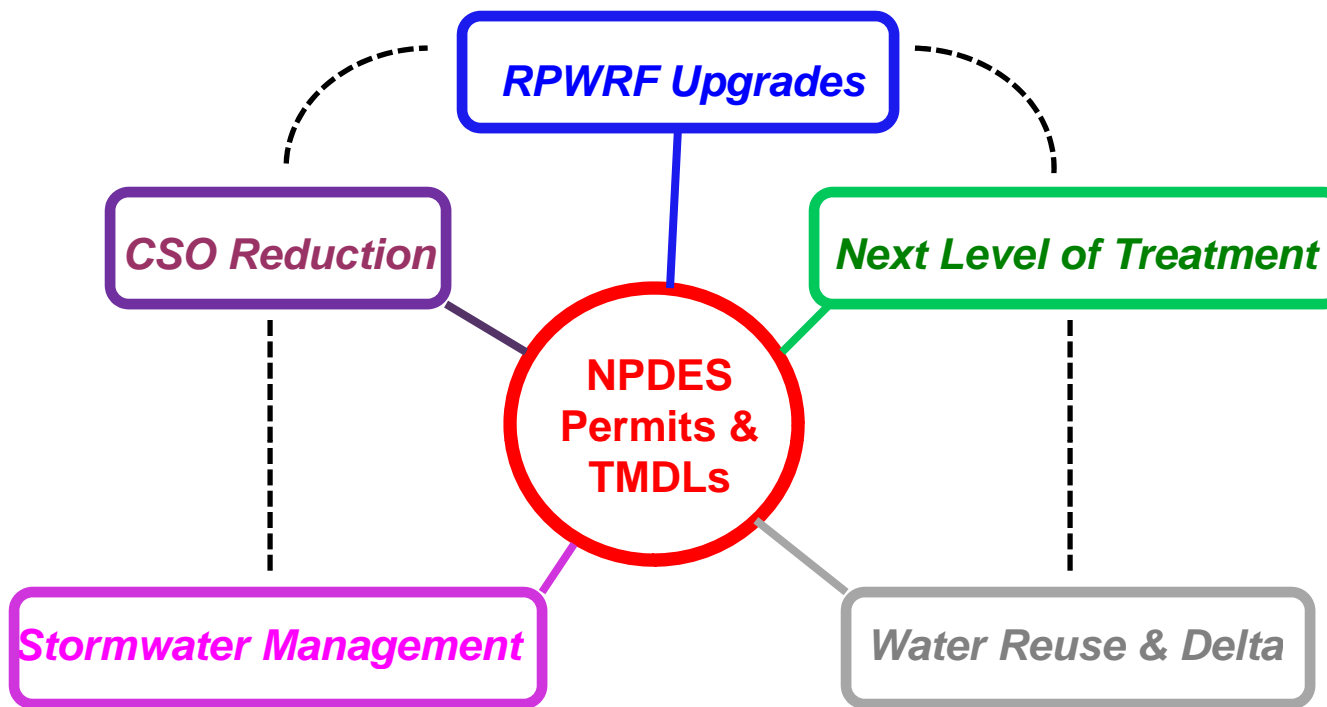
Lars H. Hendron, PE – Principal Engineer – City of Spokane

© *Pilot photographs courtesy of Esvelt Environmental Engineering, Spokane*

# Spokane's WWTP in 1958



# Spokane's Water Quality Improvement Program



## Regulations

Federal Clean Water Act  
 Revised Code of WA  
 WA Administrative Code  
 Shoreline Master Plan

## Process

Facility Plans  
 Preliminary Designs  
 Real Estate  
 Final Designs  
 Construction

