

# Worldwide Pollution Control Association

WPCA-Southern Company  
Wastewater Treatment  
Seminar

April 16 & 17, 2013

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# Overview of CCR Regulations and Changes in Disposal Management

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GPC Metro East Operating Headquarters  
Atlanta, Georgia



# Overview of CCR Regulations





# Before the Storm – What are CCPs?

## Coal combustion products (CCP) affected by the change:

- Waste products from the combustion of coal and emission control systems, including:

- Fly ash
- Bottom ash
- Flue gas emission control products
  - Gypsum
  - Flue Gas Desulfurization (FGD) Sludge
- Boiler slag
- Fluidized bed ash

### Other Names for CCPs:

CCB = Coal Combustion Byproducts (*outdated, replaced with CCPs*)

CCR = Coal Combustion Residuals (*introduced by the US EPA in 2010*)

CCW = Coal Combustion Waste (*used most commonly by the US EPA*)

Coal Ash (*common reference*)



# Before the Storm – CCP Management

**All aspects of CCP management performed by the states - No federal programs in place**

- **1976 – Resource Conservation and Recovery Act**
- **1980 Bevill Amendment** – CCP not hazardous waste!
  - The ‘Bevill exclusion’ excludes CCP from regulation as hazardous waste under Subtitle C.
- **1993 Report**
  - Subtitle D designation upheld from Bevill Amendment.
- **2000 Report**
  - Final Rule - the agency concluded that CCP are nonhazardous (maintains exemption); also the report calls for federal disposal and reuse guidelines.
- **2002 Report**
  - EPA sponsored beneficial use summits focused on barriers to utilization of CCP within the states...Beneficial reuse (or recycling) is now on the rise.



# Approaching Storm – Lightning Strikes

## December 22, 2008

- TVA failure at Kingston
  - Ash dike ruptured-largest fly ash release in U.S. history
  - 5.4 million cubic yards of fly ash sludge into the Emory River and surrounding land
  - Clean up costs approaching \$1.2 billion

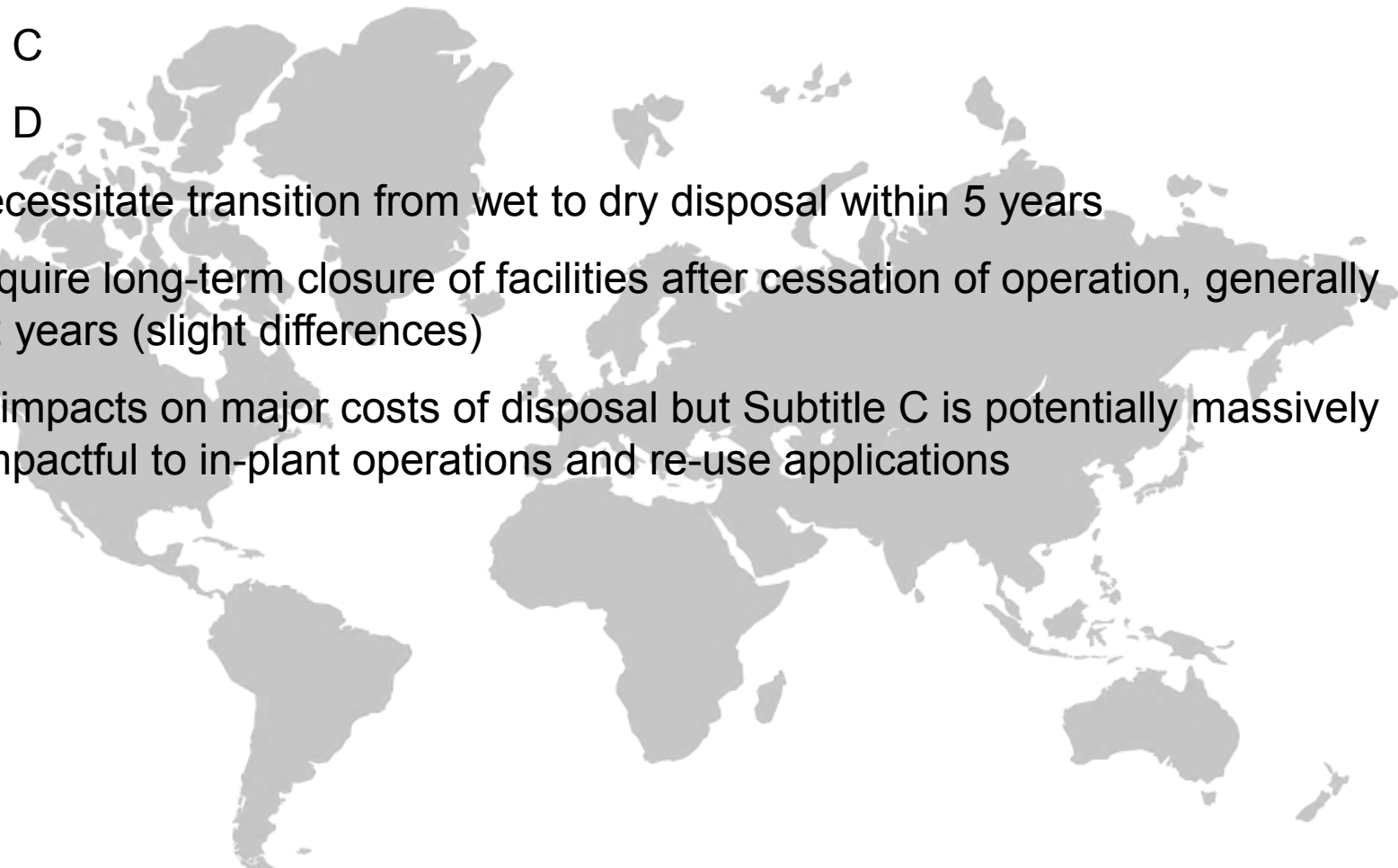
## January 9, 2009

- Widows Creek Fossil Plant Gypsum Pond
  - Water and gypsum flowed into the settling pond, which filled to capacity and then overflowed after a cap dislodged from a 30-inch standpipe
  - Some material overflowed into Widows Creek, although most of the gypsum remained in the settling pond



# Latest Front – 2010 and 2011

**June 2010 – EPA proposes two primary alternative regulatory paths for dealing with CCR as a “regulated” rather than “exempt” waste:**

- Subtitle C
  - Subtitle D
  - Both necessitate transition from wet to dry disposal within 5 years
  - Both require long-term closure of facilities after cessation of operation, generally within 2 years (slight differences)
  - Similar impacts on major costs of disposal but Subtitle C is potentially massively more impactful to in-plant operations and re-use applications
- 

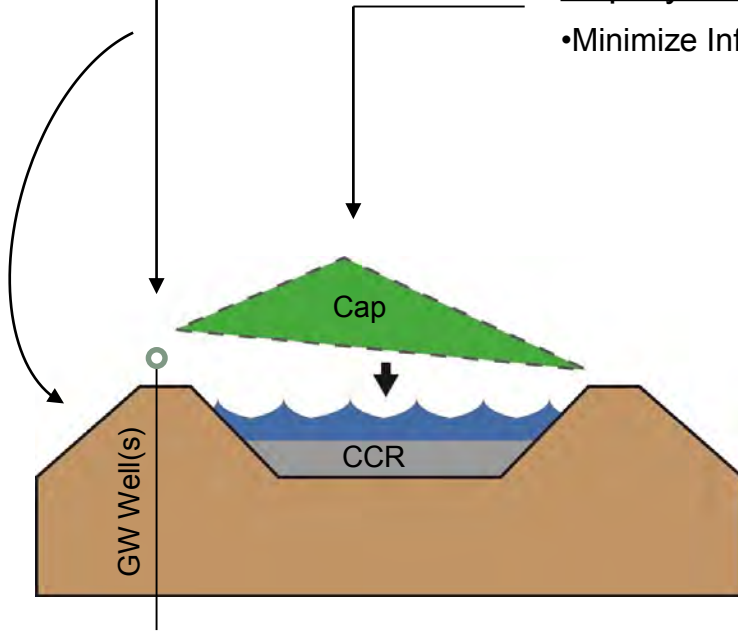
# Existing Ponds – Subtitle C

## Monitoring and Inspection

- GW Monitoring
- Site Inspection
- Report to EPA

## Cap System

- Minimize Infiltration



## Time Line

- Stop receipt of CCRs, 5 years
  - Closure, 2 years later
- 7 yrs.



