

REINHOLD ENVIRONMENTAL Ltd.



2015 Wastewater-Ash Round Table Presentation

September 22, 2015, in Charlotte, NC / Hosted by Duke Energy

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2015 Wastewater/Ash
Reinhold Conference

**Case Studies of Water Impacts to
Facilities from New CCR Rule**

Patricia M. Scroggin, PE

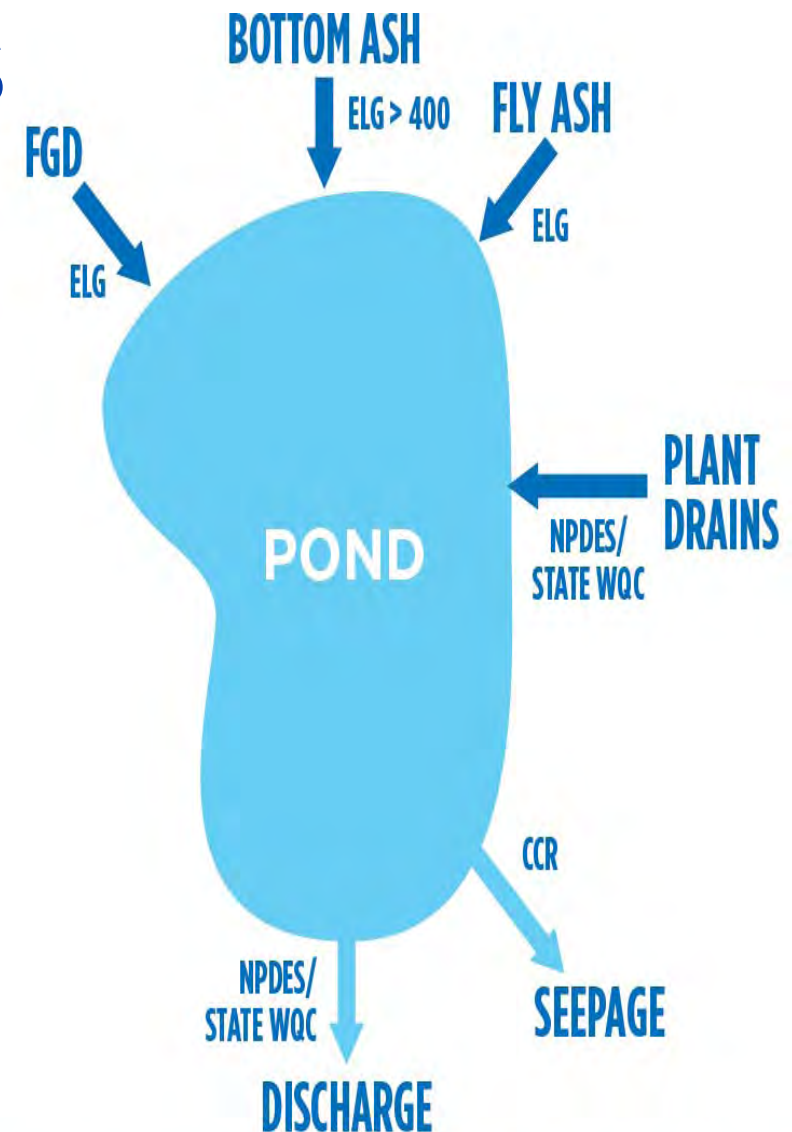
September 22, 2015



WATER IMPACTS FROM CCR COMPLIANCE PROJECTS

What can affect the water balance?

