The Municipal Perspective:

Balancing Competing Priorities of Local Economic Development, Asset Management, and Water Infrastructure Optimization

2015 BLOOM Food & Beverage Water Innovation Forum

Background

2011

- Brantford has a capital project identified to expand its WWTP to address treatment challenges
  - Operating at approx. 42% hydraulic capacity
  - Achieving all MOECC compliance requirements, but is clearly challenged

- Planned improvements - $27.5M
- Plant is contract operated, and staff are paying invoices with little knowledge of the facility

- A new General Manager of Public Works arrives on the scene with a “radical idea” - Optimization

The Approach

2012

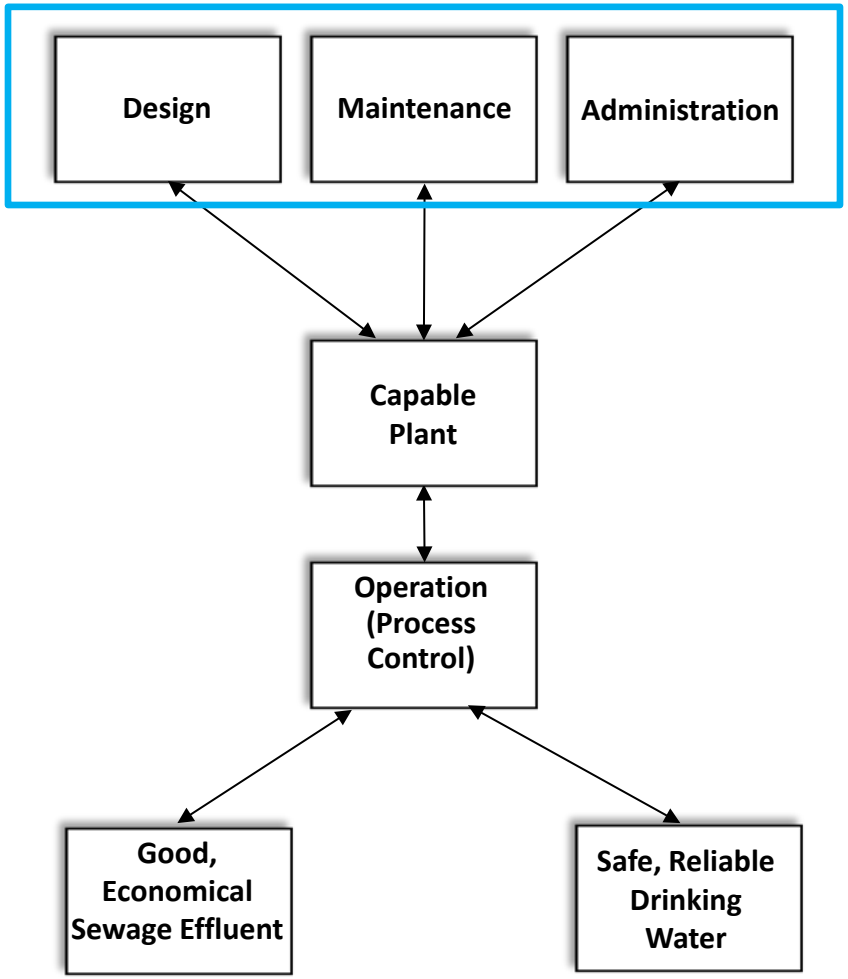
- Engage the services of Global Facilitation Inc. to initiate the Composite Correction Program

- Two parts:
  - **Comprehensive Performance Evaluation**: assess individual process units, maintenance practices, and one-on-one operator interviews to identify known or perceived Performance Limiting Factors (PLFs)
  - **Comprehensive Technical Assistance**: if there are no major PLFs relating to the design of the facility, initiate a program of optimization using Composite Correction Program principles

- Comprehensive Performance Evaluation was initiated and took about 10 days to complete

The Approach

Comprehensive Performance Evaluation Framework



Design

- Plant is designed to meet the demands of Best Planning Estimates for the community
- No individual process unit in the plant limits overall performance
- Design can achieve legislated effluent criteria

Maintenance

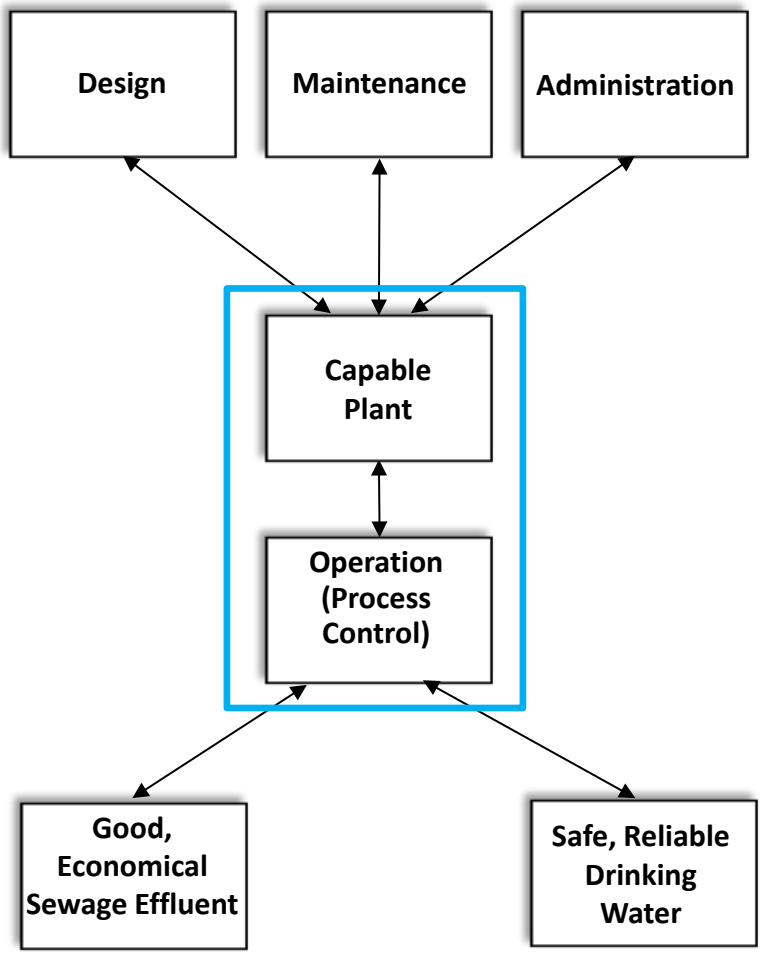
- Establishment of scheduled, preventative and reactive maintenance practices to ensure that no critical equipment or systems fail
- Life-cycle asset management to ensure maximum benefit from capital investment