## Reporting / Long-Term Care

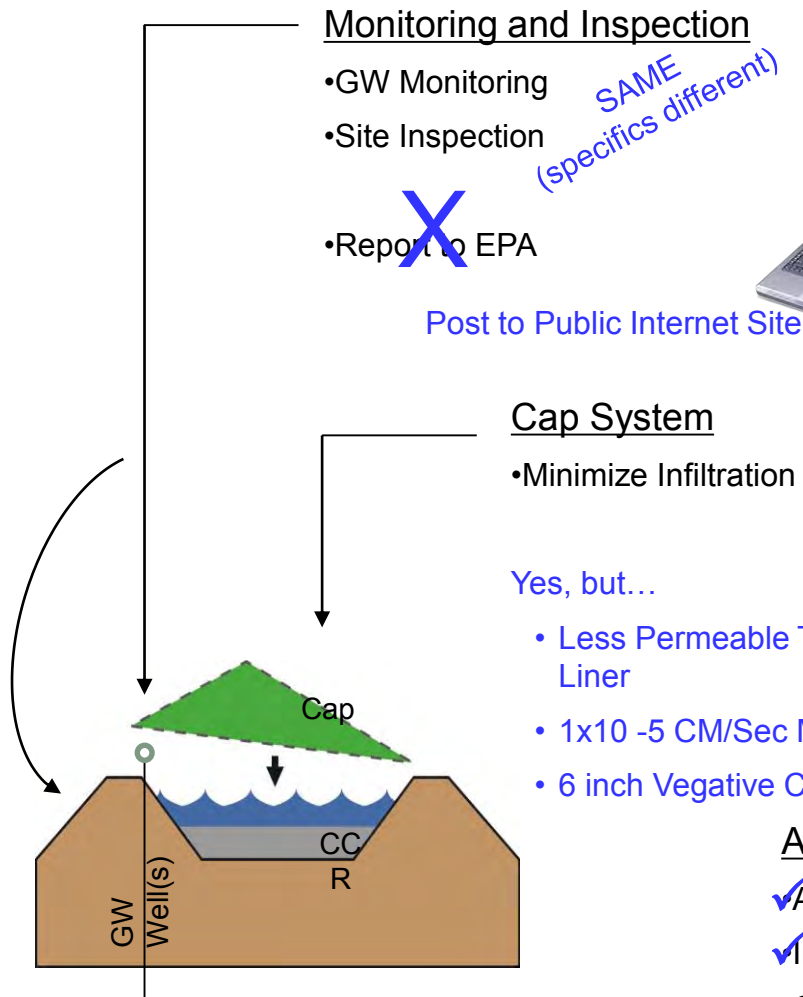
- Annual Reporting
- Financial Assurance
- Closure / Post-Closure Care
- Land Disposal Restrictions

## Applies To (at time of closure)

- Active Ponds
- Inactive Ponds
- Closed Ponds



# Existing Ponds – Subtitle ~~C~~ D



## Time Line

- Stop receipt of CCRs, 5 years
  - Closure, 2 years later
- 7 yrs.

•Closure in 5 years unless 2 year extension



## Reporting / Long-Term Care

- ✓Annual Reporting
- ✓Financial Assurance
- ✓Closure / Post-Closure Care
- ✗Land Disposal Restrictions
- Location Restrictions

## Applies To (at time of closure)

- ✓Active Ponds
- ✓Inactive Ponds
- Closed Ponds

# Existing Landfills – Subtitle C



## Monitoring and Inspection

- GW Monitoring
- Site Inspection
- Report to EPA

## Developed Existing Area

- Continue with current lined system
- Security requirements
- Operate as a Subtitle C unit (manage hazardous material)
- Cap system required

## Undeveloped / Expansion Area

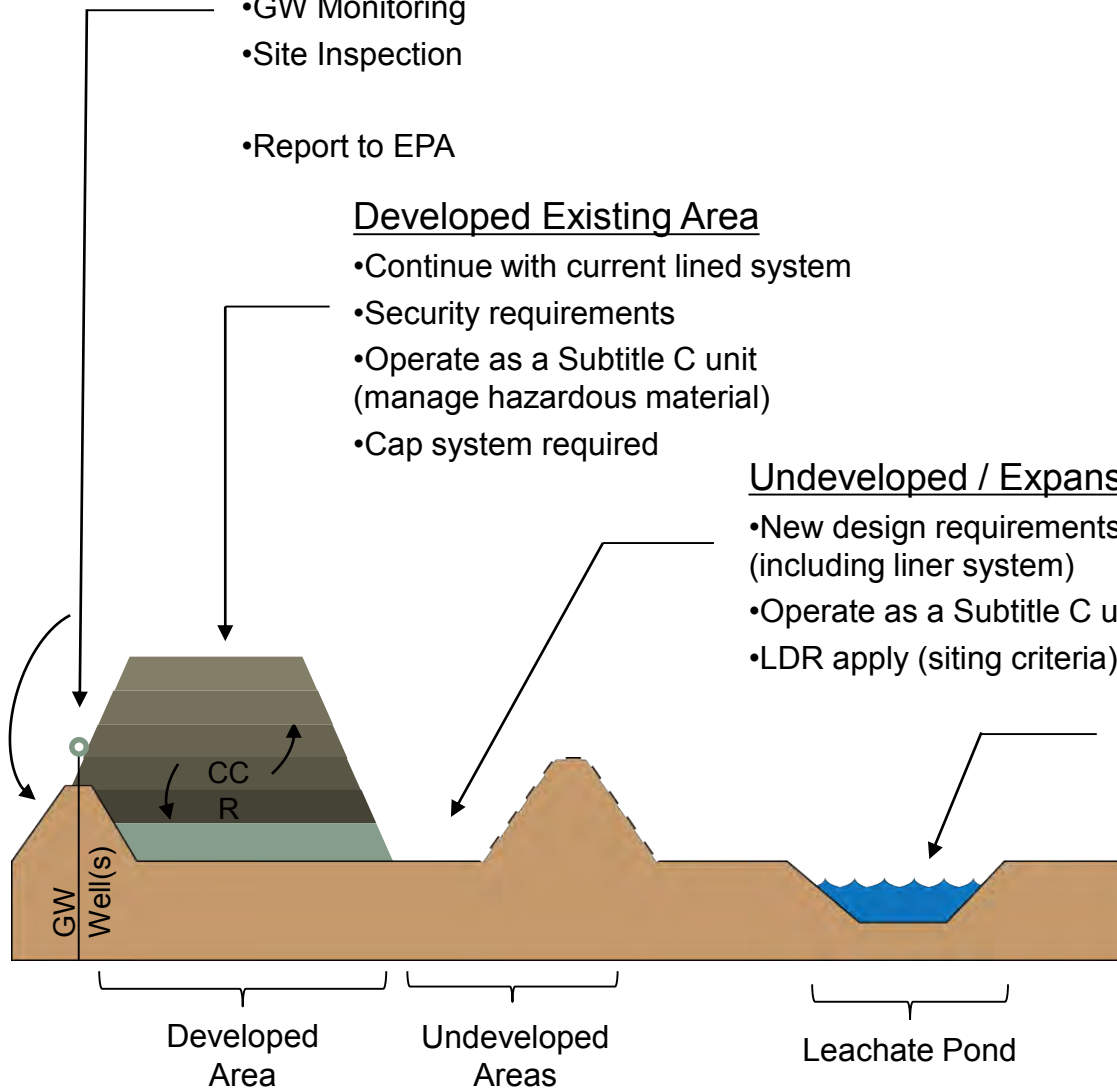
- New design requirements apply (including liner system)
- Operate as a Subtitle C unit
- LDR apply (siting criteria)