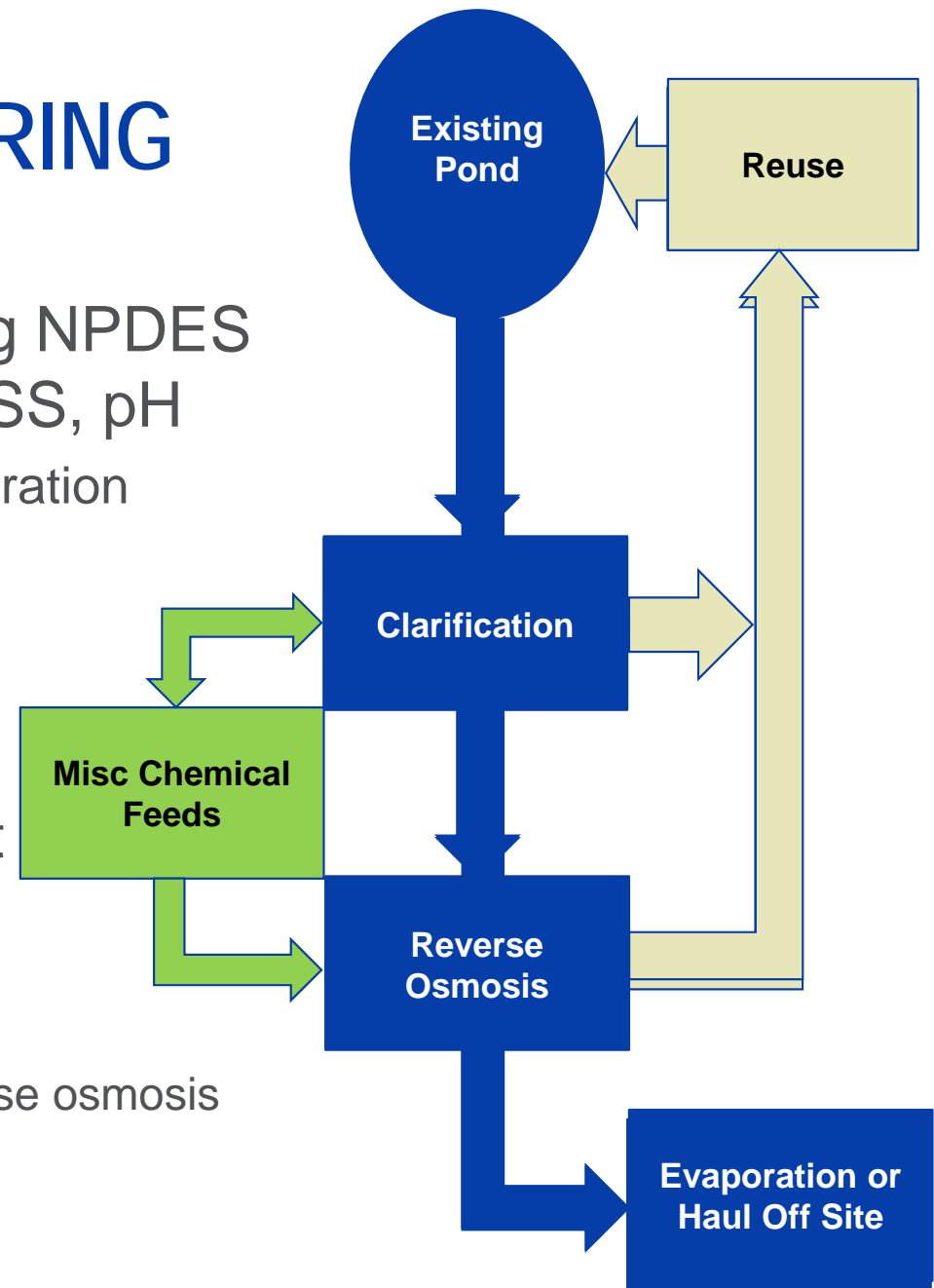
- ▶ Existing Pond Dewatering
- ▶ Flow Segregation
- ▶ Paving Projects
- ▶ Pond Closure
- ▶ Pond Elimination
- ▶ New Bottom Ash Handling System
- ▶ New Dewatering Basins



Engineering a CCR Solution

EXISTING POND DEWATERING

- ▶ Treat and discharge under existing NPDES permit pond contents – Hg, As, TSS, pH
 - Clarification, metals precipitation and filtration
 - ▶ Pilot?
 - ▶ Permanent or temporary? Sizing?
 - ▶ Water quality stratification within pond
- ▶ No pond NPDES discharge permit
 - Apply for a temporary discharge permit
 - Treat and reuse
 - ▶ Filtration, clarification and softening, reverse osmosis
 - Treat and evaporate

