Pitfalls and Successes!.. The challenges of commissioning a new 5.6-MGD microfiltration drinking water treatment plant

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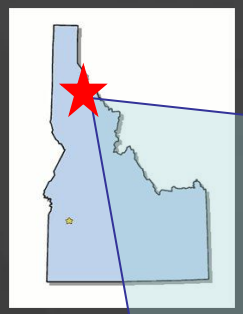
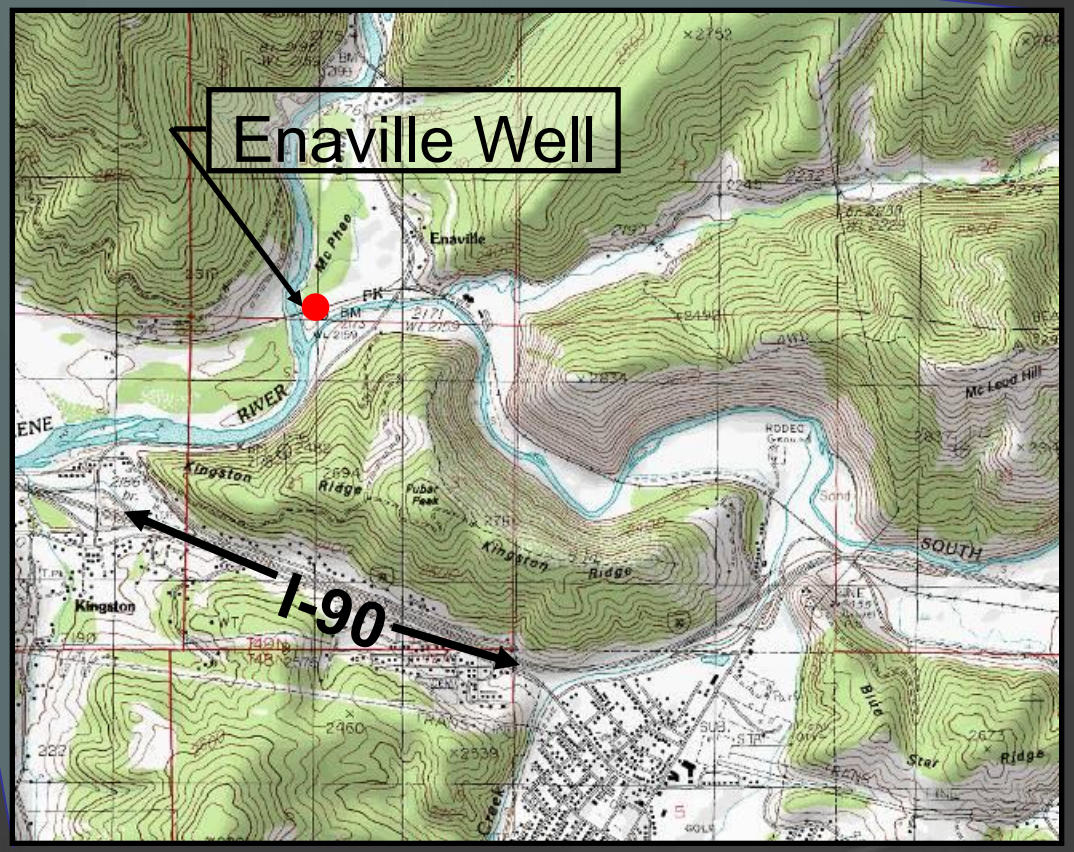
Outline and Goals

1. History of the Project
2. Who are the Players in Commissioning
3. Steps for Successful Commissioning
4. Commissioning Challenges / Lessons Learned
5. Questions

Enaville Well History

- Located in Enaville, Idaho (10 miles from Kellogg, ID)
- Positioned at the Confluence of North and South Forks of the Coeur d'Alene Rivers.
- District serves ~5500 people in multiple cityies