## Reporting / Long Term Care

- Annual reporting
- Financial assurance
- Closure / post-closure care

## Leachate Management

- CCR pond closure (tanks, other)



# Existing Landfills – Subtitle ~~C~~ D

## Monitoring and Inspection

- GW Monitoring
- Site Inspection

•Report to EPA



*SAME  
(specifics different)*

*Post to Public Internet Site*



## Reporting / Long Term Care

- ✓Annual reporting
- ✓Financial assurance
- ✓Closure / post-closure care

## Developed Existing Area

- ✓Continue with current lined system
- ~~X~~Security requirements
- ~~X~~Operate as a Subtitle C unit .....*self-implementing*  
(manage hazardous material)
- ✓Cap system required

## Undeveloped / Expansion Area

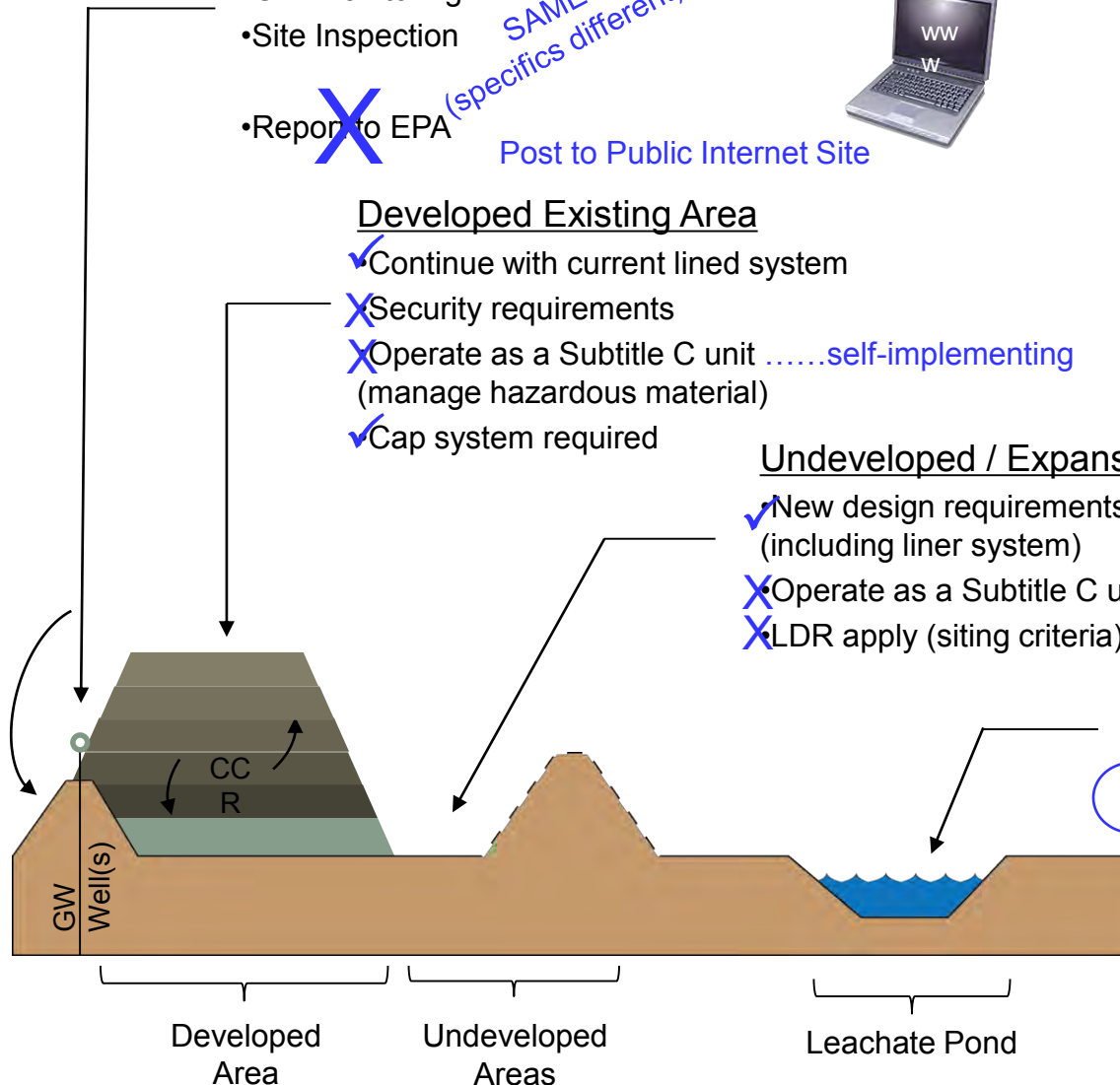
- ✓New design requirements apply  
(including liner system)
- ~~X~~Operate as a Subtitle C unit
- ~~X~~LDR apply (siting criteria) .....*other location restrictions*

## Leachate Management

- ✓CCR pond closure (tanks, other)

*...But could line or build lined ponds*

- Meet LDR
- GW monitoring
- Closure / Post-closure
- Stability requirements





## Changes in Disposal Management – Driving Factors



# Factors Driving Change

## Business Drivers

- Utility fleet downsizing
- Mergers and Acquisitions
- CCP Sales

## Regulatory Drivers

- Release of the new federal rules for the management of CCPs (anticipated 2014 followed by <1 year to >4 years for the rules to take effect)
- The outcome of the new rules (hazardous or non hazardous; pond closures required and period for compliance; etc.)
- Actions due to “adjacent” rules:
  - Effluent Limitation Guidelines – Expected April 19, 2014
  - MATS, etc. – Plant Decommissioning
- “Regulatory Purgatory” – Current regulatory status leads to many unknown factors in project execution, which has grown into CCP Management uncertainty.