Administration

- Operational policies and practices (Standard Operating Procedures, by-laws, quality management standards)
- Sufficient capital and operating budgets to maintain and operate the facility
- Benchmarking to validate performance

The Approach

Comprehensive Performance Evaluation Framework



Capable Plant

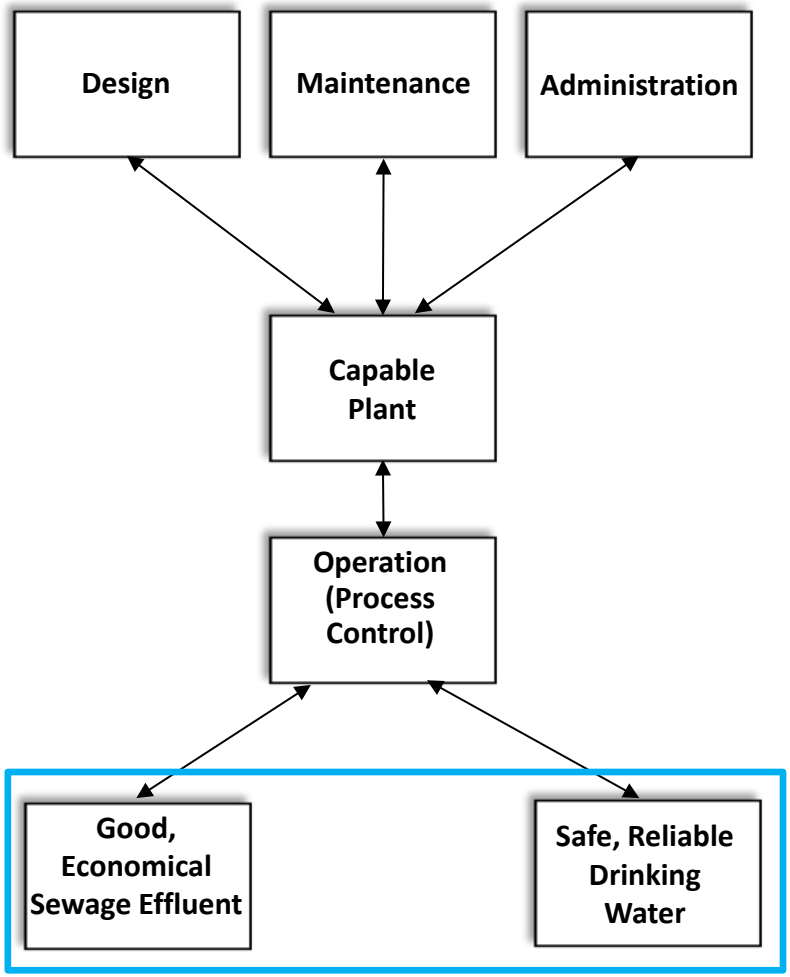
- Designed to meet demands (all of the individual process units – no bottle-necks)
- Properly maintained plant infrastructure
- Supported by proper policies, practices, and budgets

Operation (Process Control)

- Operator certification, ongoing training, plant optimization project work
- Daily performance data collection (manual and SCADA)
- “Special Studies” when problems arise
- Operator engagement