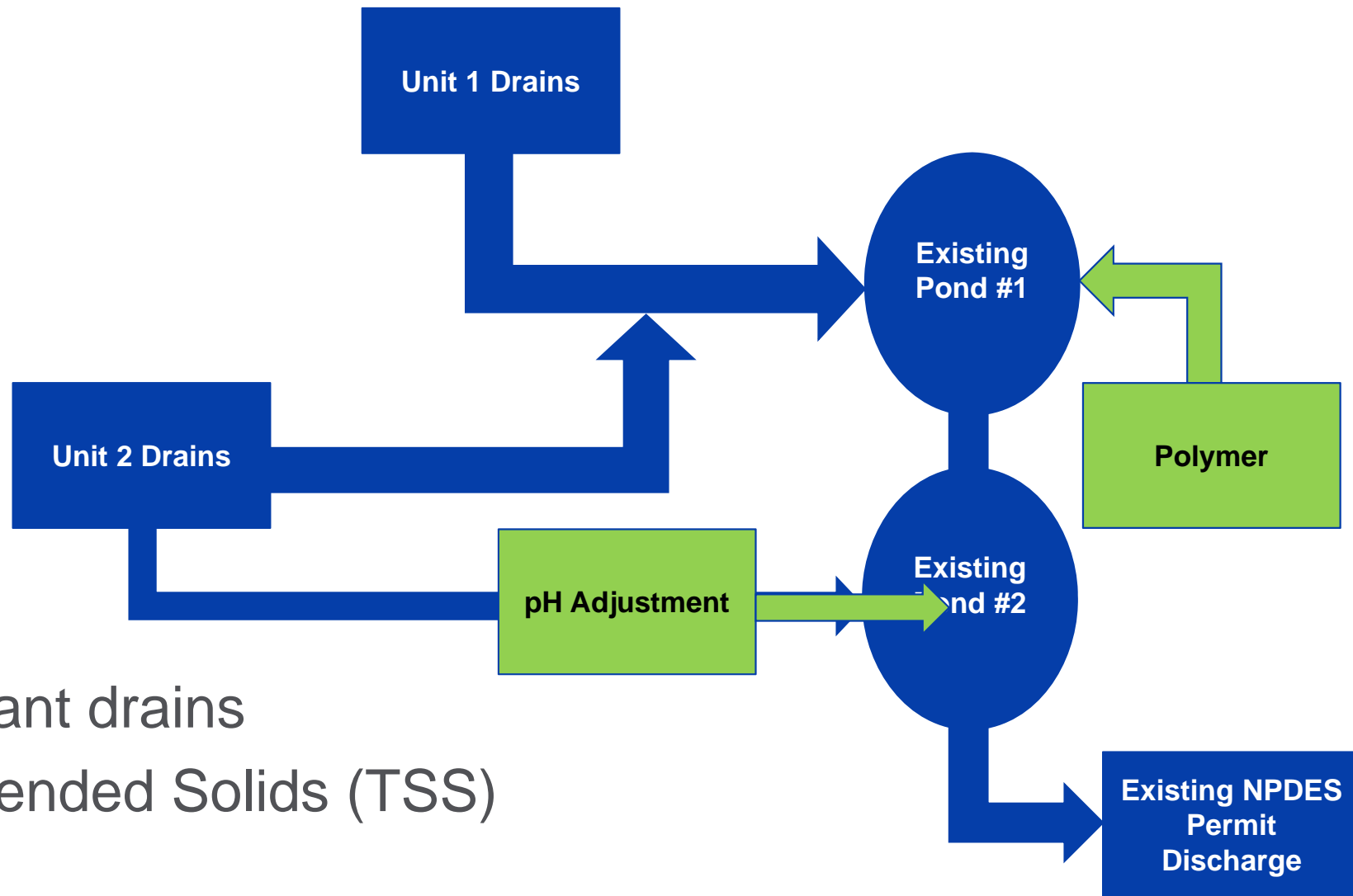


PAVING PROJECTS

- ▶ **Purpose:** Capture of CCR materials
- ▶ **Impact:** Additional flow previously identified as stormwater now collected and potentially combined with CCR process water
- ▶ NPDES permit revision
- ▶ Design to include – 100 year, 500 year stormwater event?