# Factors Driving Change

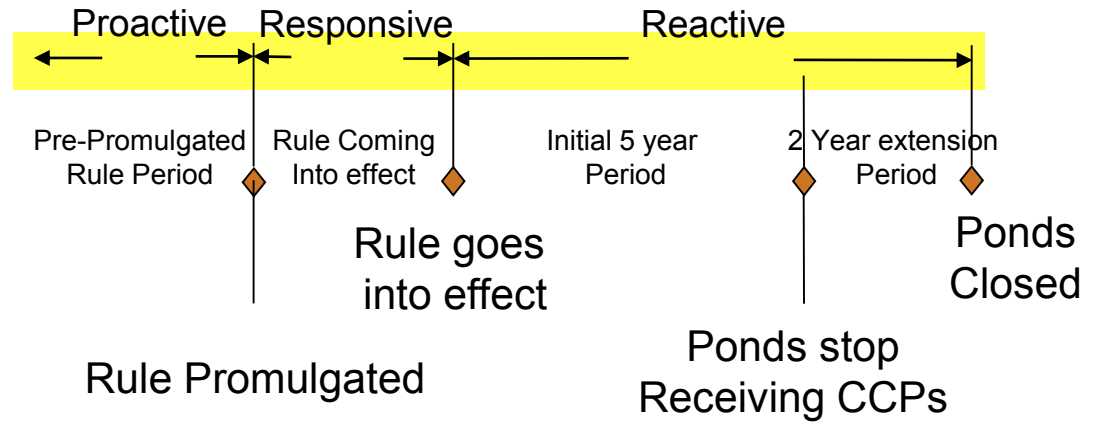
## Observed Trends

***Proactive*** – Begin projects now because of capacity needs, perception, etc.

***Responsive*** – Begin projects after directions are provided (i.e., rules are draft)

***Reactive*** – Begin projects when the regulations require action

# Factors Driving Change Observed Trends



**Standard Operating Procedure(s) –**  
Routine tasks due to normal operations



**Strategic and Planning –** Strategic and planning tasks to prepare



**Pond Closures –** Pond closures



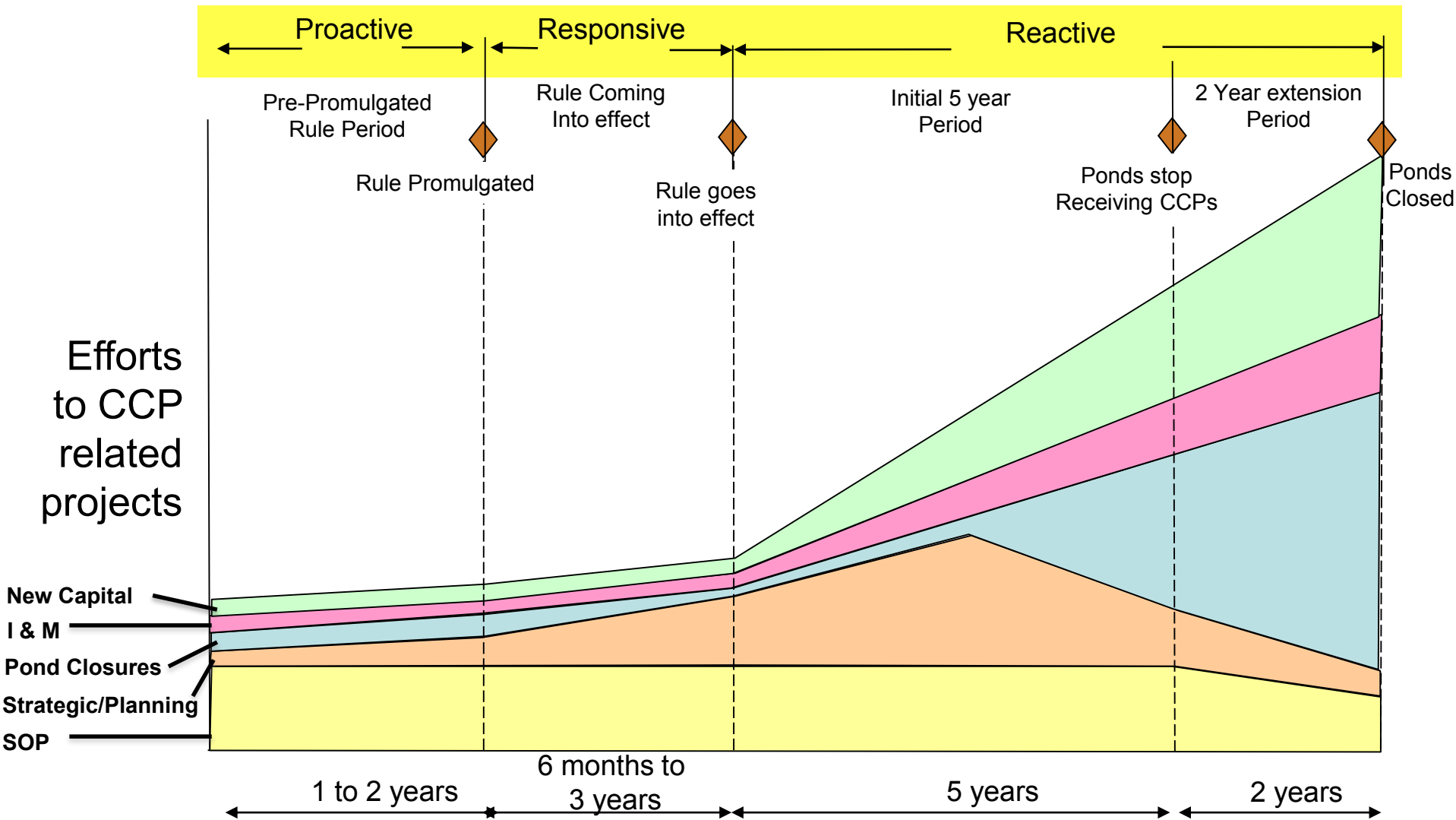
**Instrumentation and Monitoring –**  
Inspection and monitoring



**New Capital Project(s) –** New capital projects



# Factors Driving Change Observed Trends





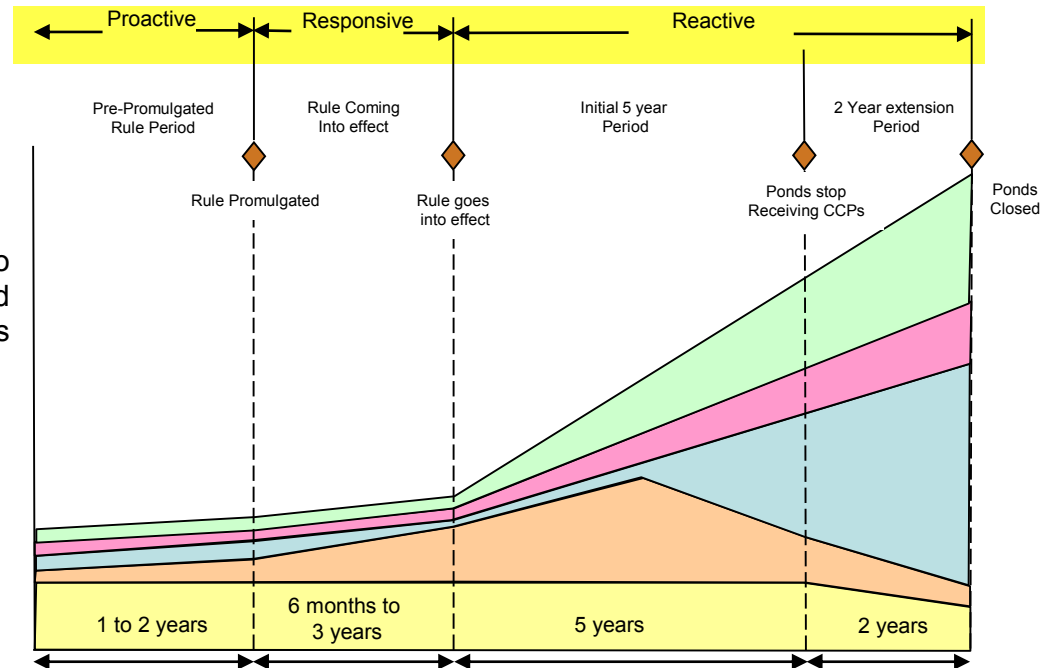
# Factors Driving Change Observed Trends