## Funding

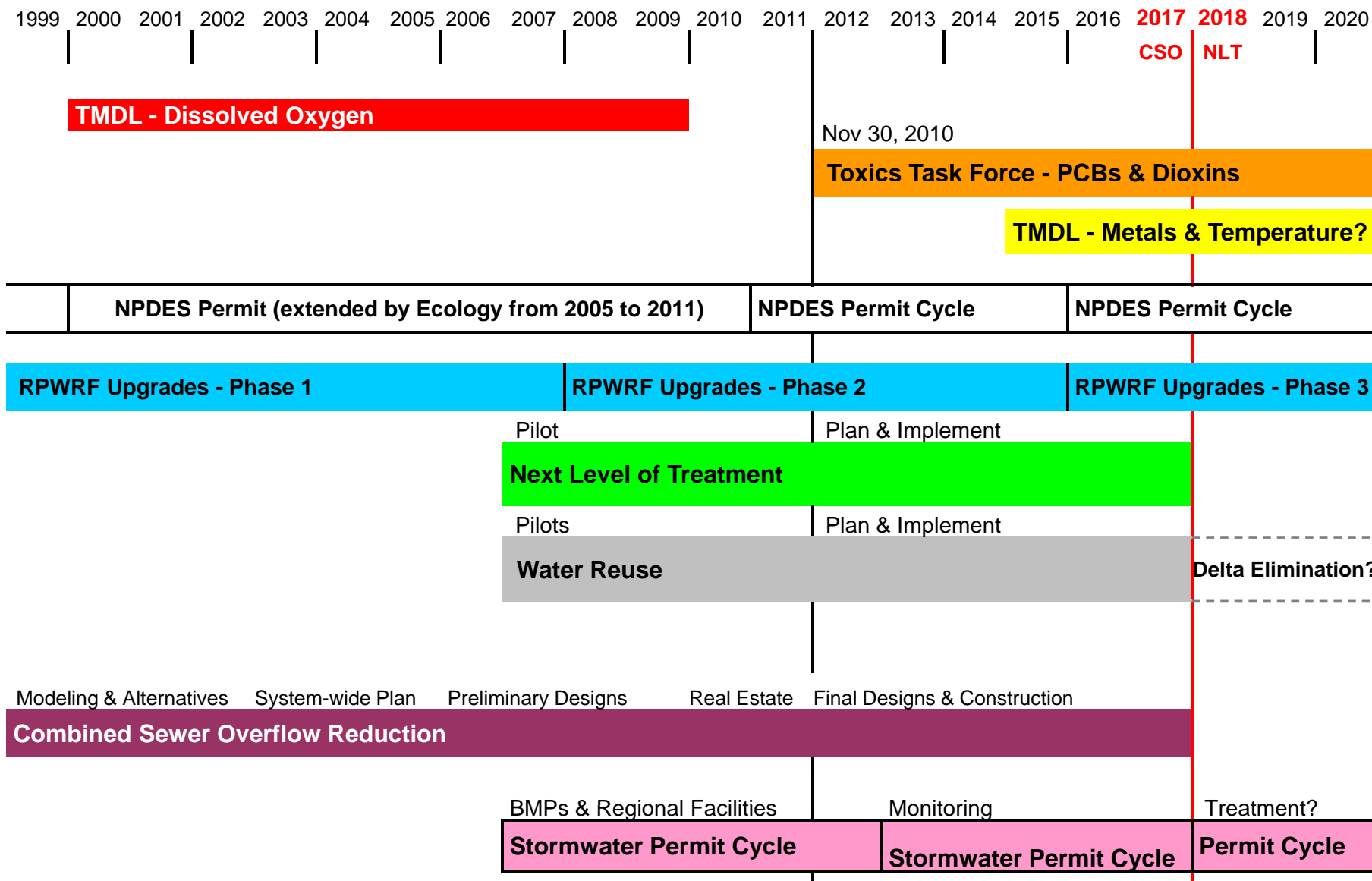
Rates & Reserves  
 Spokane County  
 PWTF & SRF Loans  
 Bonding

NPDES = National Pollutant Discharge Elimination System (Federal EPA)  
 TMDL = Total Maximum Daily Load (WA State Dept of Ecology)  
 RPWRF = Riverside Park Water Reclamation Facility (treatment plant)  
 CSO = Combined Sewer Overflow (sewage mixed with rain or snowmelt)  
 Delta = any "gap" between plant performance and the Permit Requirements

PWTF = Public Works Trust Fund  
 SRF = State Revolving Fund



# Spokane's Water Quality Improvement Program



# Spokane's WWTP in 2011



RPWRF is an activated sludge plant with anaerobic digestion and alum addition for advanced secondary treatment.

Average flow ~40 MGD

Wet peak flow ~135 MGD

Undergoing continuous upgrades since 1999

Next Level of Treatment is the addition of tertiary treatment to achieve new and future more stringent effluent limits.

# Next Level of Treatment



# Next Level Of Treatment



New NPDES Permit implements TMDL for Dissolved Oxygen:

- Total Phosphorus (WLA 17.8 lbs/day)
- Ammonia Nitrogen
- Carbonaceous BOD

Compliance deadline is March, 2018

PCBs, PBDEs, metals, etc. are also of concern

# Next Level of Treatment



- Pilot a variety of technologies
- Identify which best serves City's needs
  - Focus on P, evaluate re: PCBs, metals, etc.
  - This step does not select a Vendor
- Update the Facility Plan
- RFP for Design or Alternative Delivery
- Vendor selected during design
- Proceed to construction
- Operate to determine performance



# Next Level of Treatment



Technology Selection Protocol is underway

Esvelt Environmental Engineering is coordinating the City's full-scale, peer-reviewed Pilot to determine most suitable technology(ies) for NLT.