The Approach

Comprehensive Performance Evaluation Framework

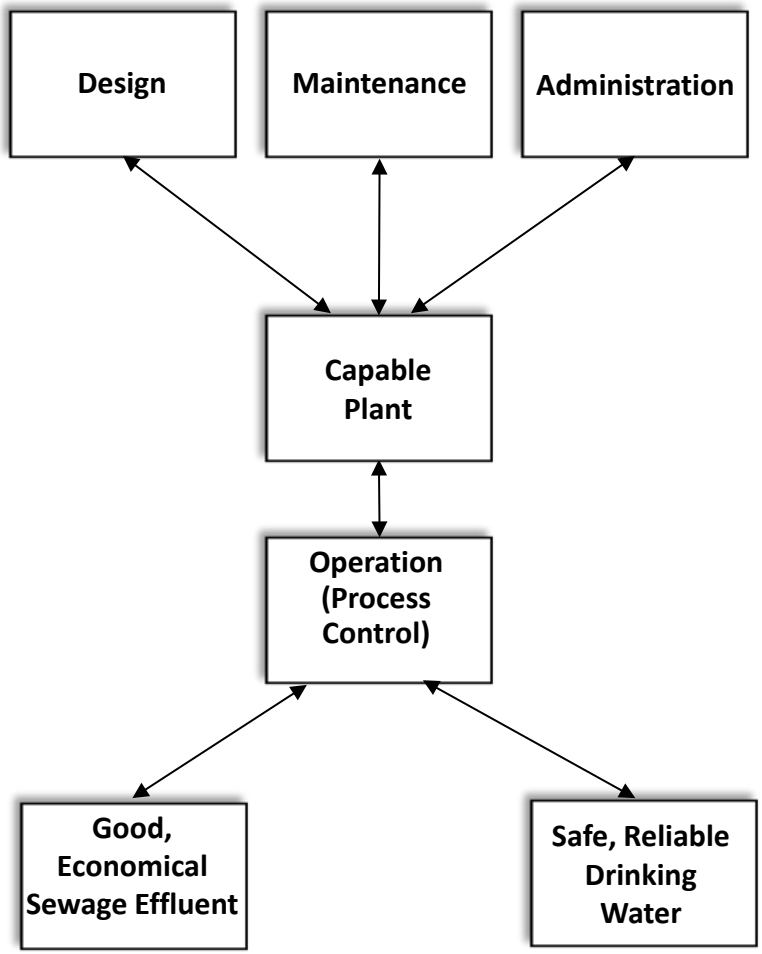


Good, Economical Sewage Effluent and Safe, Reliable Drinking Water

- Meet, or exceed, MOECC Environmental Compliance Approval (ECA) effluent parameters
- Meet, or exceed, MOECC Drinking Water Quality Standards/Legislation

The Results…

Comprehensive Performance Evaluation Framework



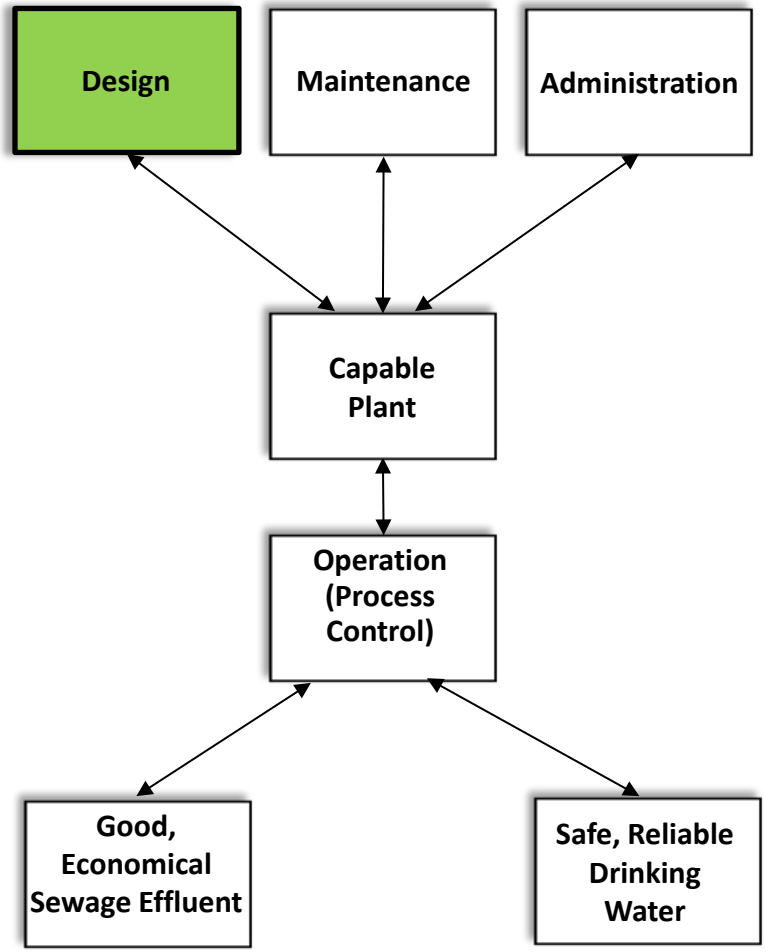
Comprehensive Performance Evaluation:

Design:

- Traditional design, some operational limitations, and the usual quirks

The Results…

Comprehensive Performance Evaluation Framework



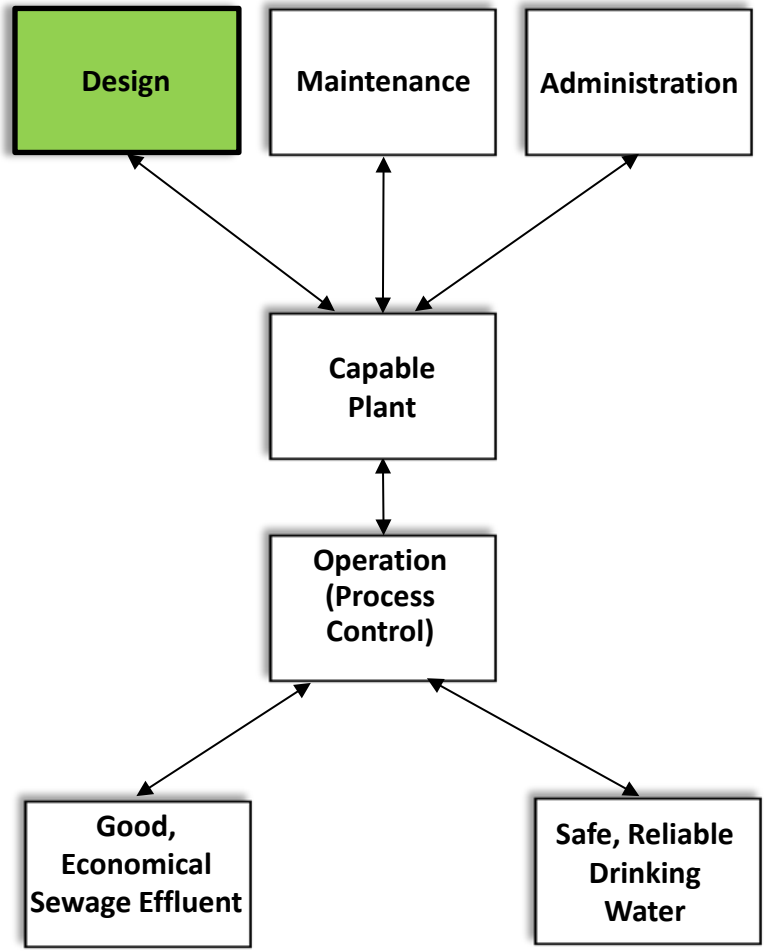
Comprehensive Performance Evaluation:

Design:

- Traditional design, some operational limitations, and the usual quirks

The Results…

Comprehensive Performance Evaluation Framework



Comprehensive Performance Evaluation:

Design:

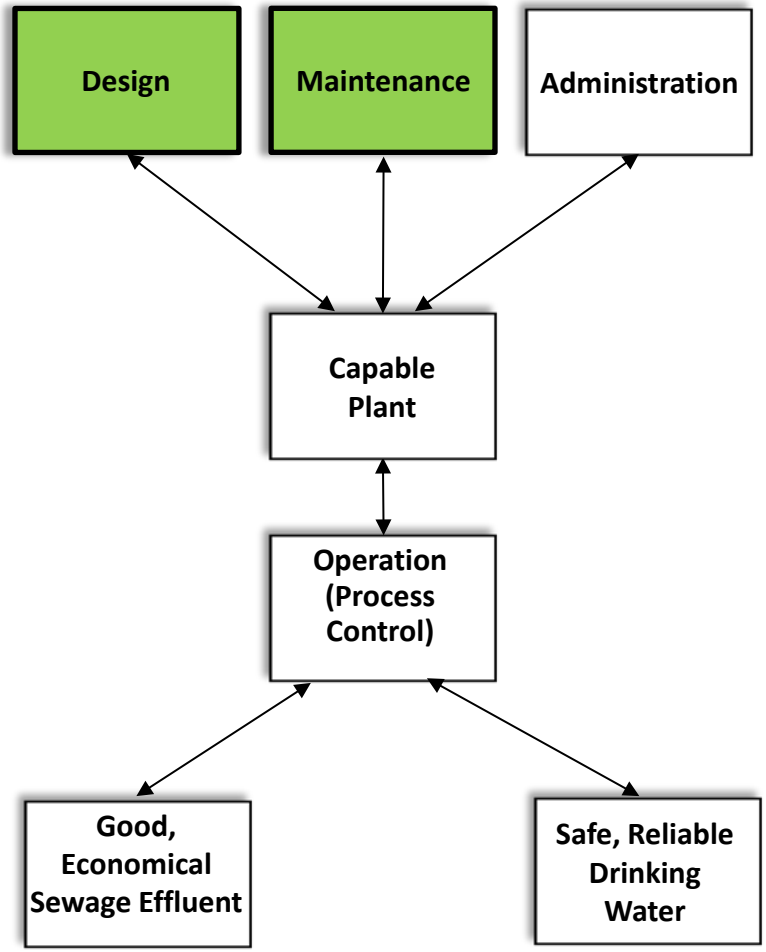
- Traditional design, some operational limitations, and the usual quirks

Maintenance:

- Visual inspections, operator interviews, records review reveal good maintenance practices

The Results…

Comprehensive Performance Evaluation Framework



Comprehensive Performance Evaluation:

Design:

- Traditional design, some operational limitations, and the usual quirks

Maintenance:

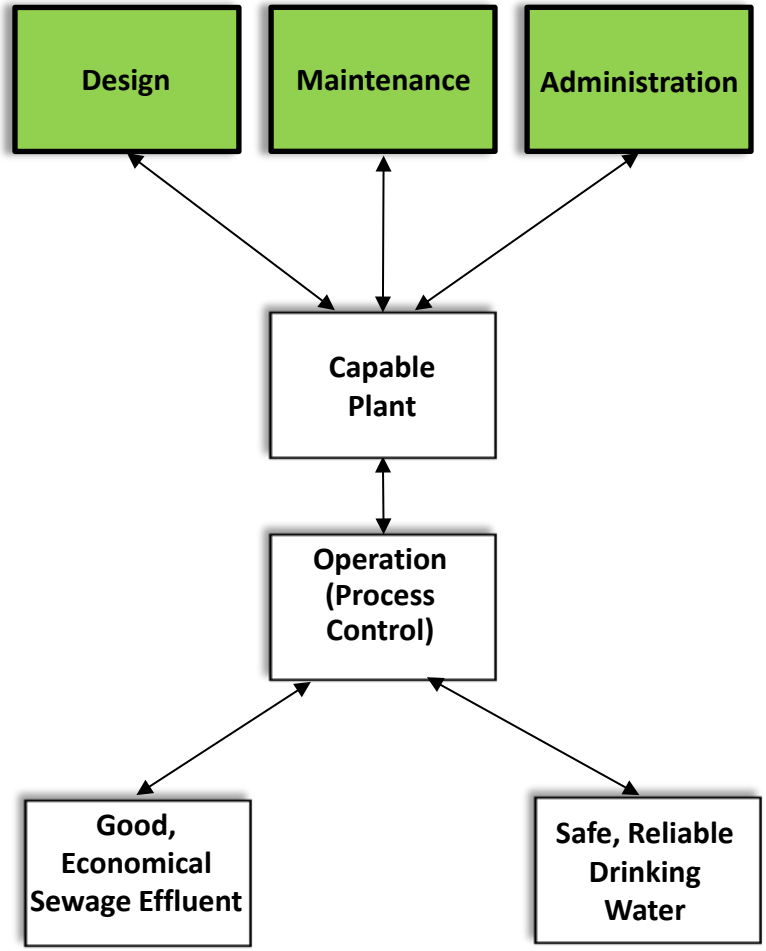
- Visual inspections, operator interviews, records review reveal good maintenance practices