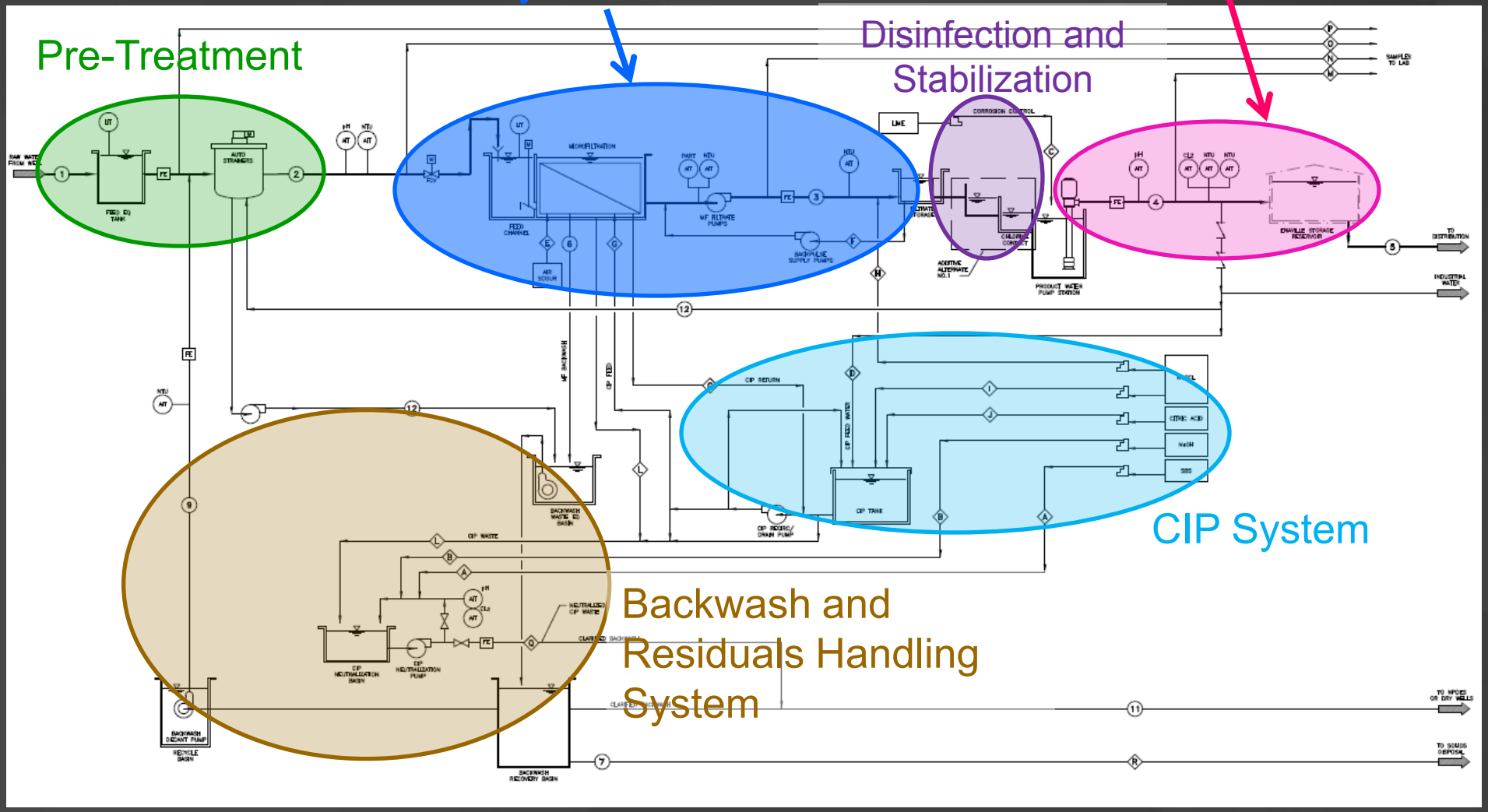


Enaville Well History

- Constructed in 1957
  - 6-foot diameter
  - 62-feet deep
  - 7000 gpm
- Well Determined to be GWUDI 2004
- No adequate aquifer available for new well
- Microfiltration selected for treatment

March 2007

Enaville MF WTP Process Schematic



Typical Project Timeline

Commissioning: The Players

- Owner and Operation Staff
- Regulatory
- Engineers
- Equipment Suppliers
- Contractors
- Programmers
- Consumable Suppliers

District, J-U-B, IDEQ

Commissioning: The Players

- Define and manage expectations
- Effective information transfer

- Resolve Issues
  - Build trust by resolving conflicts as they occur
  - Strengthen commitments by demanding accountability

- Establish who is doing what and when

Commissioning

"It's a Process, not an Event!"