- Treatment performance – new and future
- Life cycle cost – capital and O&M
- Compact installation – limited space
- Operational considerations
- Design considerations

# Next Level of Treatment

## 1<sup>st</sup> stage – sedimentation

Corix (S)

Kruger Actiflo (K)

Cambridge Water Technology (C)

## 2<sup>nd</sup> stage – filtration

Corix multimedia granular (F)

Bluewater continuous upwash sand (B)

Zenon membrane (Z)

# Next Level of Treatment

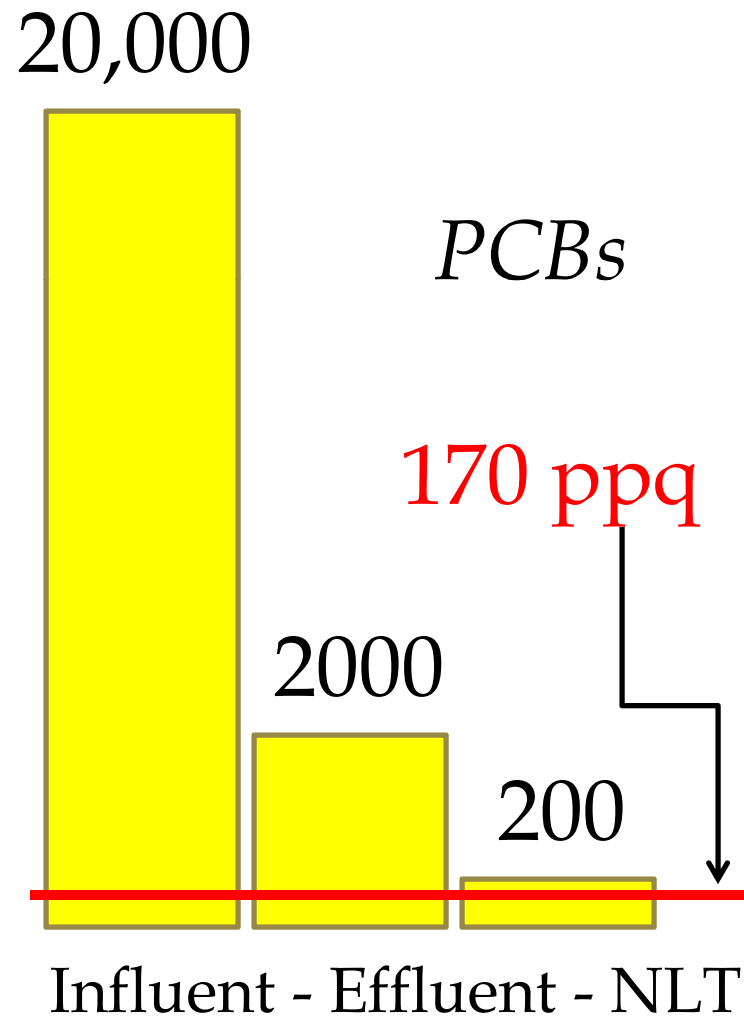
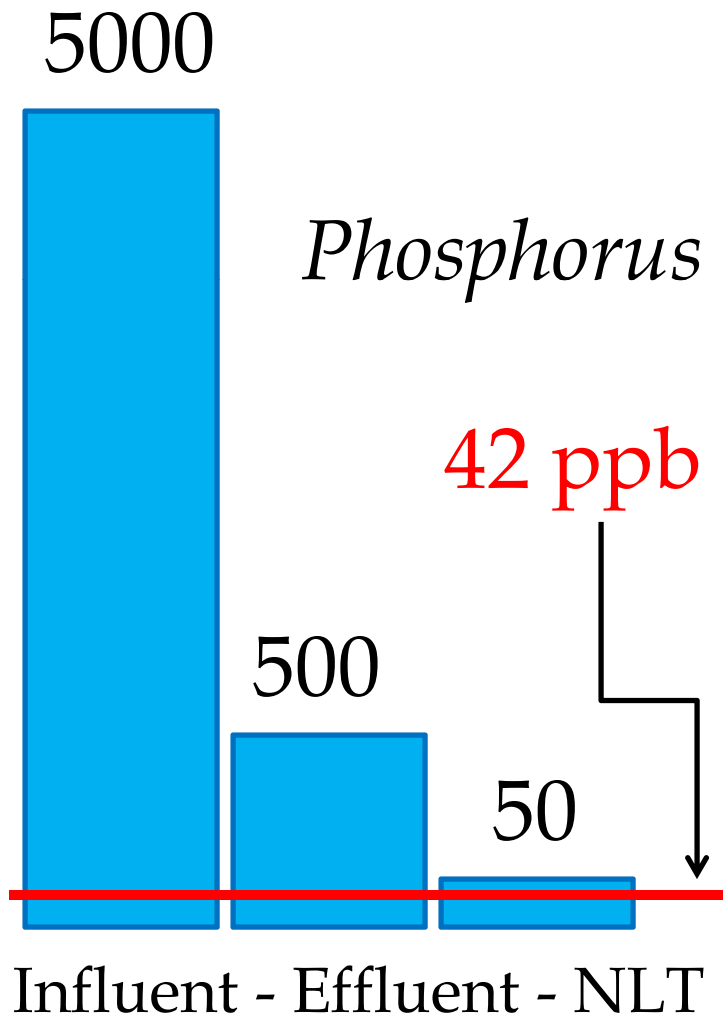