Administration:

- Plant is in compliance, staff are well trained and certified to the level of the facility

The Results…

Comprehensive Performance Evaluation Framework



Comprehensive Performance Evaluation:

Design:

- Traditional design, some operational limitations, and the usual quirks

Maintenance:

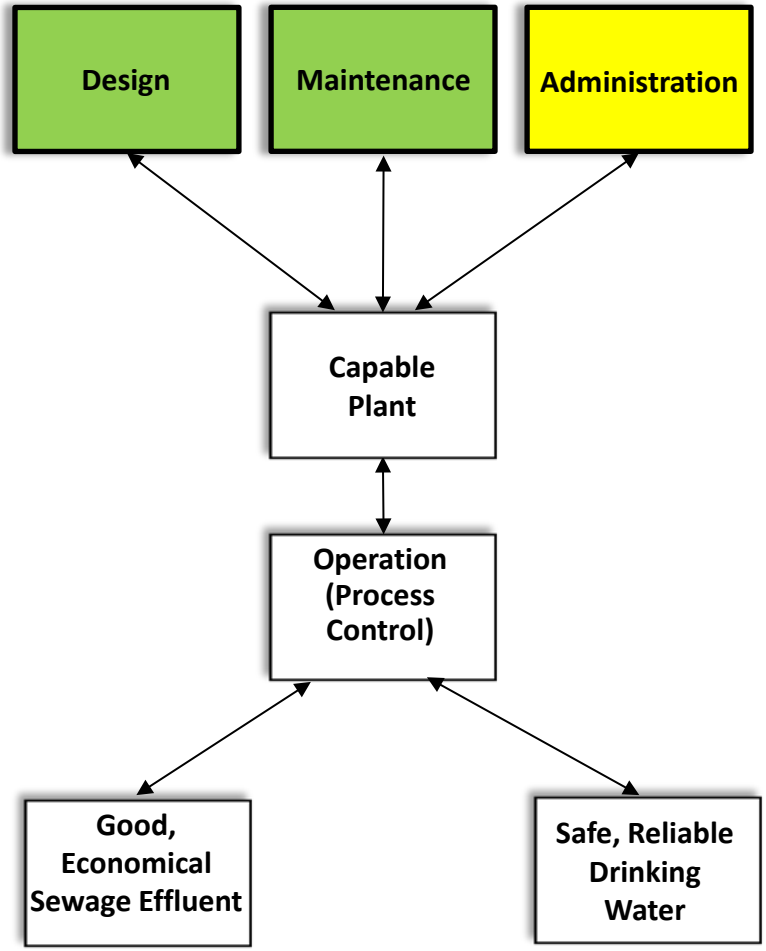
- Visual inspections, operator interviews, records review reveal good maintenance practices

Administration:

- Plant is in compliance, staff are well trained and certified to the level of the facility
- Operators stress that plant is under pressure to achieve compliance, and is the last barrier of treatment before discharge to a sensitive water body

The Results…

Comprehensive Performance Evaluation Framework



Comprehensive Performance Evaluation:

Design:

- Traditional design, some operational limitations, and the usual quirks

Maintenance:

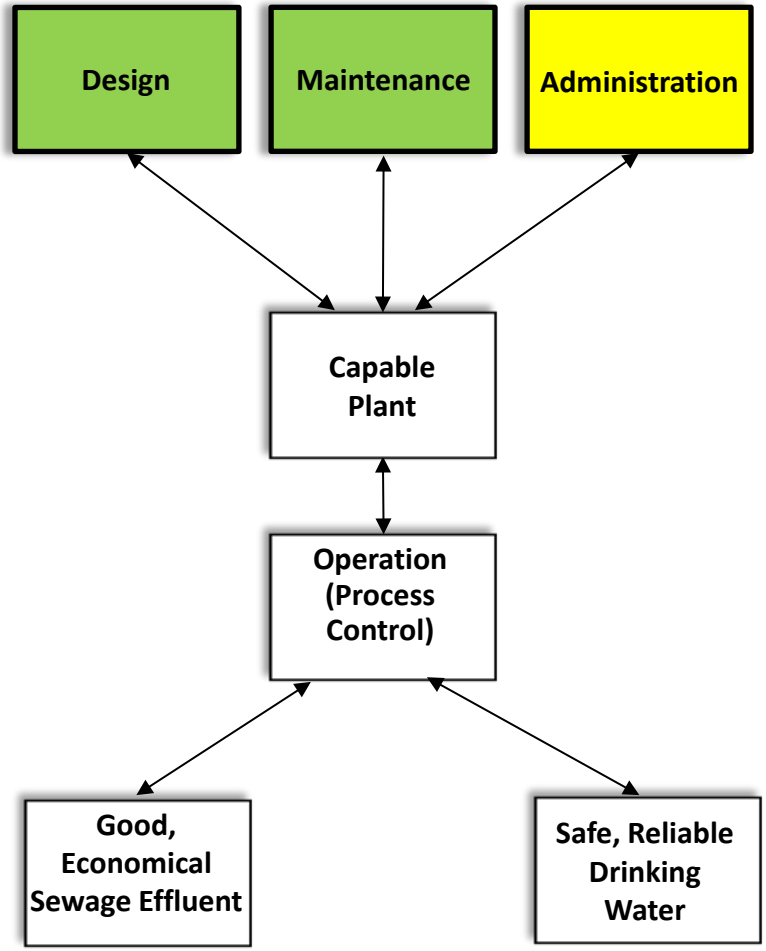
- Visual inspections, operator interviews, records review reveal good maintenance practices