**Proactive Behavior** –  
Begin projects now  
because it is  
right/necessary

**Responsive Behavior** –  
Begin projects  
when directions are  
provided (i.e., rules  
are draft)

**Reactive Behavior** –  
Begin when the  
regulations require  
action

Efforts to  
CCP related  
projects



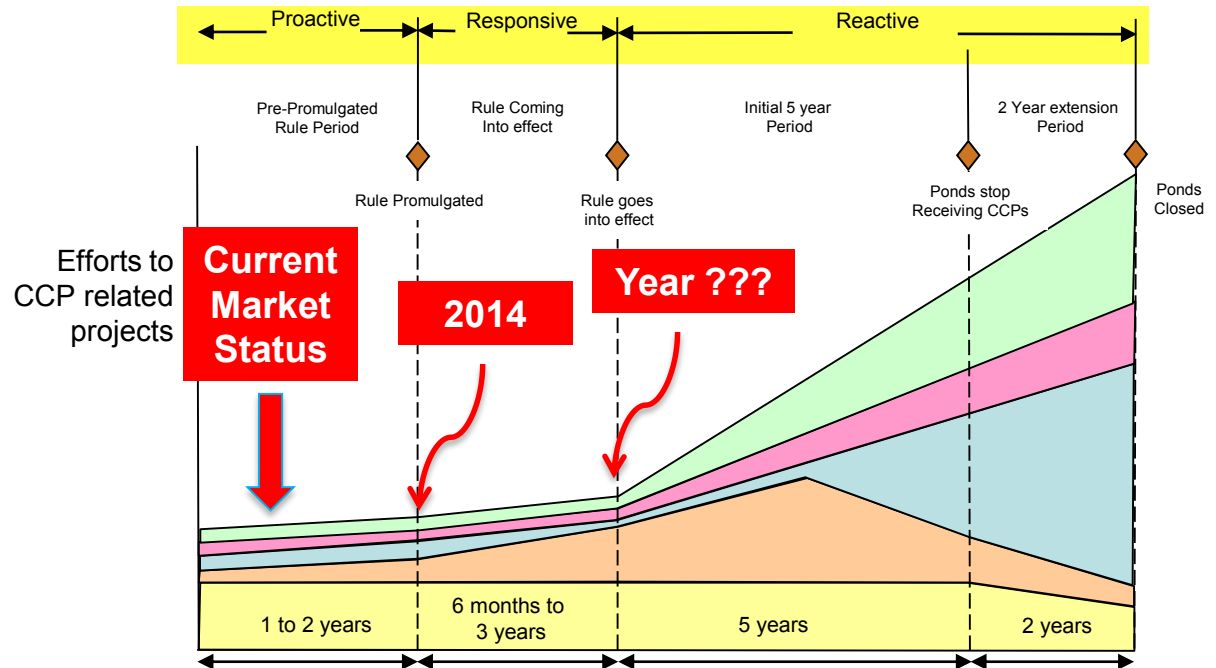
<b>Standard Operating Procedure(s)</b> – Routine tasks due to normal operations	↔	↔	↔	↓
<b>Strategic and Planning</b> – Strategic and planning tasks to prepare	↑	↑↑	↑↑ ~ ↓	↓
<b>Pond Closures</b> – Pond closures	↑	↓	↑↑	↑↑↑
<b>Instrumentation and Monitoring</b> – Inspection and monitoring	⊘	⊘	↑	↑↑
<b>New Capital Project(s)</b> – New capital projects	↔	↑	↑↑	↑↑↑↑

# Factors Driving Change Observed Trends

**Proactive Behavior** –  
Begin projects now  
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**Responsive Behavior** –  
Begin projects  
when directions are  
provided (i.e., rules  
are draft)

**Reactive Behavior** –  
Begin when the  
regulations require  
action



**Growing Needs**

<b>Standard Operating Procedure(s)</b> – Routine tasks due to normal operations	↔	↔	↔	↓
<b>Strategic and Planning</b> – Strategic and planning tasks to prepare	↑	↑↑	↑↑ ↓	↓
<b>Pond Closures</b> – Pond closures	↑	↓	↑↑	↑↑↑
<b>Instrumentation and Monitoring</b> – Inspection and monitoring	⊘	⊘	↑	↑↑
<b>New Capital Project(s)</b> – New capital projects	↔	↑	↑↑	↑↑↑↑

# Factors Driving Change

## What Options are being Considered?

- Minor modifications to plant
    - Upgrade of existing systems
    - Technology improvements
  - Major modifications to plant
    - Add New Scrubbers
    - Convert to dry systems
  - Repowering or closure
  - Continue to operate for a period without making a decision (delay)
- 

# Factors Driving Change

## Current Trends (services requested)

- Studies, budgeting, and planning
- No new ponds
- Closing existing (active and inactive ponds)
- New landfills being considered, and some permitting starting
- Plant closures – (closure of disposal units)
- Exploring beneficial reuse opportunities (steady, included in new strategies)
- Innovation options – landfills over ponds
- Groundwater issues – characterization and interception
- Water re-use/management studies

**Needs are evolving!**





## Changes in Disposal Management – Solving the Puzzle

# Solving the Puzzle

## Regulatory Challenges

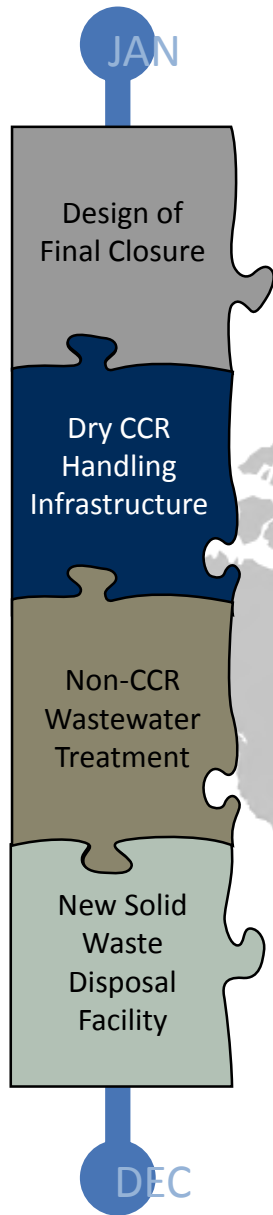
### Challenges before the new regulations

- Cessation of sluicing may increase NPDES challenges
- Permitting process is unclear

### Challenges after the new regulations

- Regulators not familiar with the engineering and operation of conversions (and new dry disposal)
- Proposed regulations have mandatory closure requirements (180 days), with limited mechanisms for extension.

# For a Typical Power Station with Ponds

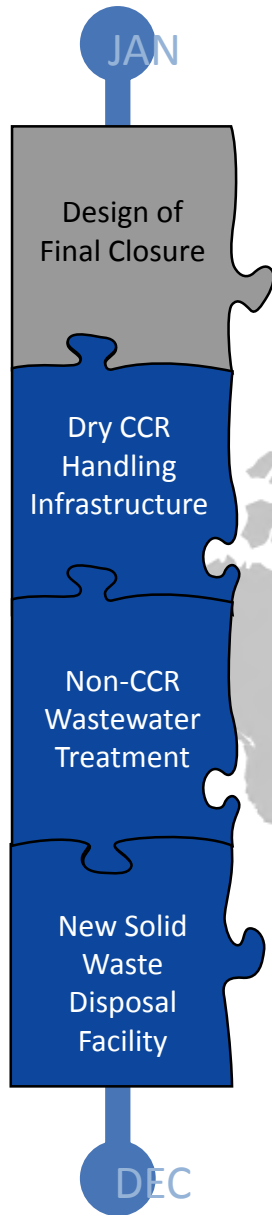


**The following is needed prior to the start of final closure construction (i.e. before the spigot is turned off)**

- Design of Final Closure
- Dry CCR Handling Infrastructure
- New Non-CCR Wastewater Treatment Facilities
- New Solid Waste Disposal Facility



