REINHOLD ENVIRONMENTAL Ltd.

2015 Wastewater-Ash Round Table Presentation

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Integration of CCR and ELG Implementation Plans

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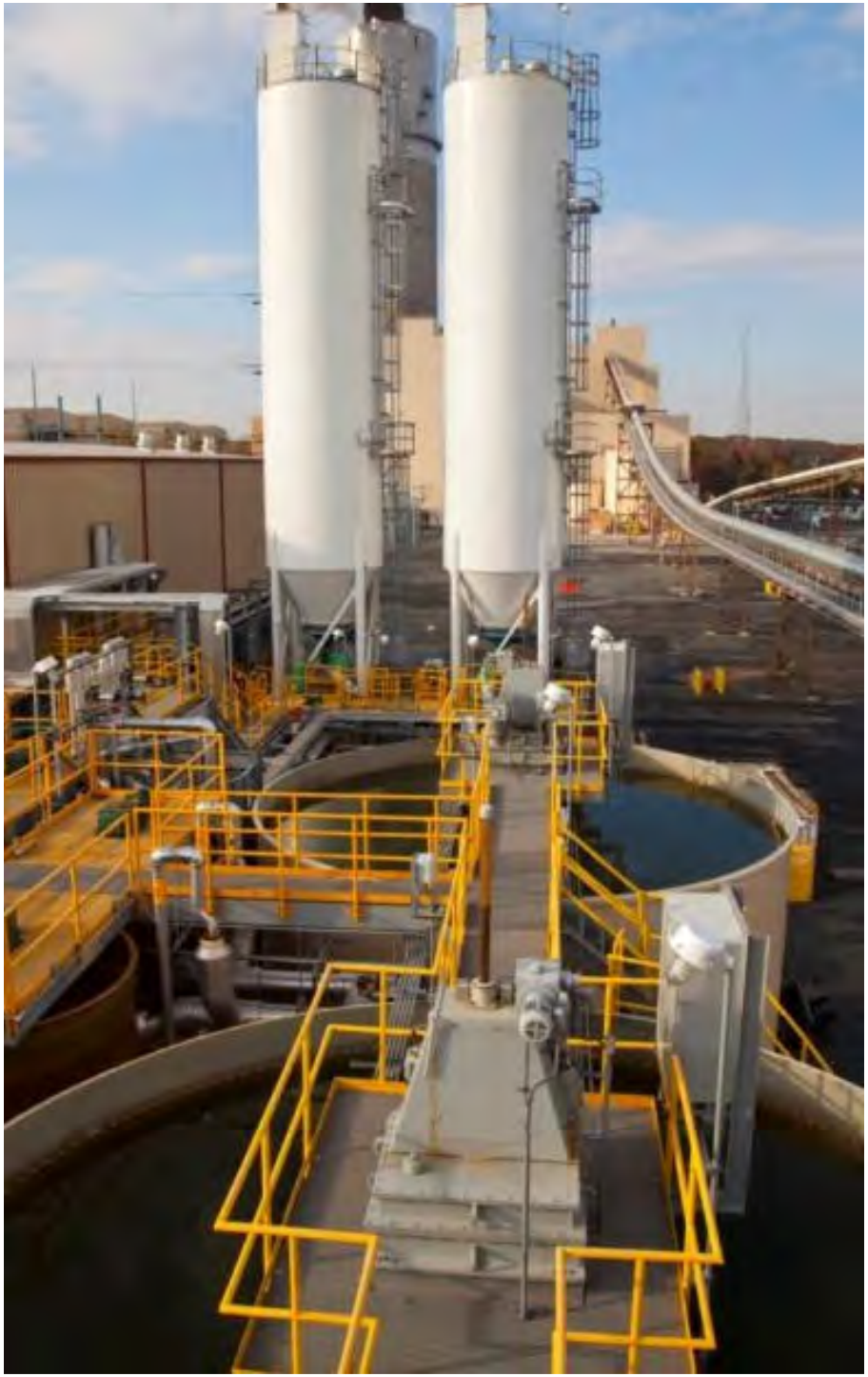
Reinhold Environmental Conference