Administration:

- Plant is in compliance, staff are well trained and certified to the level of the facility
- Operators stress that plant is under pressure to achieve compliance, and is the last barrier of treatment before discharge to a sensitive water body
- City staff pay the bill, but know very little about the facility or how to support it

The Results…

Comprehensive Performance Evaluation Framework



Comprehensive Performance Evaluation:

Design:

- Traditional design, some operational limitations, and the usual quirks

Maintenance:

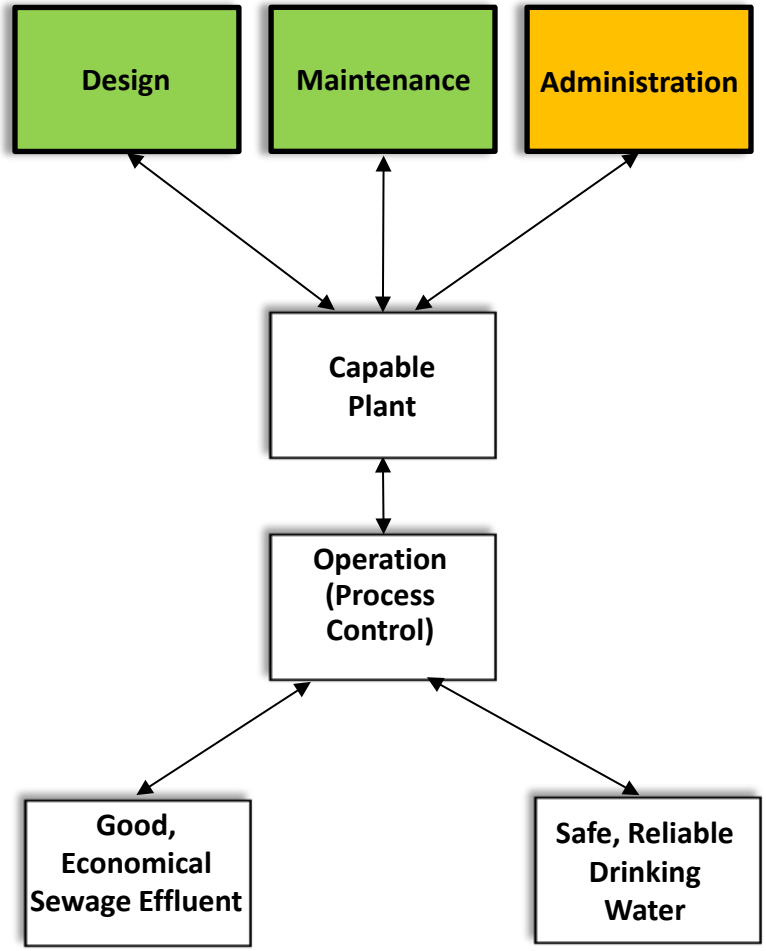
- Visual inspections, operator interviews, records review reveal good maintenance practices

Administration:

- Plant is in compliance, staff are well trained and certified to the level of the facility
- Operators stress that plant is under pressure to achieve compliance, and is the last barrier of treatment before discharge to a sensitive water body
- City staff pay the bill, but know very little about the facility or how to support it
- City's population is approx. 95,000 with plans for 163,000

The Results…

Comprehensive Performance Evaluation Framework



Comprehensive Performance Evaluation:

Design:

- Traditional design, some operational limitations, and the usual quirks

Maintenance:

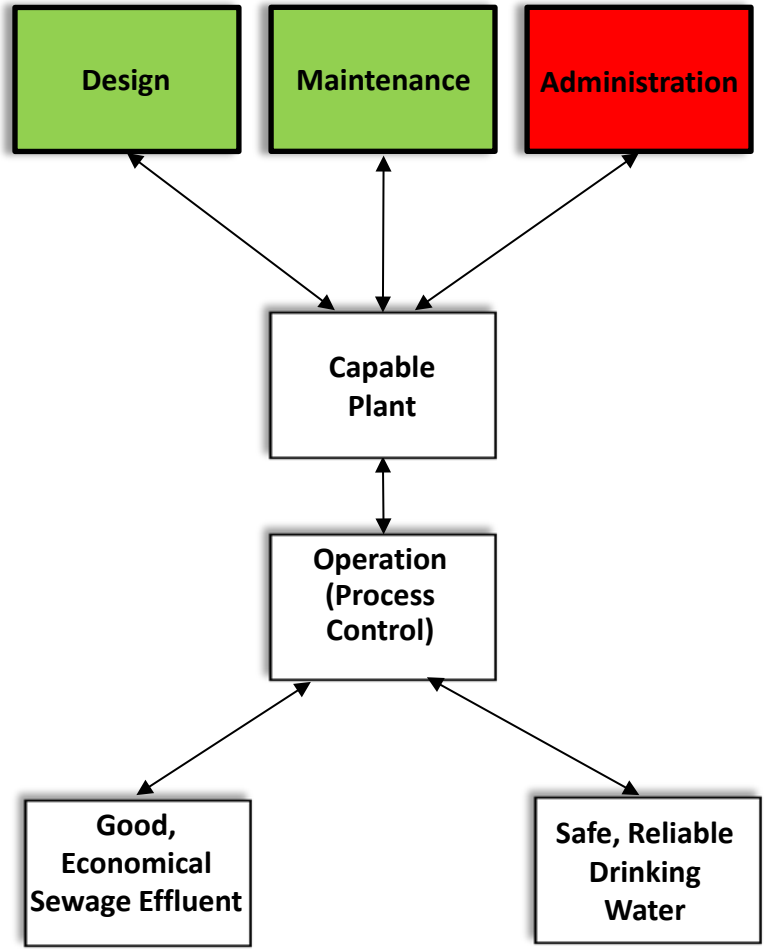
- Visual inspections, operator interviews, records review reveal good maintenance practices