SOLUTIONS FOR POND CLOSURE



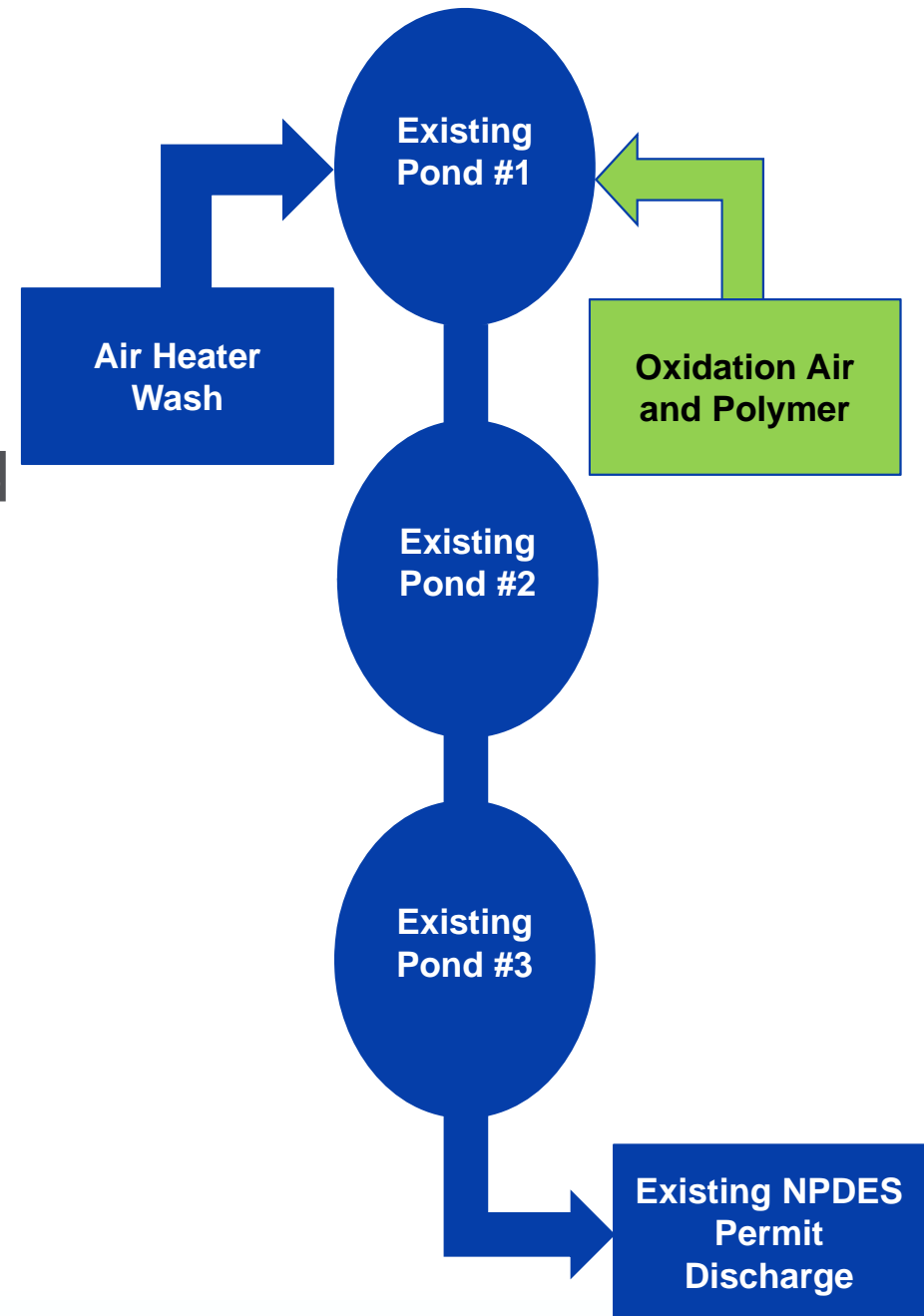
- ▶ General plant drains
- ▶ Total Suspended Solids (TSS)
- ▶ pH