# Next Level of Treatment

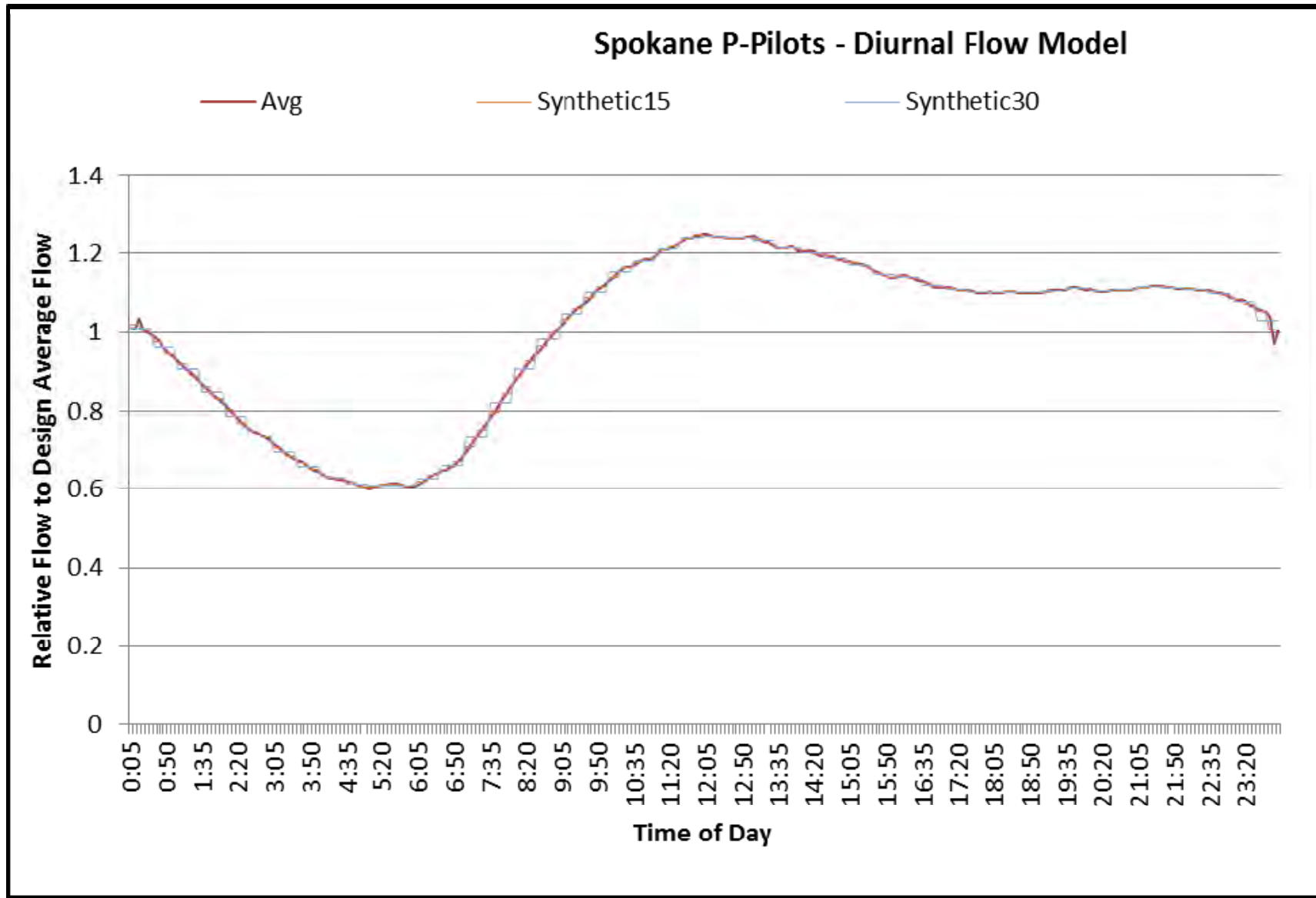


*Installation of one "S" unit ~ 0.5 MGD*

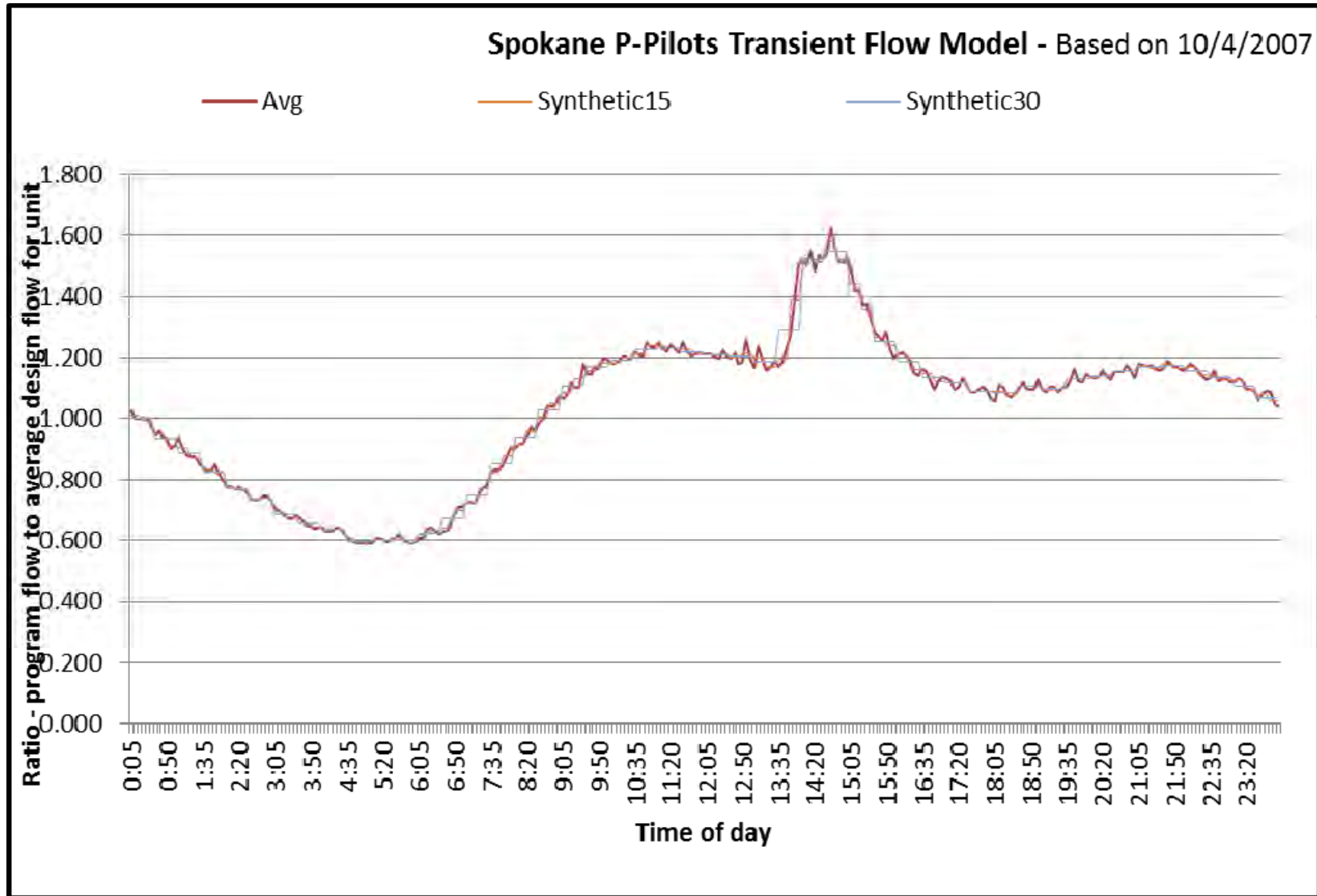
# RPWRF Upgrades & NLT



# Next Level of Treatment



# Next Level of Treatment





# Next Level of Treatment

## Implementation of Selected Technology

- Pilot testing completed 1<sup>st</sup> Quarter 2011
- **Data analysis is underway**
- Pilot Report expected 2<sup>nd</sup> Quarter 2012
- Facility Plan Amendment
- Engineering Report





# Next level of Treatment

## Implementation of Selected Technology

Three Delivery Methods to choose from

- Traditional Design-Bid-Build
- Design-Build
- General Contractor as Construction Manager  
(*a.k.a. Construction Manger at Risk*)