Administration:

- Plant is in compliance, staff are well trained and certified to the level of the facility
- Operators stress that plant is under pressure to achieve compliance, and is the last barrier of treatment before discharge to a sensitive water body
- City staff pay the bill, but know very little about the facility or how to support it
- City's population is approx. 95,000 with plans for 163,000
- City has a poor understanding of plant performance, little coordination regarding Pollution Control, Engineering, and Development Planning

The Results…

Comprehensive Performance Evaluation Framework



Comprehensive Performance Evaluation:

Design:

- Traditional design, some operational limitations, and the usual quirks

Maintenance:

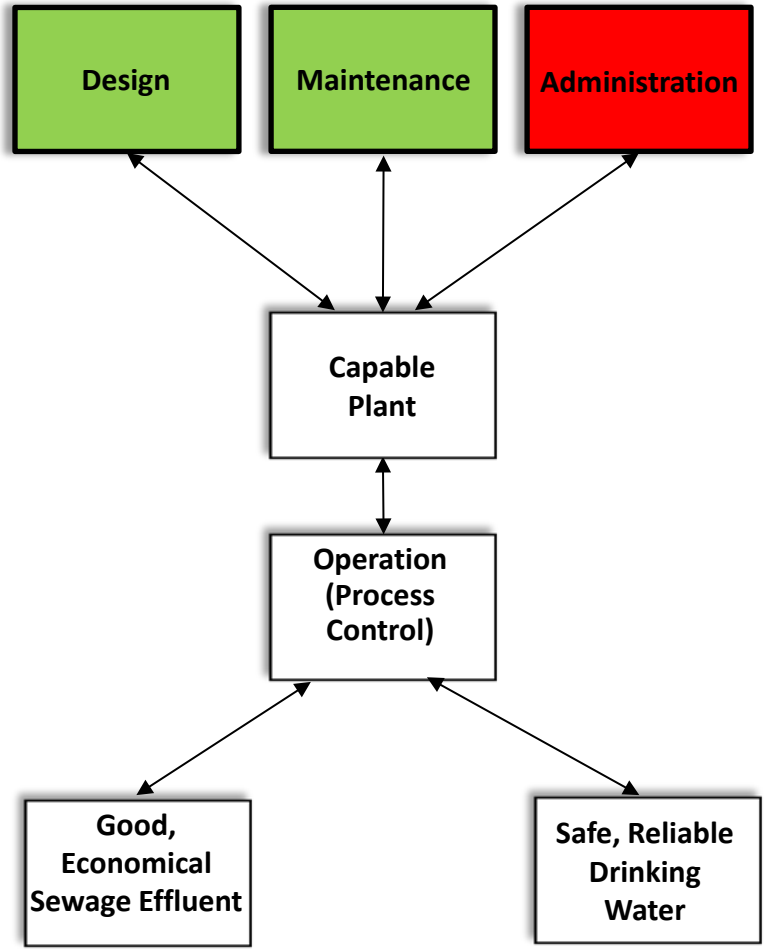
- Visual inspections, operator interviews, records review reveal good maintenance practices

Administration:

- Plant is in compliance, staff are well trained and certified to the level of the facility
- Operators stress that plant is under pressure to achieve compliance, and is the last barrier of treatment before discharge to a sensitive water body
- City staff pay the bill, but know very little about the facility or how to support it
- City's population is approx. 95,000 with plans for 163,000
- City has a poor understanding of plant performance, little coordination regarding Pollution Control, Engineering, and Development Planning
- Could there be a development freeze??