POND ELIMINATION

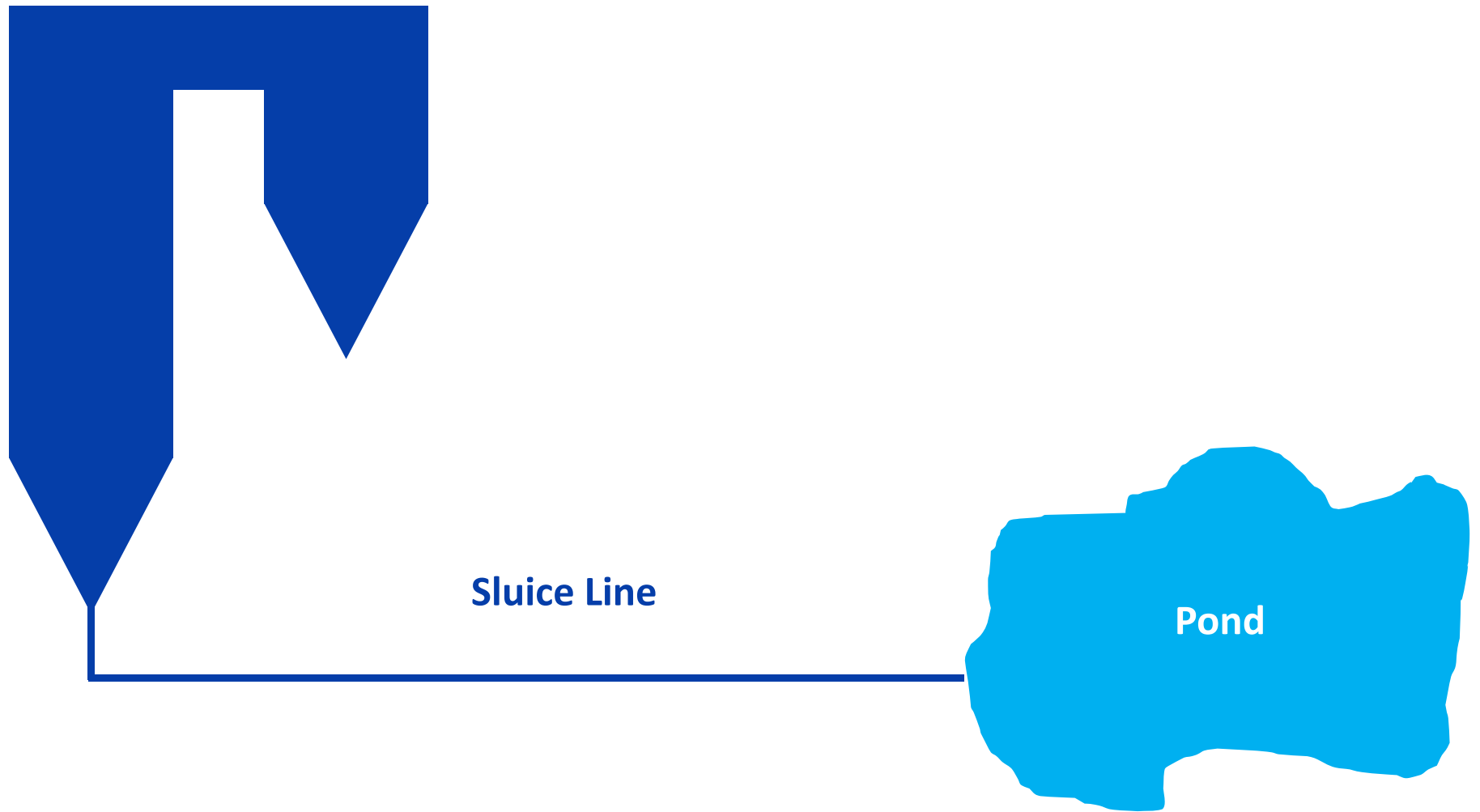
- ▶ Wet FGD blowdown
 - Discharge permit: TSS, pH, oil and grease, mercury
- ▶ FGD treatment system
 - Optimize FGD operations to reduce treatment flowrate
 - Update water balance
 - Combine with fly ash or bottom ash for treatment? (ELG?)
 - Clarification with enhanced metals precipitation