01 **CCR Rule Overview**

02 **ELGs Overview**

03 **Integration and Intersections**

04 **Achieving Compliance**

01 CCR Rule Overview

EPA CCR Rule

- Coal Combustion Residual (CCR) Rule
  - Final Published in Register April 17, 2015
  - Self-Implementing
    - Public Website
  - Enforced by Public and NGOs
  - Both Dry Landfills and Impoundments Regulated
  - Likely States will start incorporating requirements
    - Public Enforcement, Self-Implementation to remain

EPA CCR Rule

257.6X - Location Restrictions

257.7X - Design Criteria

257.8X - Operating Criteria

257.9X - Groundwater Monitoring

257.100 - 104 - Closure and Post-Closure

257.105 – 107 - Records, Notifications, Web

EPA CCR - Determination

- Legal Level Determination
- Creation of Specific Documents
- Suitable for public Viewing
- Compliance with State Law does not mean compliance with CCR Rule
- Keep in “operating record”
- Notify State

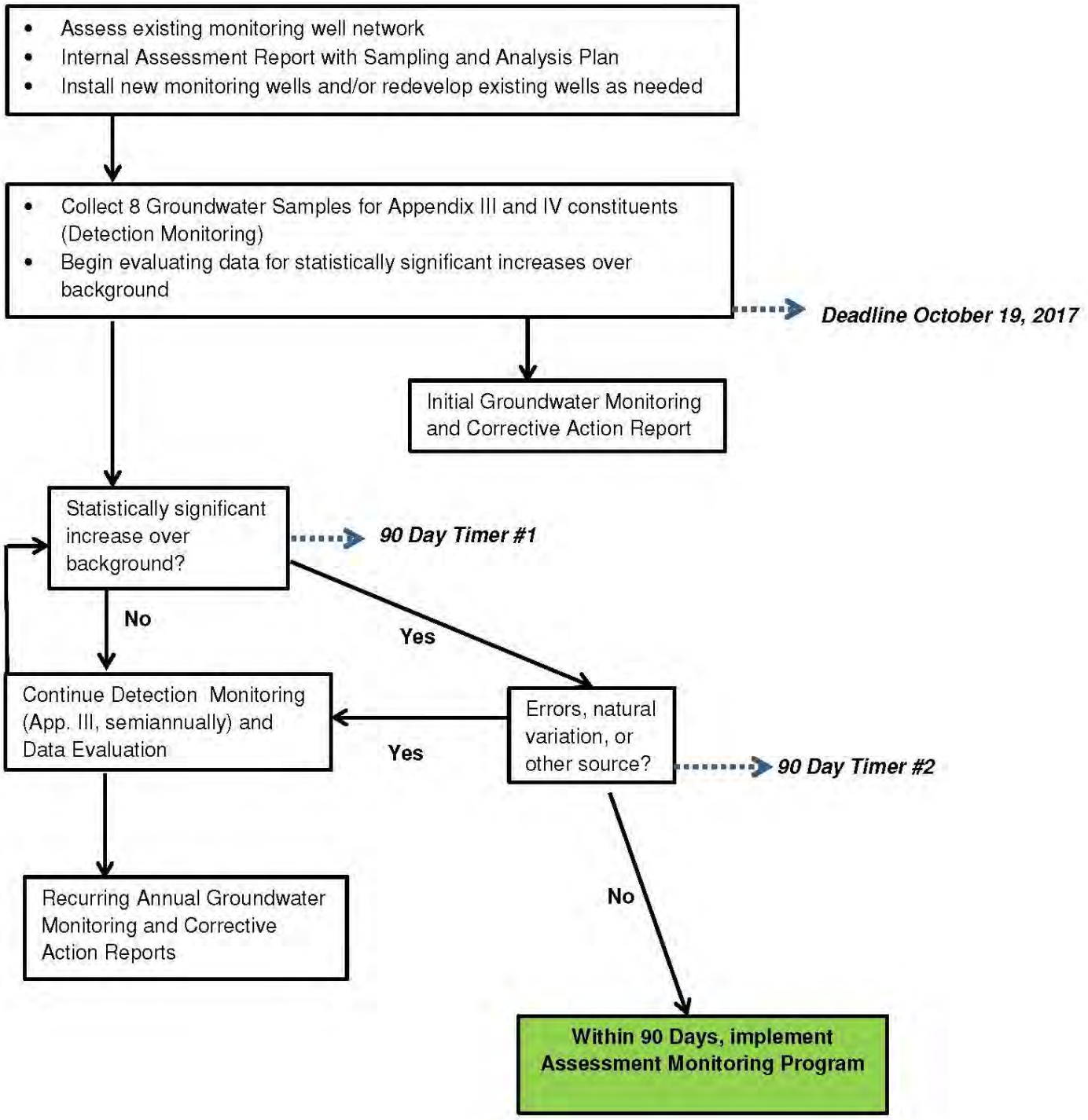
Requirements At A Glance By Facility Type