Major Steps (after construction):

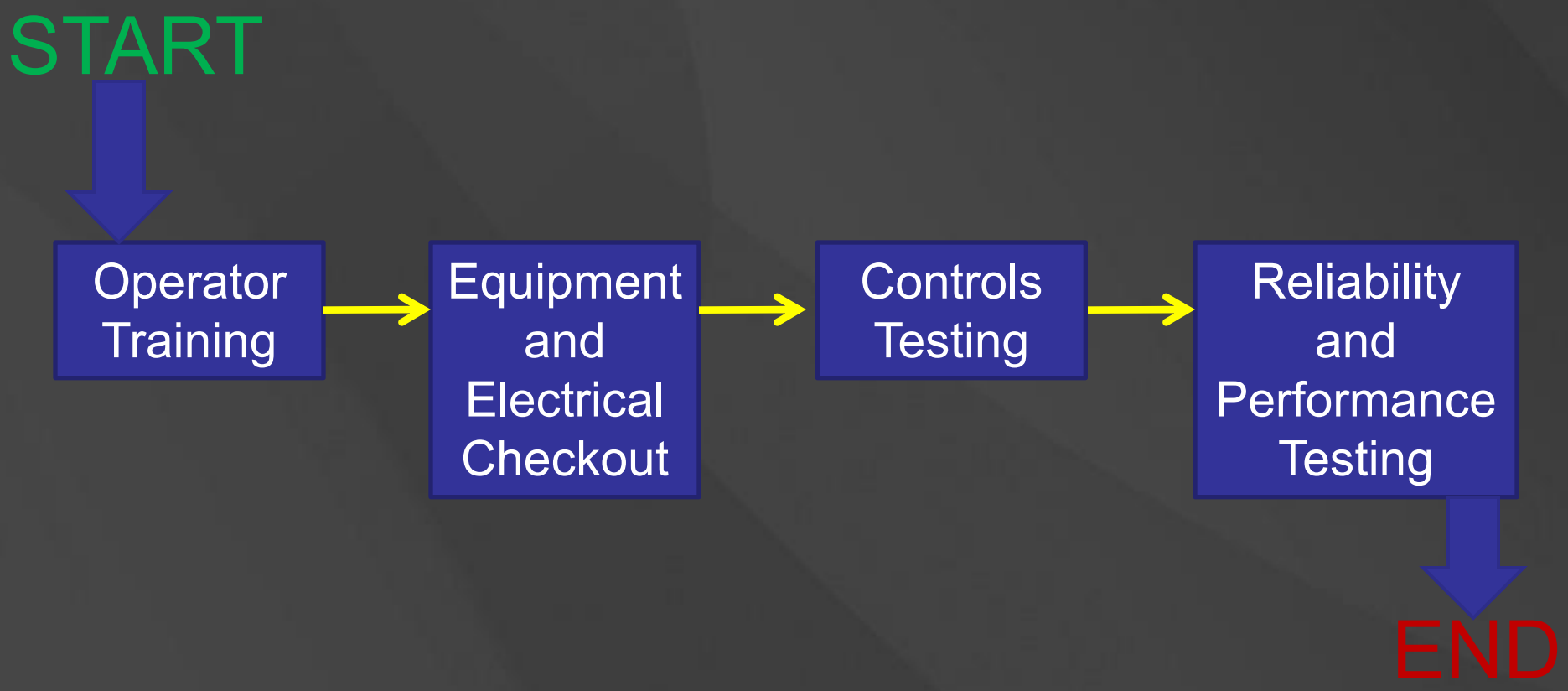
- *Owner Training (Understanding the System)*
- *Equipment /Electrical Checkout*
- *Controls Testing*
- *Reliability and Performance Testing*

So, what could go wrong?