AIR HEATER WASH

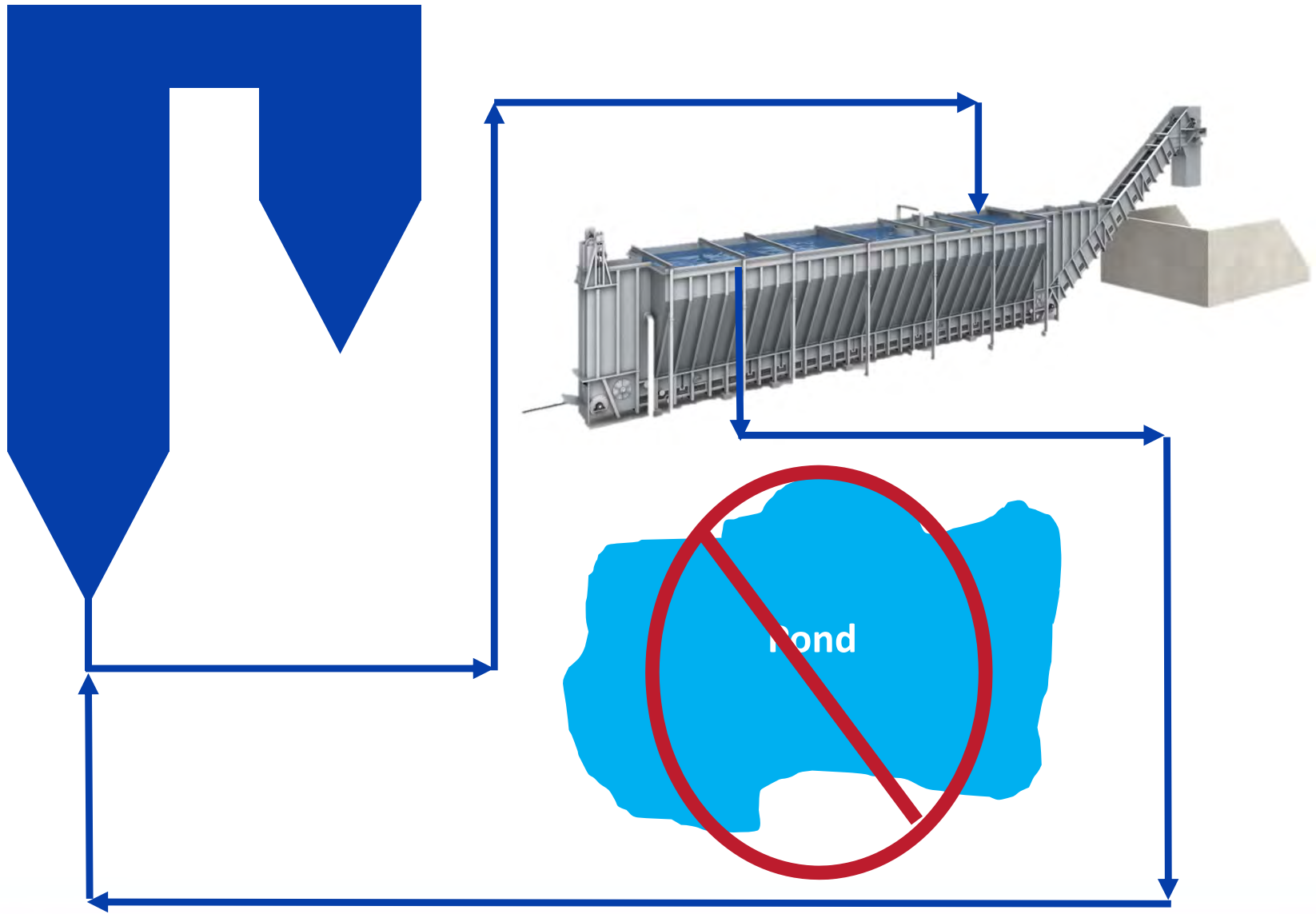
- ▶ Non-chemical metal cleaning wastewater now higher than permit allowance for copper and iron
 - Oxidation air
 - Polymer injection
 - Organosulfide
 - Goal: oxidation and precipitation of metals