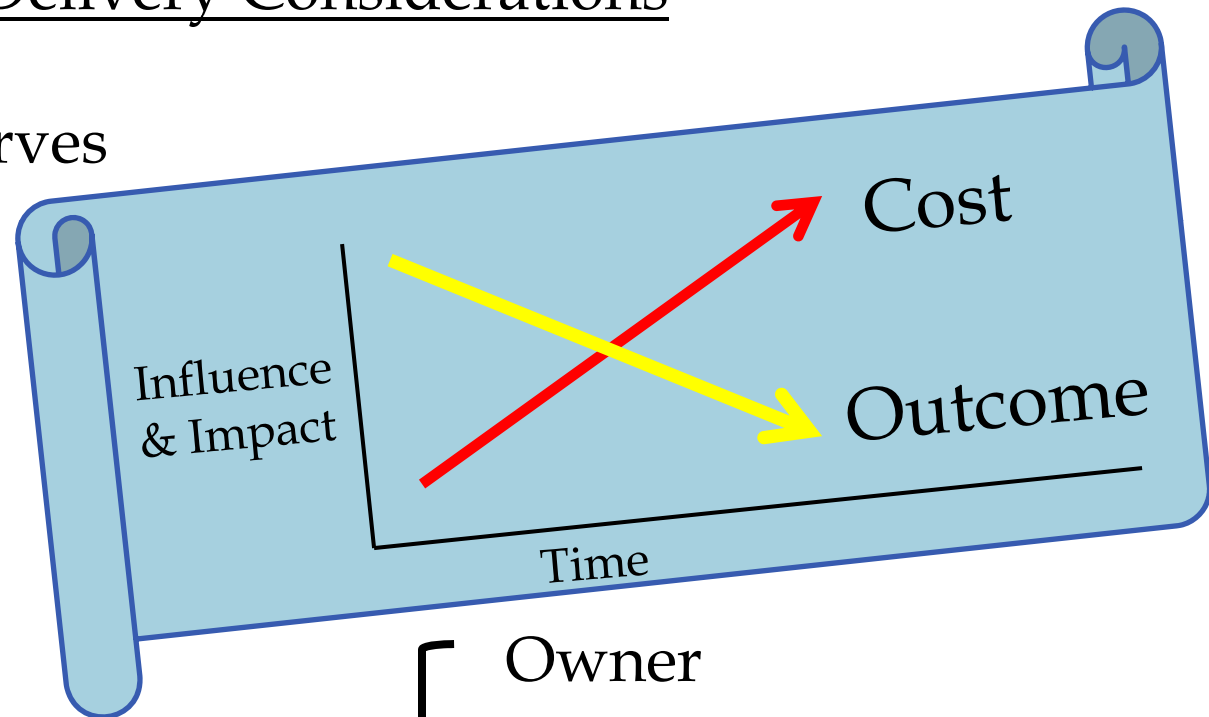
DB and GC/CM are authorized in the RCW

# Next Level of Treatment



## Alternative Delivery Considerations

Influence curves



Optimize timing of input

- Owner
- Designer
- Constructor

# Next Level of Treatment



## Alternative Delivery Considerations

### Risk–Control continuum

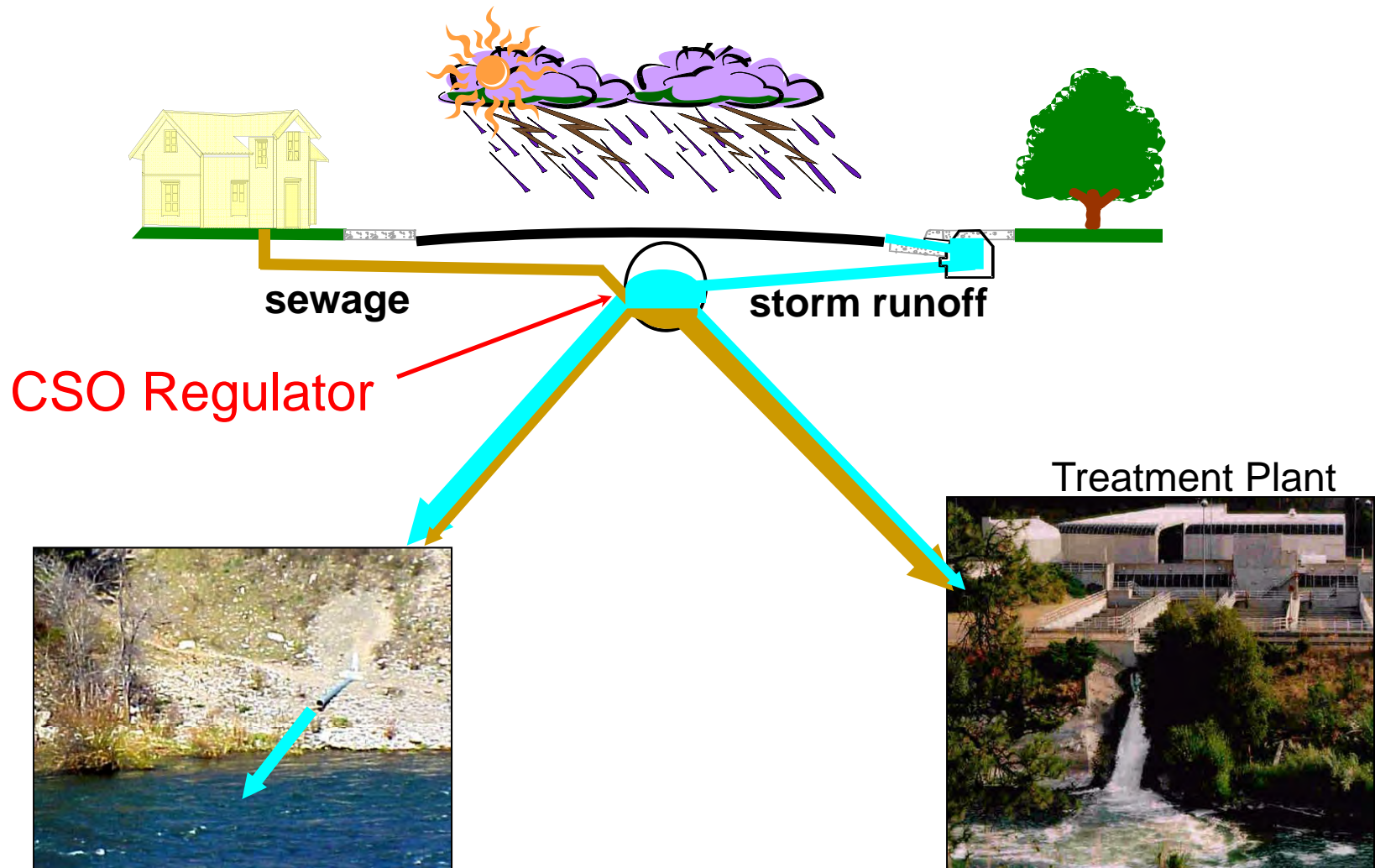
- innovation and responsibility
- regulatory compliance
- City's comfort level