	EXISTING CCR LANDFILLS	NEW LANDFILLS
Location Restrictions	Unstable areas	• Placement above the uppermost aquifer • Wetlands • Fault areas • Seismic impact zones • Unstable areas
Design Requirements	Not required	• Leachate collection & removal system • Two component liner
Structural Analysis	Not required	Not required
Operating Criteria	• Fugitive dust controls • Run on, run off control • Surface water protection • Inspection requirements for landfills	• Fugitive dust controls • “Wetting” of CCR • Run on, run off control • Surface water protection • Inspection requirements for landfills
Groundwater Monitoring Systems	• Groundwater monitoring program • Groundwater monitoring wells • 8 rounds of sampling data (by October 17, 2017) • Calculate background levels	• Groundwater monitoring program • Groundwater monitoring wells • 8 rounds of sampling data (within 6 months & before accepting CCR)
Closure & Post Closure Requirements	• Equivalent to liner system • Alternative designs if infiltration criteria is met • 30 years landfill cap & leachate collection maintenance • 30 years of groundwater monitoring	• Equivalent to liner system • Alternative designs if infiltration criteria is met • 30 years landfill cap & leachate collection maintenance • 30 years of groundwater monitoring
Recordkeeping, Reporting & Communication	• Compliance documents maintained for 5 years • State agency notification of comprehensive list of actions • All unit documentation publically available on website, titled “CCR Rule Compliance Data and Information”	• Compliance documents maintained for 5 years • State agency notification of comprehensive list of actions • All unit documentation publically available on website, titled “CCR Rule Compliance Data and Information”