EXISTING BOTTOM ASH SYSTEM



REMOTE DRAG CHAIN CONVEYOR ADDED



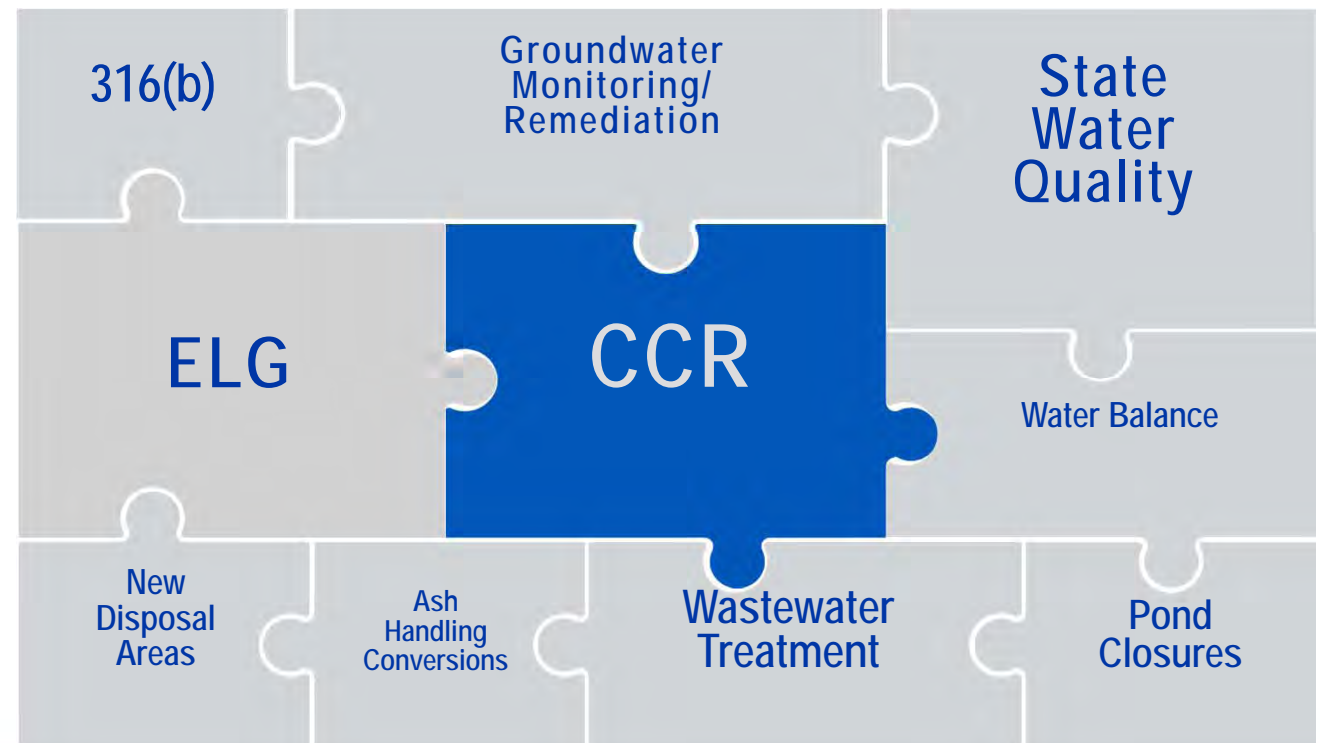
REMOTE DRAG CHAIN CONVEYOR ADDED

- ▶ Impoundment size driven by TSS limit in discharge permit
- ▶ If designed properly – not a CCR impoundment
 - Self-supported
- ▶ ELG may require closed loop operation
 - TSS – could increase from 30-50 ppm to 1,000 – 1,500 ppm



CCR CASE STUDIES

- ▶ Plant Description
- ▶ Scope of Work Changes
- ▶ Implementation Costs
- ▶ Exclusions
 - Landfills
 - GW Monitoring



CASE STUDY PLANT A

- ▶ Midwest Coal Fired Utility
- ▶ 2 Units
 - 250 MW each
- ▶ AQCS
 - SCR, FGD and Baghouse/Precipitators
- ▶ Bottom Ash
 - Sluiced to Ponds Onsite
- ▶ Fly Ash
 - Hydroveyors removed
 - New Silo
- ▶ Onsite Landfill
- ▶ NPDES
 - 12 ppt Hg



SCOPE OF WORK – PLANT A

- ▶ All CCR ponds closing onsite
 - 2 total – cap and close
 - 150 acres
- ▶ Bottom Ash
 - Dewatering Basins
 - ▶ 1 acre – 3 cells
 - ▶ 30 days of CCR storage per cell
 - Remote SFC
 - ▶ Two redundant units
 - New CCR compliant pond
 - ▶ 8 acres
- ▶ Fly Ash
 - Remove hydroveyors
 - New silo- 2,500 tons
- ▶ New Process and Stormwater Ponds
 - Process – 6 acres
 - Stormwater – 4.5 acres
- ▶ FGD wastewater
 - 900 gpm
 - Tank based – Phys/Chem
 - Pond based – 8 acres

CASE STUDY PLANT B

- ▶ Midwest Coal Fired Utility
- ▶ 2 Units totaling 350 MW
 - 3rd unit is retired
- ▶ AQCS
 - FGD and Baghouse/Precipitator
- ▶ Bottom Ash
 - Sluiced to ponds onsite
- ▶ Fly Ash
 - Hydroveyors
- ▶ Once-through cooling – 300 MGD
- ▶ NPDES
 - 12 ppt Hg



SCOPE OF WORK – PLANT B

- ▶ All CCR ponds closing onsite
 - 35 acres
 - 2 total – cap and close and clean closure evaluated
- ▶ Bottom Ash
 - Dewatering Basins
 - ▶ 0.5 acre – 3 cells
 - ▶ 30 days of CCR storage per cell
 - Remote SFC
 - ▶ Two redundant units
 - New CCR compliant pond
 - ▶ 6 acres
- ▶ Fly Ash
 - Disconnect and abandon in place hydroveyors
- ▶ New Process and Stormwater Ponds
 - Process – 8 acres
 - Stormwater – 5 acres
- ▶ FGD wastewater
 - 300 gpm
 - Tank based – Phys/Chem
 - Pond based – 6 acres

PATH FORWARD?