## General Considerations regarding NLT

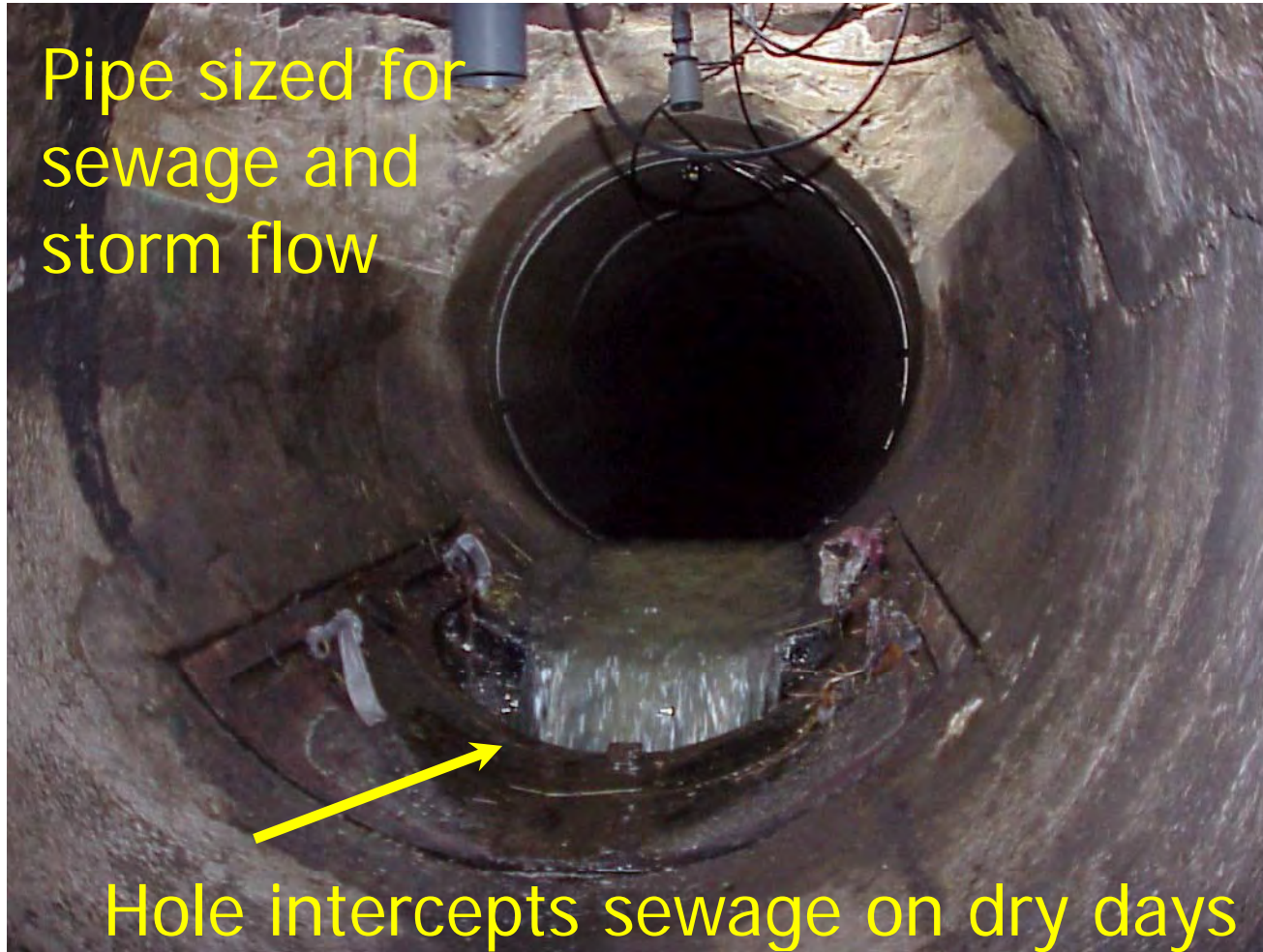
### Plant Operations

- flow variations and process impacts
- accuracy of lab methods
- financing and sustainability

# *Combined Sewer Overflows*



# CSO Regulator = Overflow Threshold



Old style "Leaping Weir"

# Improved Regulator



Float-actuated  
control valve

NOV 19 2008

# CSO Tank Construction



# Completed CSO Tank





# CSO Reduction Program



| <u>Year</u> | <u>Outfalls</u> | <u>Avg Gallons</u> | <u>Avg Frequency</u> |
|-------------|-----------------|--------------------|----------------------|
| 1980        | ~42             | 600 M              | 1000                 |
| 1994        | 24              | 80 M               | 450                  |
| 2011        | 22              | 75 M               | 350                  |
| 2017        | <20             | ~8 M               | <20                  |