Commissioning Goals

- ***Owner Training (Understanding the System)***
  - *Educate the Owner, show them what was built and how to operate it.*
- ***Equipment /Electrical Checkout***
  - *Find problems that you have to bring the contractor back for (electrical problems, leaks, etc)*
- ***Controls Testing***
  - *Find problems that weren't present in the equipment or electrical check-out, programming glitches and "Gremlins"*
- ***Reliability and Performance Testing***
  - *Prove the system works*
  - *Need operators fully up to speed*

Commissioning Flow Chart



Commissioning Steps

Owner Training

BEFORE

Existing Well Pump Station

- *3 pumps*
- *5 instruments*
- *2 alarms*

AFTER

Brand new WTP

- *Includes existing well pump station, plus…*
- *8 tanks,*
- *120 automated valves,*
- *29 pumps and equipment,*
- *50 transmitters and instruments*
- *2 programmers, 5 PLCs and thousands of lines of programming code,*
- *Hundreds of alarms*

Commissioning Steps

Equipment /Electrical Checkout

- *Checklists!*
- *What does **" I'm done, we checked that"** really mean…*
- *Need to chase-down recurring issues…*
  - *Can have domino-effect if not resolved early*
  - *Discuss them with the group, don't work in a vacuum*
  - *Often, one person is fighting something that another can help solve easily - teamwork*

Commissioning Steps

- *Controls Testing*
  - *Test every scenario, try to crash the system*
  - *Find the "Gremlins before they find you"*
  - *Working in a group solves issues the quickest*

- *Reliability and Performance Testing*
  - *Need clear roadmap that everyone understands*
  - *Need to have contingency plans in place*
    - *Must protect public health*
    - *Need to verify analyzers and instruments*
    - *Must maintain production*