▶ PLANT AND FIELD SURVEY

- Start with existing water balance
- Sit down with Operations and Engineering and capture:
 - ▶ Modifications
 - ▶ Changes made for operational ease
 - ▶ Bypasses around equipment
 - ▶ Known issues with process equipment
- Are all the flow directions correctly indicated on water balance?
- Sources, users and discharges
 - ▶ Working flow analysis equipment



FLOW MEASUREMENT & SAMPLING PLAN

▶ Flow Measurement

- Flowmeter selection
- Duration?

▶ Capture

- Lines without flow measurement
- Intermittent flows

▶ Sampling plan identified:

- Sample locations
- Frequency
 - ▶ Shift
 - ▶ Seasonal
 - ▶ Operational variations
 - Cycling units

▶ Constituents to analyze

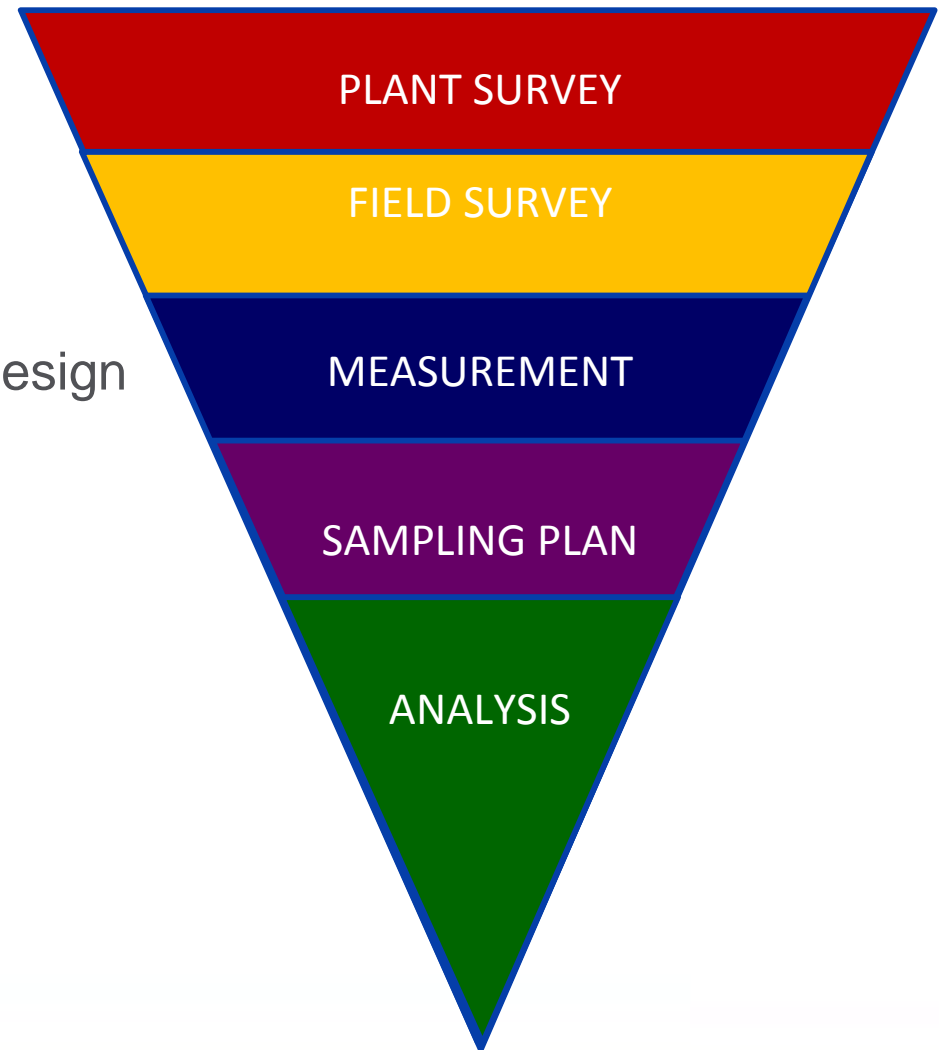
- Chlorides
- Anions
- Cations
- Conductivity
- Heavy metals
- Highly soluble compounds
- Nutrients



ANALYSIS

▶ Process optimization

- Identify excess water usage
- FGD training
- FGD optimization
 - ▶ Bring cycles of concentration back to design



QUESTIONS?

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