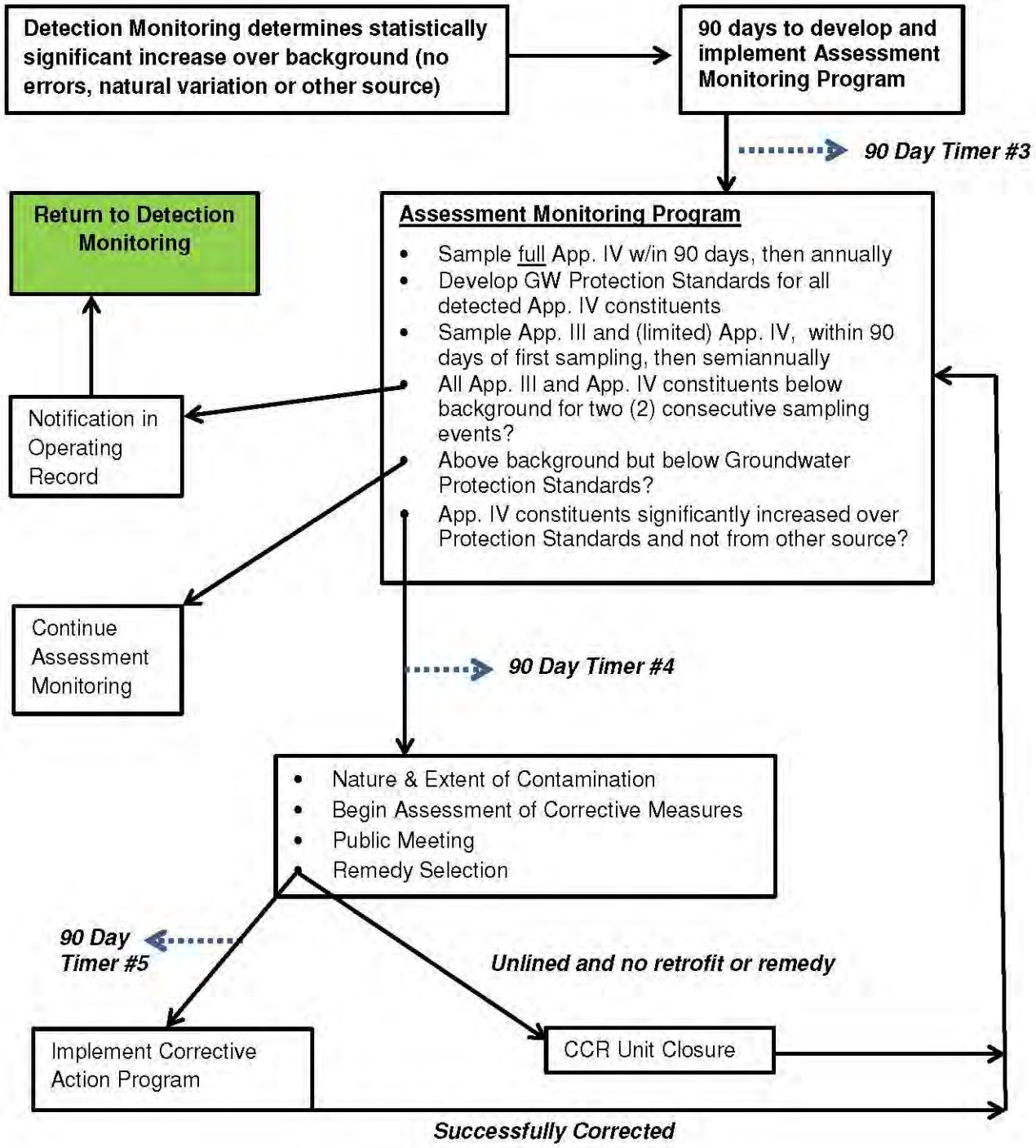
EPA CCR Rule
Simple View

1. **Structural Reviews**
2. **Groundwater Monitoring**
3. Fugitive Dust and Air Quality
4. Run-On and Run-Off Controls
5. Closure and Post Closure Documentation
6. Additional Design Requirements
7. Beneficial Reuse Provisions Exist

EPA CCR Detection Monitoring



EPA CCR Detection Monitoring



02 ELGs Overview

Effluent Limitation Guidelines

- Technology Based Effluent Limits
- Flue Gas Desulfurization (FGD) Wastewater
- Non-Chemical Metal Cleaning Wastes
- Coal Combustion Residual (CCR) Landfill Leachate
- Integrated Gasification Combined Cycle
- No Discharge of Fly ash transport Water or Flue Gas Mercury Systems
- Leachate and Bottom Ash Transport Water
  - No Discharge on bottom ash over 400 MW

Regulated through State and NPDES Permits

Nonchemical Metal Cleaning Limits New and Existing

	30 Day Average	Daily Maximum
Copper, ppm	1.0	1.0
Iron, ppm	1.0	1.0
TSS, ppm	30	100
Oil and Grease, ppm	15	20

Proposed IGCC Wastewater Limits New and Existing

	30 Day Average	Daily Maximum
Arsenic, ppb		8
Mercury, ppt	1.29	1.76
Selenium, ppb	227	453
TDS, ppm	22	38

FGD Wastewater Limits New and Existing Sources

	30 Day Average	Daily Maximum
Arsenic, ppb	6	8
Mercury, ppt	119	242
Selenium, ppb	10	16
Nitrite-Nitrate, ppm as N	0.13	0.17

Proposed CCR Leachate Limits New and Existing

	30 Day Average	Daily Maximum
Arsenic, ppb **New Only**	6	8
Mercury, ppt **New Only**	119	242
TSS, ppm	30	100
Oil & Grease, ppm	15	20

Effluent Limitation Guidelines

- Limits must be met prior to reuse, co-mingling or discharge
  - FGD and Leachate Exemption
  - Language allowing ahead of ZLD
- Leachate BAT presented as chemical precipitation
- FGD BAT presented as physical/chemical + anoxic/anaerobic biological system

03 Integration and Intersections

Integration and Intersections

1. Bottom Ash Discharge Elimination (ELG), New Requirements for Ponds (CCR)
2. Trickle Down of Bottom Ash Pond Closure (CCR), Co-Mingling (ELG)
3. FGD Discharge Limits (ELG), Leachate Discharge Limits (ELG), Run-On Regulations (CCR)
4. Beneficial Reuse (CCR), Encapsulation (CCR), FGD Discharge Limits (ELG)