# Design of Final Closure

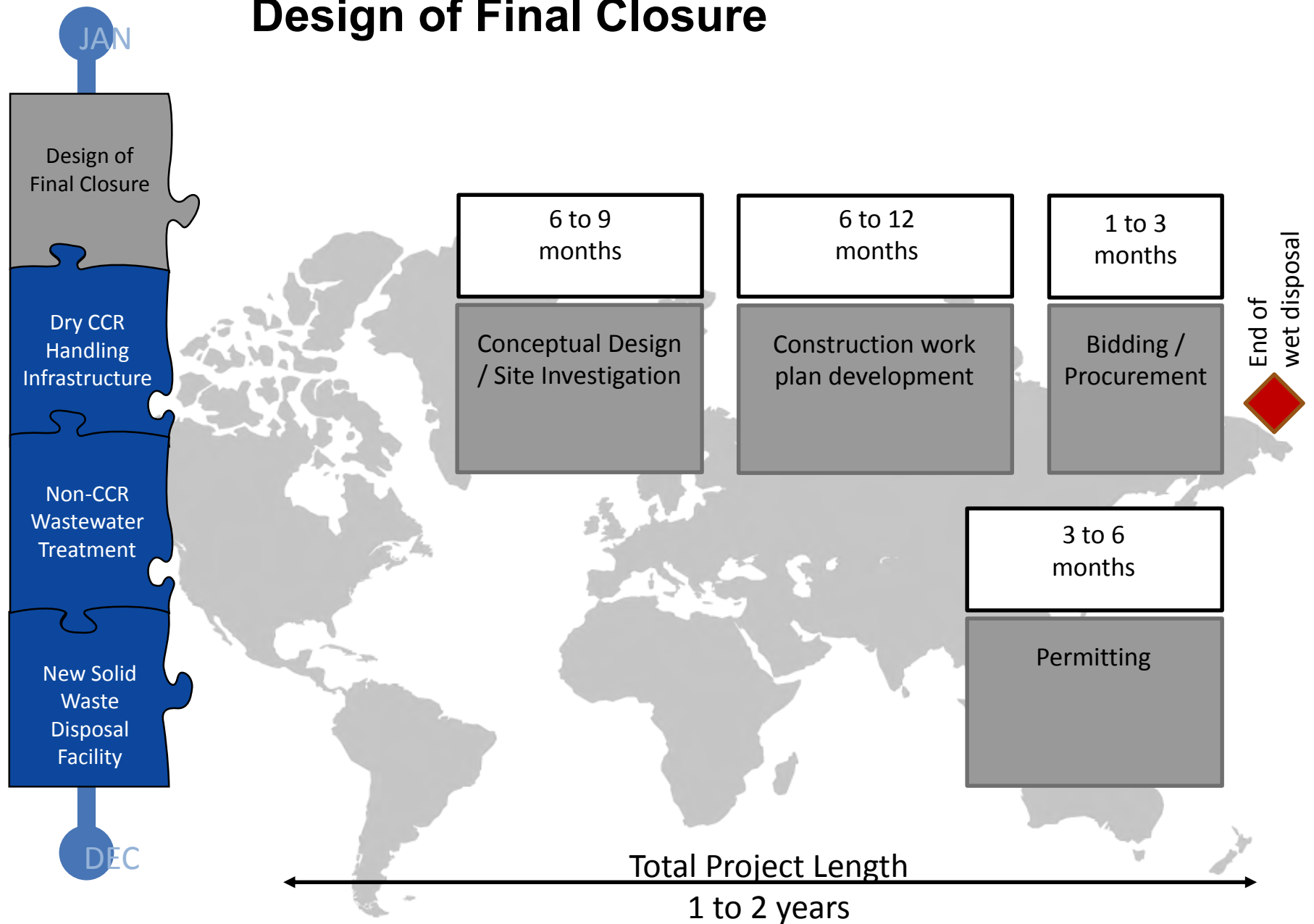


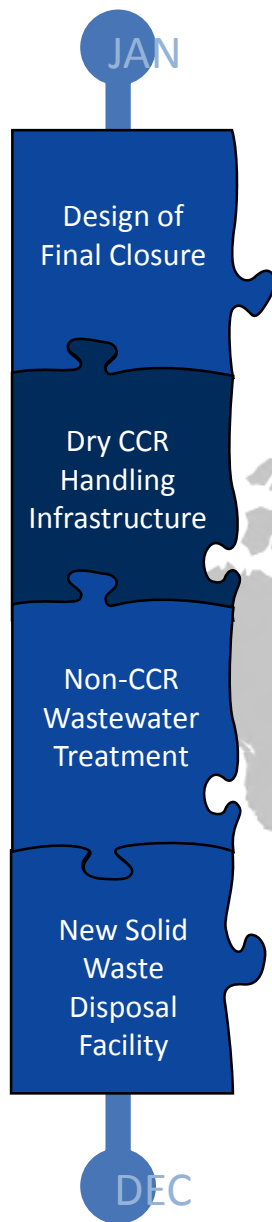
## Basic Steps Required for Final Closure Design/Permitting

- Conceptual Design
- Internal Funding Allocation
- Site Investigation
- Development of Construction Work Plan
  - Design Drawings
  - Specifications
  - Contract Documents
- Permitting
  - NPDES Modifications
  - Storm Water Construction Permit (SWP3)



# Design of Final Closure





# Dry CCR Handling Infrastructure

## Fly Ash

- Pneumatic handling and ash silos
- Conveyors
- Trucks

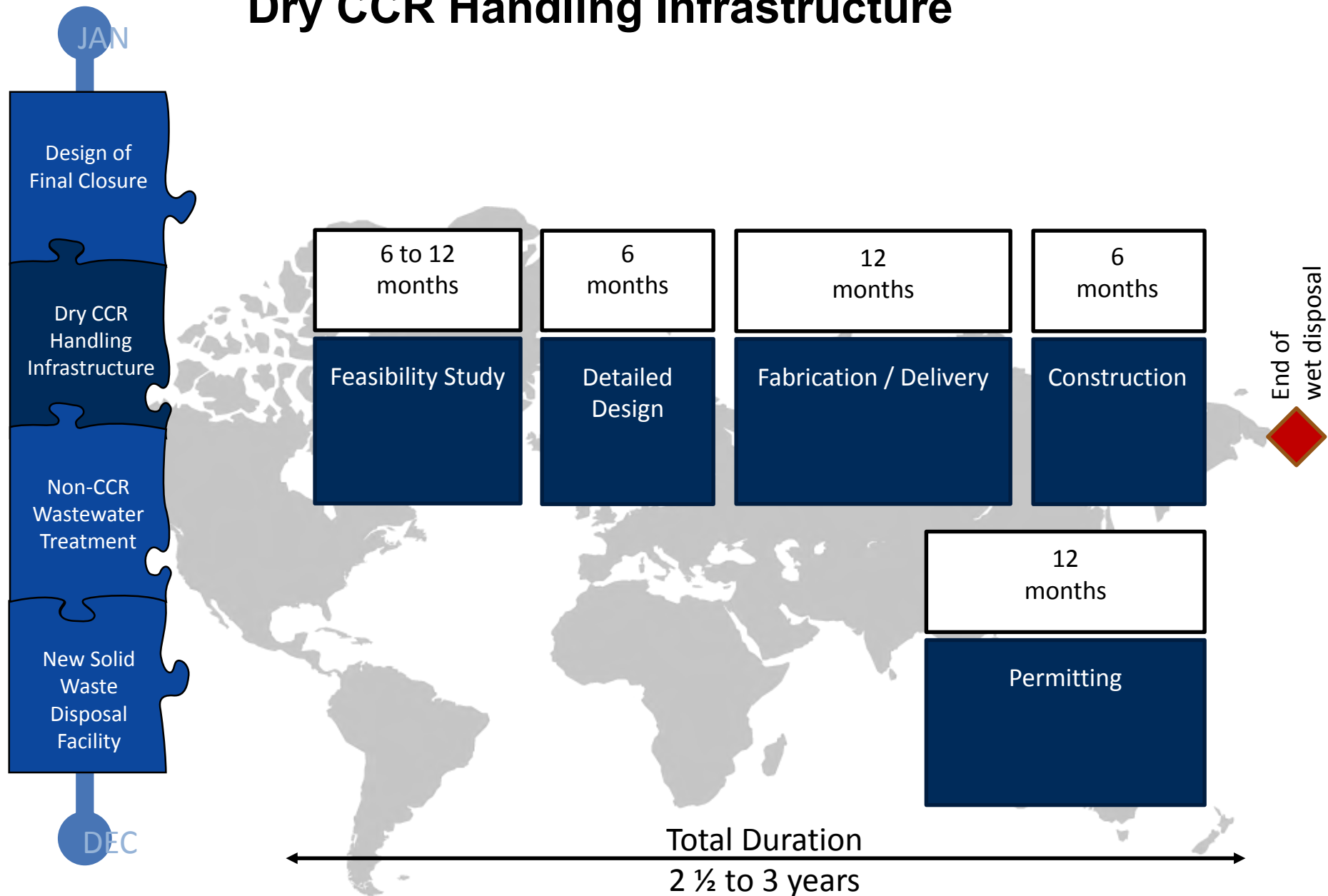
## Bottom Ash/Slag

- Hydrobins
- Chain conveyors
- True dry bottom ash handling very complex and would require very significant changes to the boiler – assume not required under Subtitle D Option