Commissioning Steps

- *So how do you <u>Beat the Gremlins</u>?*

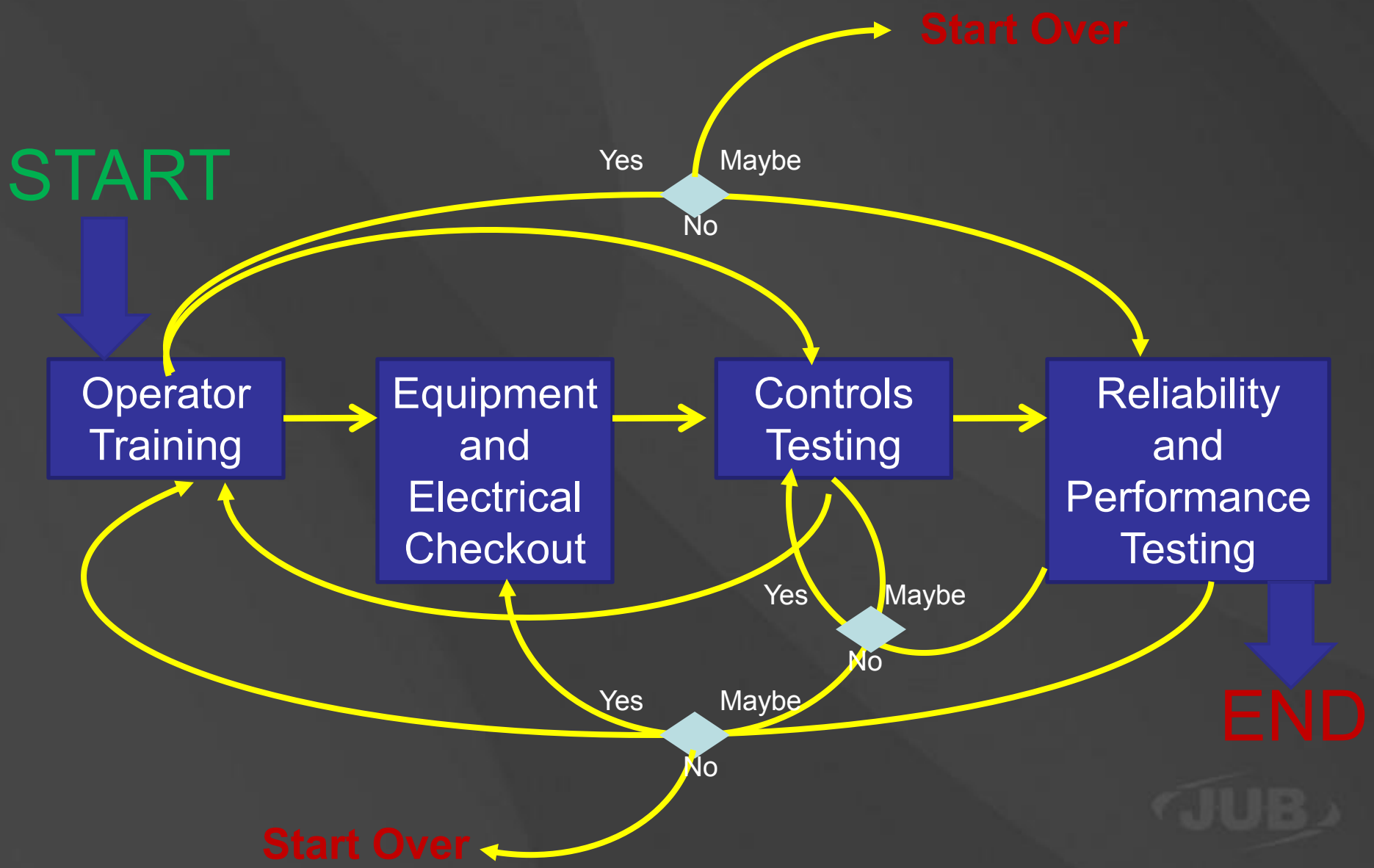
Time

Perseverance

Teamwork

and of course … *<u>sunlight</u>*

A “Real” Commissioning Flow Chart



Lessons Learned

Things can, and will go wrong…

Issues Within your Control

Construction "misses"

Things that got built wrong, or not built

Plant Contamination

Dirty water in the plant

Weather and Logistics

Freeze Protection on temporary piping and systems not yet put into operation

Issues NOT in your Control

Power Failures

Crane ran into site power line at end of electrical checkout

Weather and Logistics

Spring flooding around the well

Load limits on roads for chemical deliveries

Lessons Learned

Commissioning Analogy:

The 5 Stages of Grief Management

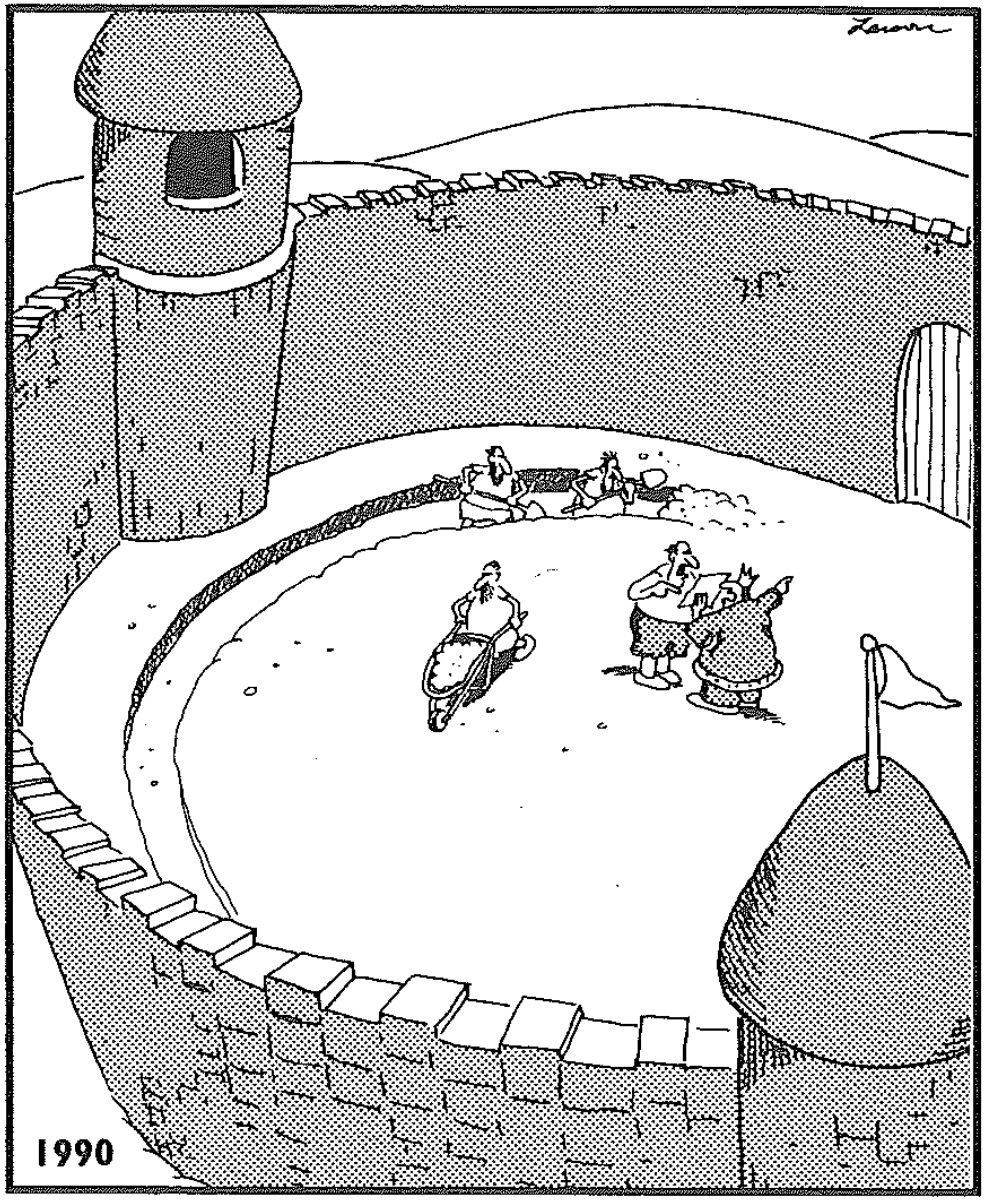
1. Denial and Isolation
2. Anger
3. Bargaining
4. Depression
5. Acceptance

Lessons Learned

Contract/Team Consideration	How it was done in Enaville	Benefits to this approach	Disadvantages to this approach
Microfiltration Equipment Procurement Contract	Retained by Owner, (Not assigned to Contractor)	•Reduces Owner cost at bid day	•Increases Owner coordination between contracts
		•Owner able to negotiate directly from supplier regarding disputes, liquidated damages, and scope of supply	•Increases Owner/Engineer coordination between Contractor and equipment supplier
		•Contractor doesn't have to include equipment in value of bond	•Assigning responsibility more difficult
		•Opportunity for Owner to develop closer relationship with equipment supplier	•Warranty claims more difficult
		•Reduces contractor risk	•Increases Owner risk of delays related to equipment delivery.
Programming	MF Eqpt. Mfr. Provided programming for MF system, Owner provided programmer for the remaining plant	•Owner has a local on-call programmer	•Increased coordination required between multiple programmers
		•Decreased issues with change orders related to controls changes.	•Difficult to discern lines of responsibility (scope of work)
		•Owner programmer can "talk-shop" with the MF System Programmer.	•Difficult to troubleshoot during controls testing

Thanks!

Central Shoshone County Water District	Owner
Idaho Department of Environmental Quality	Regulatory Agency
GE- Zenon Water and Process Technologies	Microfiltration Equipment Supplier
Contractors Northwest, Inc.	General Contractor
J-U-B Engineers, Inc.	Civil Engineer / Lead Engineer
Separation Process, Inc.	Process Mechanical / Membranes
AEI Engineering	Electrical Engineer
Eixenberger Architects	Architect



Suddenly, a heated exchange took place between the king and the moat contractor.

Questions…

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