One overflow per outfall per year, on average

# Separated Stormwater



*1" of rain over the whole City is a Billion Gallons!*

*(about 25% falls on right-of-way)*

Discharges to River

- OR -

Discharges to Ground

- Bio-infiltration Swales
- Regional Facilities
- Catch Basins and Drywells (UIC)

# Stormwater Management

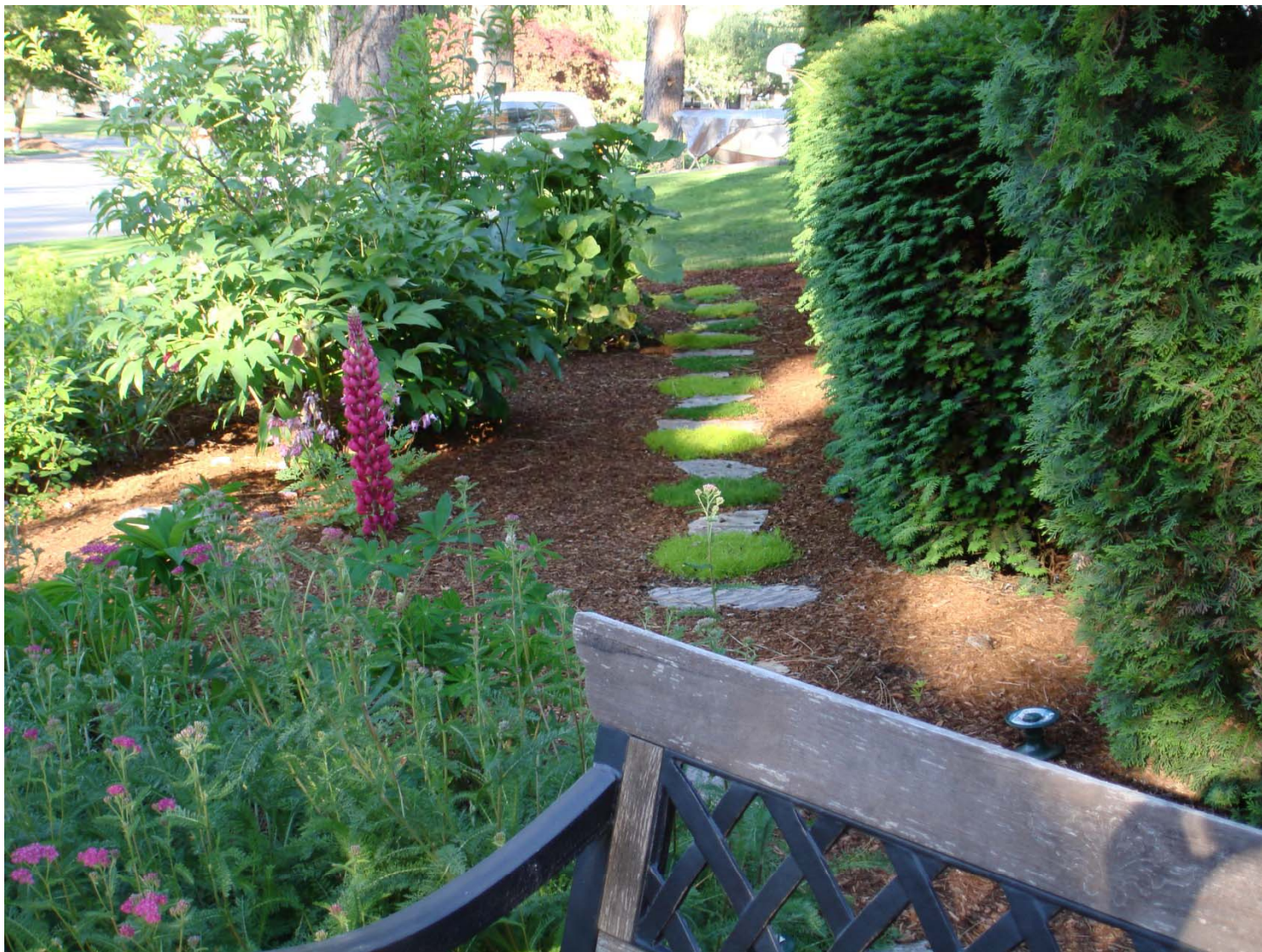


- ✓ 1980s – separated for CSO Reduction
- ✓ 1980s – grass swales for treatment (LID)
  
- ✓ 2000s – regional facilities, Stormwater Manual
- ✓ 2000s – public education/involvement (BMPs)
  
- ✓ 2010s – rain gardens, permeable pavement
- ✓ 2010s – monitoring and enhanced LID
- ✓ 2010s – low-phosphorus fertilizer?

# Low Impact Development...



# ... and Best Management Practices



# Questions?



## Wastewater Management

Lars Hendron, PE – City of Spokane Wastewater

(509) 625-7929

[lhendron@spokanecity.org](mailto:lhendron@spokanecity.org)