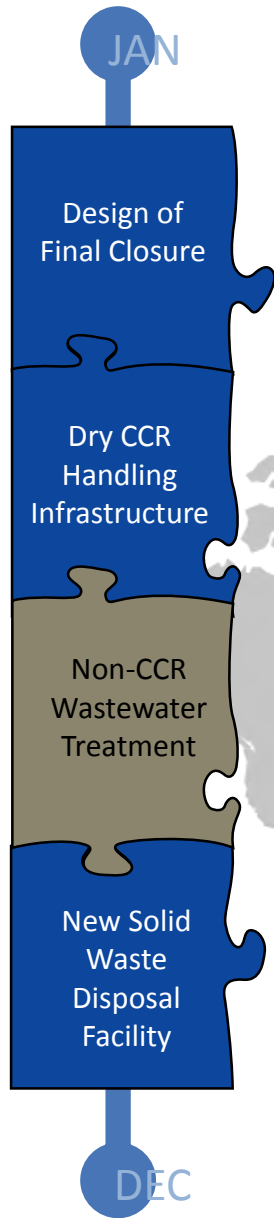
## Gypsum Dewatering

- Thickeners
- Water recycle
- Fly ash blending

# Dry CCR Handling Infrastructure



# Non-CCR Wastewater Treatment



## Reduction in dilution/ residence time

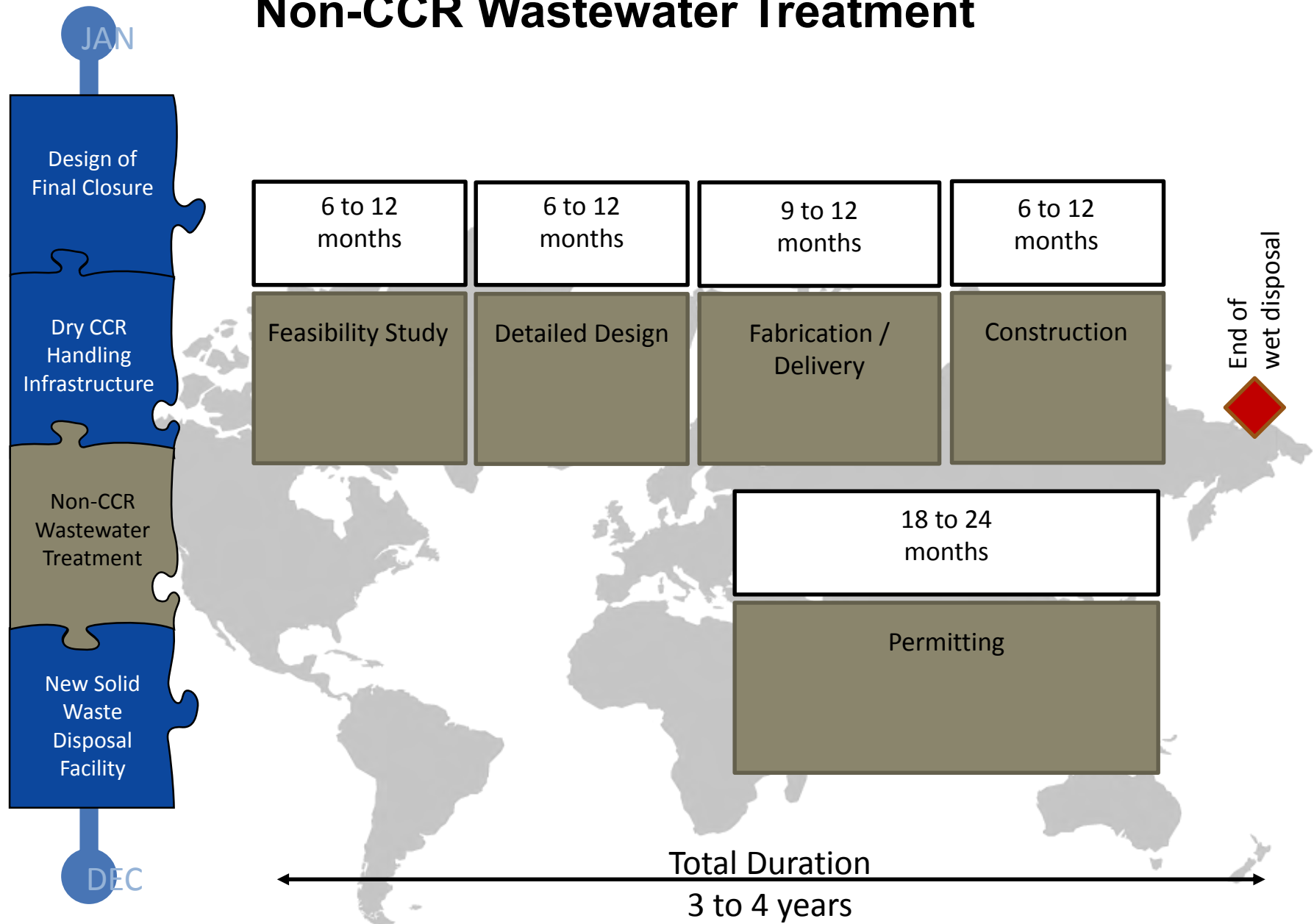
## New dedicated wastewater facilities needed

- Non CCR wastewater may require conventional wastewater treatment facilities
- High-load wastewaters may require additional treatment
  - zero liquid discharge,
  - membranes, etc.

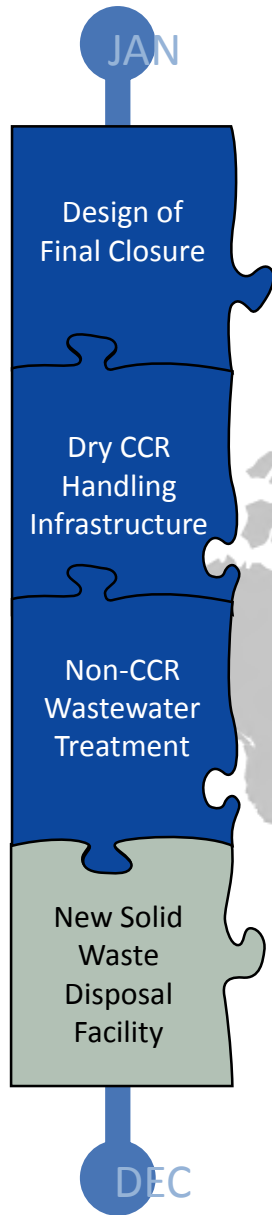
## Recycle/reuse may reduce treatment needs but must be balanced with other costs

- reuse FGD blowdown for cooling tower make up
- reuse to moisture condition CCR material for landfilling