CCR Pond Replacement

- Groundwater Elevation
- Condition of Bottom Ash Ponds
- Existing Liner System
- Solids Removal Plans
- Groundwater Monitoring Wells
- Impoundment Long Term Closure Driven
- Also Applies to:
  - Fly Ash, Gypsum, Run off Ponds
  - Zero Liquid Discharge Ponds with “Significant Amounts of CCR Material”
  - FGD Settling Ponds (i.e. gypsum ponds)

CCR Pond Replacement

Replacement Options

- Surge and Settling Tanks
  - Replace ponds from
- Submerged Ash Conveyors
  - Wet Bottom Ash Hopper
- Dry Ash Conveyor
  - Crushing
  - Space and Heat
- FGD Pond Closure
  - Belt dewatering
  - Solids Clarification Tanks
  - Combined Softening Systems

Trickle Down of Bottom Ash Pond Closure

- Bottom Ash System – Tight Water Balance
  - Sludges from IW Processes
  - Blowdown Sources
  - Contact Stormwater
  - Ash, Gypsum, FGD Byproduct Loading Areas
  - Condensate Drains, Floor Drains, etc…
- New Bottom Ash Systems – Lessons
  - Fine Solids in Bottom Ash
  - Velocity and Pipe Erosion
  - Drag Chain Level Controls

Trickle Down of Bottom Ash Pond Closure - Solutions

- Bottom Ash System – Tight Water Balance
  - New Dewatering Facilities
  - Blowdown Discharge Flow Increase – Cycle Modification or Basin Controls
  - Stormwater, Loading Areas, Process Drain, Recycle and Reuse

- New Treatment System – Lesson Learned
  - Side Stream solids removal
  - Control Valve Design > Orifice Plates
  - Drag Chain Surge Management Systems

FGD and Leachate Discharge Limits

- Similar limits on arsenic, mercury
- Co-mingling provision
- Run-On Contact Water – similar quality
  - Regulated Haul Roads
  - Treated as Leachate by States
- WQBEL driven selenium limits on leachate
- WQBEL driven boron limits

FGD and Leachate Discharge Limits

Benefits of Combining

- Single Treatment System to treat all
  - Equalization Required
  - Stormwater exclusion
  - Forked pre-treatment ahead of biological system
- Influent Quality Benefits
  - Chlorides
  - Temperature
  - Nitrate
- Continuous flow to keep “bugs” alive
  - Temperature
  - Chloride

Beneficial Reuse, Encapsulation, FGD Discharge Limits

- Dry FGD ZLD reuse options
  - Anticipating Language revision in final ELG language

- Encapsulation Blending FGD Blowdown
  - Gypsum
  - Dry FGD byproduct
  - Fly Ash
  - Bottom Ash

Beneficial Reuse, Encapsulation, FGD Discharge Limits

- Dry FGD Reuse Option
  - Multiple Units or Stations
  - Storage for outage
    - Planned
    - Unplanned Trip
  - Material Design of Dry FGD System
  - Chloride and Hardness Controls
    - Feed tank, nozzle, and piping corrosion
    - Nozzle scaling
- Encapsulation Blending FGD Blowdown
  - Creation of solid waste
  - Must have no free liquid
  - TCLP results
  - Reduced Impact to Water, Groundwater, Air, and Soil

04 Achieving Compliance

Achieving Compliance

CCR Rule

- Structural
  - Weekly inspections
  - Markers and other monitoring
- Groundwater monitoring
  - Potential new wells
  - Sampling procedures
- Fugitive dust and air quality
  - Plan Completion
- Run-on and run-off Controls
  - Evaluation Report
- Closure and post closure documentation
  - Additional closure and post closure requirements
- Additional design requirements on new facilities
- Annual reports and other documentation to public website

ELGs

- EPA and State driven technology improvements
- Co-mingling evaluation as necessary
  - Additional Internal Monitoring Points
- May require new treatment processes
  - FGD Blowdown
  - Leachate treatment
  - Non-chemical metal cleaning wastes
  - Integrated Gasification Combined Cycle

Achieving Compliance

Integration

- Ash Pond Closure and Treatment
- Re-routing flows to avoid co-mingling impacts from ash pond closures
- Run-on impacts and leachate processing, links to required FGD treatment
- New treatment on FGD and CCR leachate
- Beneficial reuse and material disposal considerations

Integration of CCR and ELG Implantation Plans

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