The Results…

Comprehensive Performance Evaluation Framework

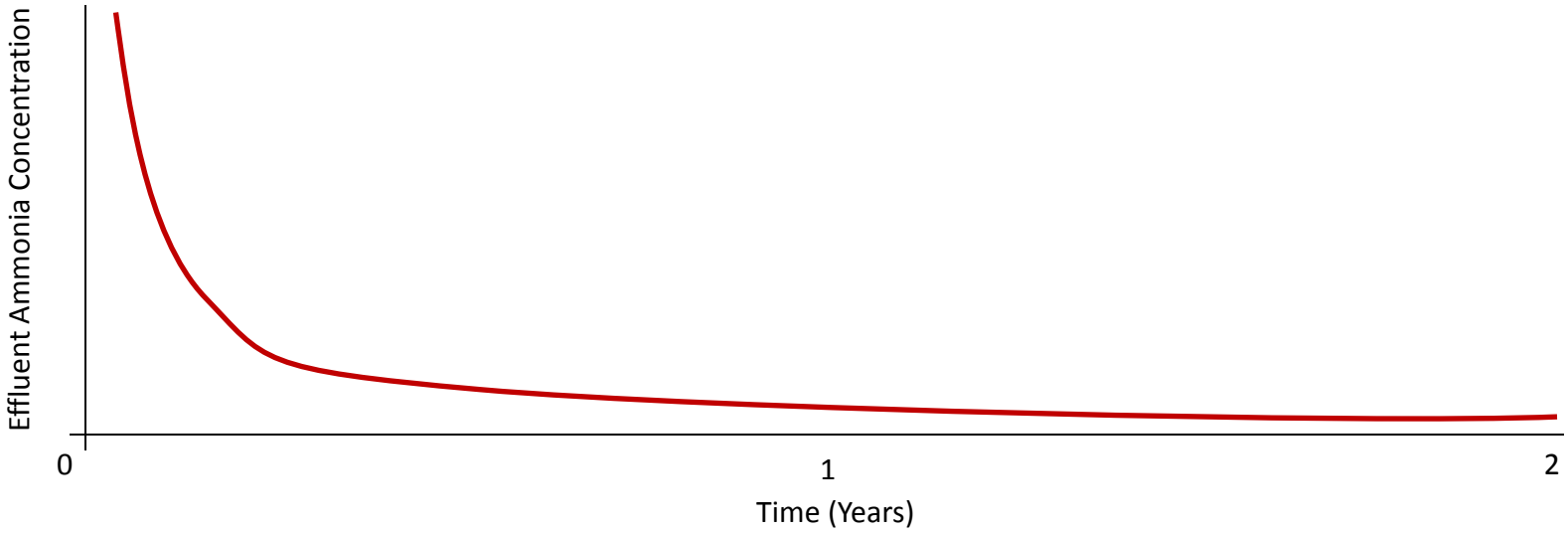


Now what?

Expand the plant!

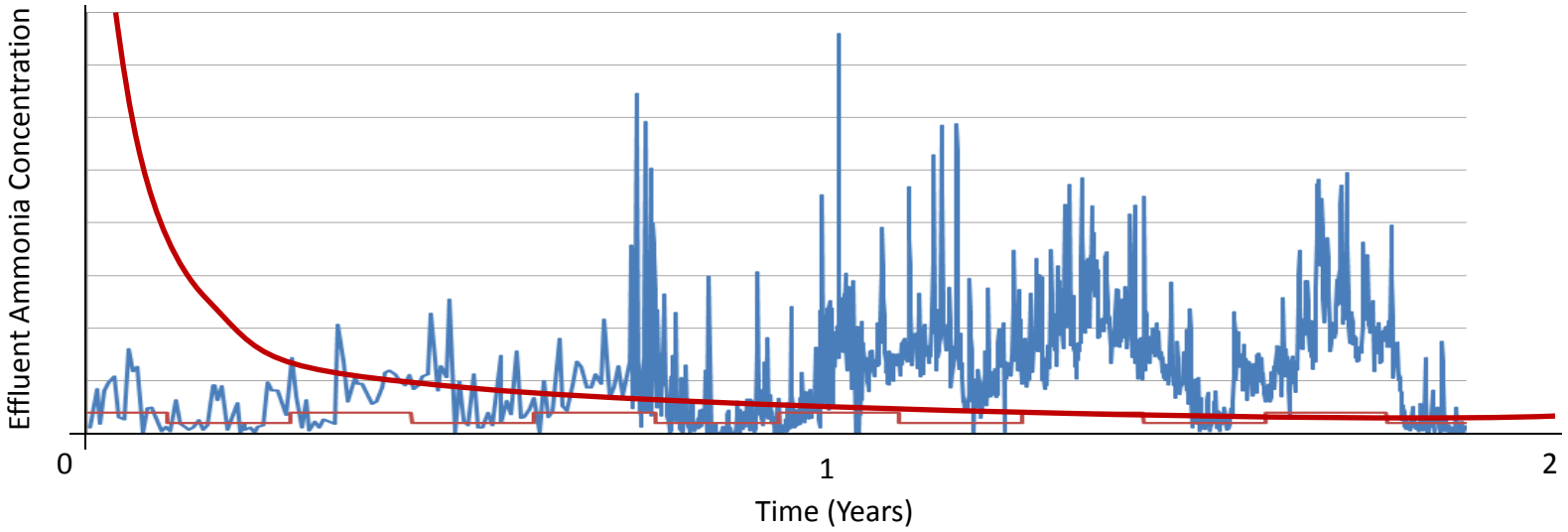
Comprehensive Technical Assistance

- A process of working with operational staff to introduce a very structured method of operation in the plant
- Creation of a detailed database of operational parameters
- Data-based decision making for operational changes and process improvements
- Usually takes about 18 to 24 months of facilitation to achieve permanent change
- A culture of continuous improvement
- Effluent Ammonia removal is a good indication of quality process control



Comprehensive Technical Assistance

- A process of working with operational staff to introduce a very structured method of operation in the plant
- Creation of a detailed database of operational parameters
- Data based decision making for operational changes and process improvements
- Usually takes about 18 to 24 months of facilitation to achieve permanent change
- A culture of continuous improvement
- Ammonia removal is a good indication of quality process control



Comprehensive Technical Assistance

- Continuous testing inside the plant
- Testing various operational strategies
- Finally the database began to show that there were intermittent influent problems
- Worked with Pollution Control to identify industries that we needed to work with
- Revealed weakness in the City's Sewer Use By-law, over-strength agreements

Comprehensive Technical Assistance

2014

- New Sewer Use By-law approved by City Council
- Introduced Compliance Agreements for Over-strength users

- City Council Concerns:
  - Businesses are only paying about 15% of treatment cost, City residents are paying the rest
  - Impact on businesses – full cost recovery won't work, can't have residents subsidize them
  - Loss of revenue if Over Strength Agreements are terminated

- Outcomes:
  - All Over Strength users signed Compliance Agreements with the City
  - Some businesses will have to make significant investments at their facilities, with payback periods of about 2.5 years
  - Projected treatment plant problems will begin to subside in mid-2016
  - Estimate that plant will meet growth requirements to 2031 (163,000 population)
  - Only State-of-Good Repair improvements to treatment plant will be required
  - Plant will be able to meet growth projections for population and associated employment lands

Compliance Agreements