# Non-CCR Wastewater Treatment



# New Solid Waste Disposal Facility



**Management of CCRs in an existing Subtitle D landfill (MSW) is economically unfeasible due to:**

- high volume wastes,
- high transportation costs, and
- high tipping fees

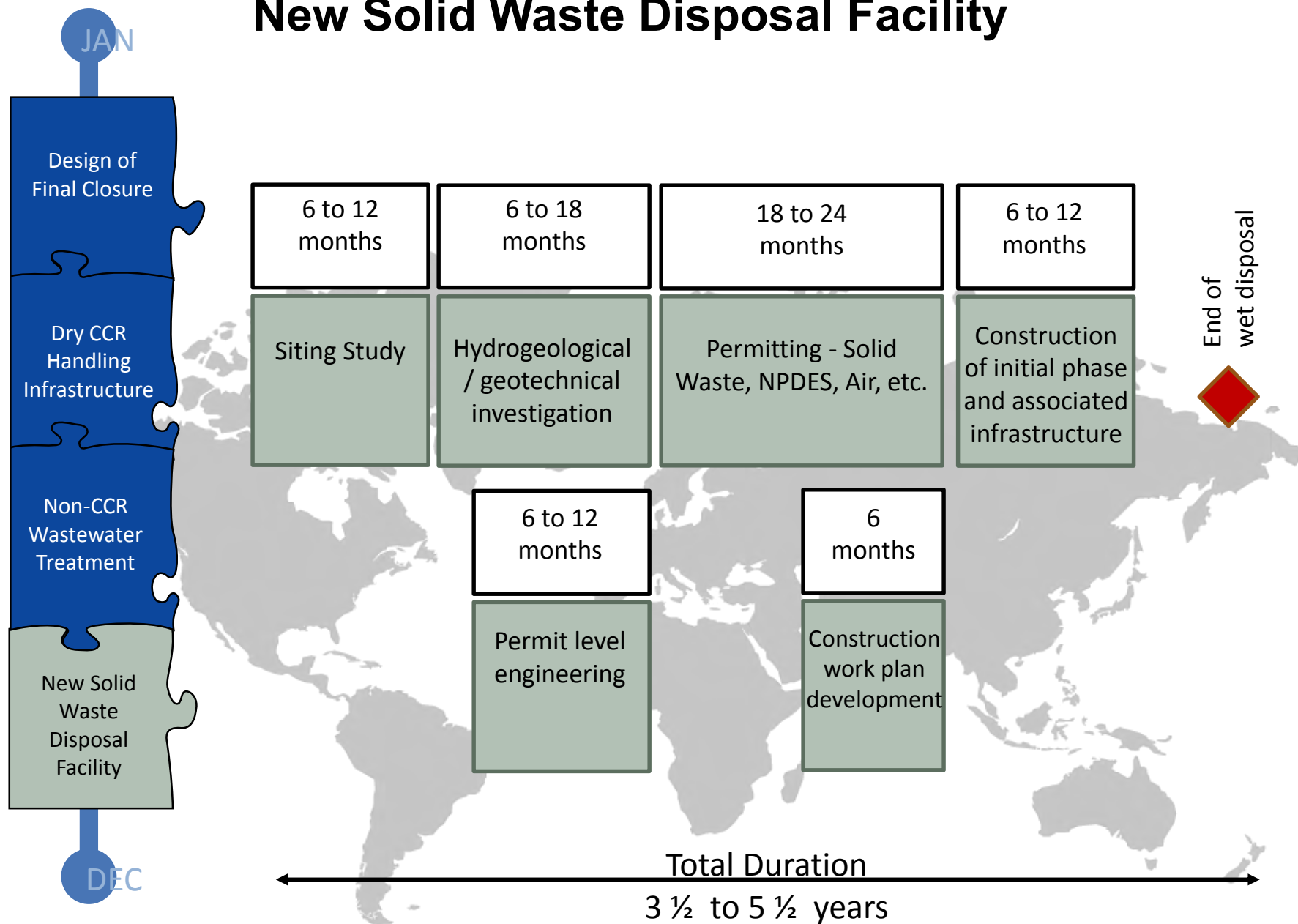
**A dedicated (new) dry landfill for final disposal will be needed**

**Prior to the start of final pond closure, a new dry landfill will need to be...**

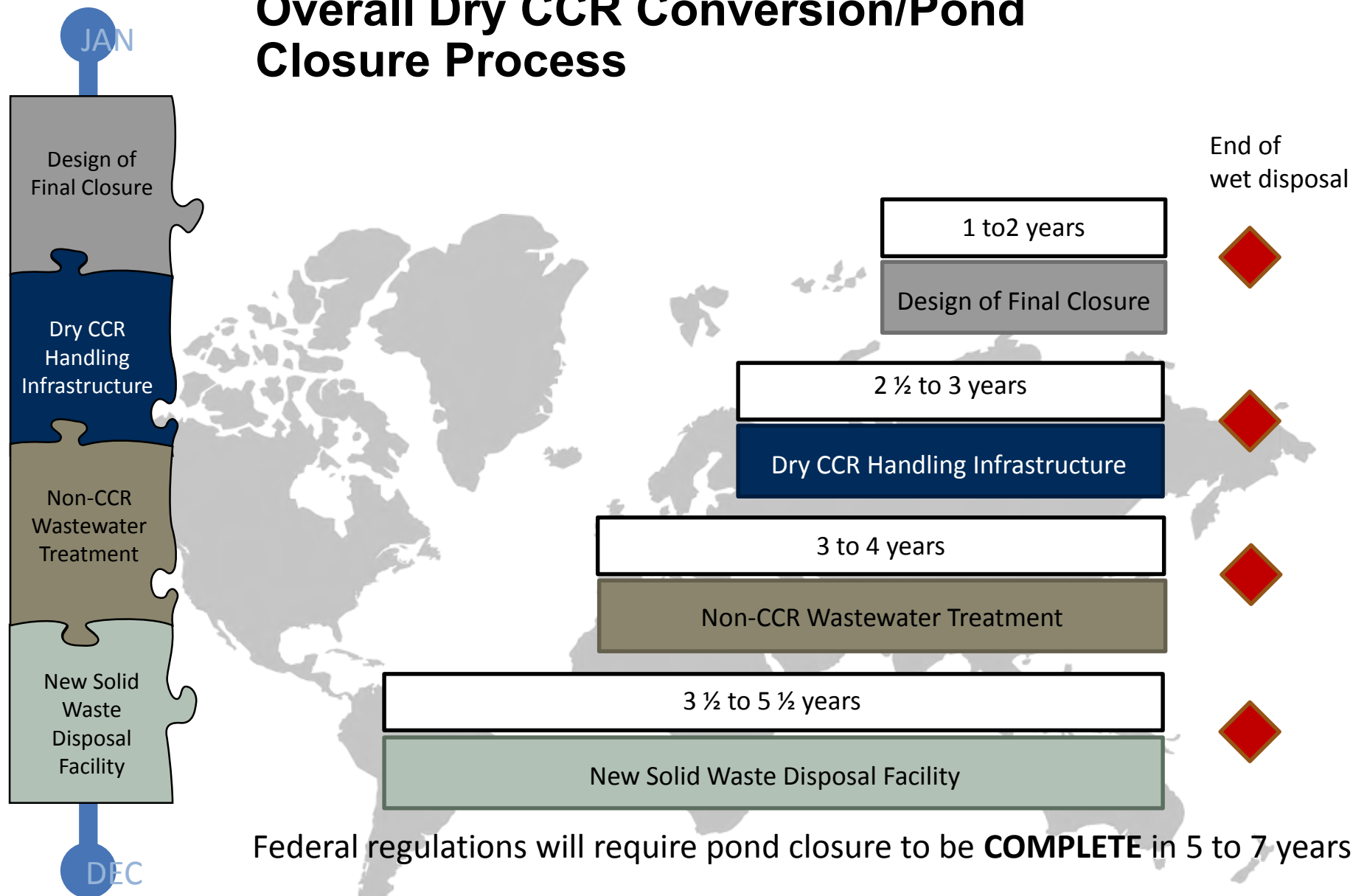
- sited,
- permitted,
- constructed, and
- begin operation



# New Solid Waste Disposal Facility



# Overall Dry CCR Conversion/Pond Closure Process



Federal regulations will require pond closure to be **COMPLETE** in 5 to 7 years!

*The time to begin is...**NOW!!!***

# Solving the Puzzle

## Management Challenges

### Securing funds

- Include all projects required to convert from wet CCR operations to dry:
  - Wastewater treatment facilities,
  - Dry fly ash handling,
  - Gypsum dewatering, etc.
- Must phase costs over as long period of time
- Planning and careful budgeting is key

# Solving the Puzzle

## Management Challenges (Continued)

### Planning for dry handling

- Shifting to dry CCR management will require the need for dry landfills
  - Needed in service before pond closure
  - Approach is very involved (site, design, permit, and construct)
- Consider alternative conveyance methods – rail, barge, or conveyor
- Evaluate capacity of ash silos/bottom ash storage bins

### Management of Non-CCR Wastewater

- Currently minor wastewater streams may become significant and controlling streams for a new wastewater facility
- New treatment technologies may be required, with potential higher levels of O&M

# Summary

## *Solving a complicated puzzle for pond closures:*

- Requires careful planning as well as considerations for multi-step processes
- Requires overcoming challenges which
  - Leads to other challenges
  - Requires a systematic approach
- Avoid the learning curve (for all phases of the project)
- Includes more than just pond closures (that may take precedence)
  - Landfills,
  - Dewatering facilities,
  - Wastewater treatment, etc.
- It is a lengthy process....