

# Treatment Residual Disposal Options

# Overview

- Acronyms & Abbreviations
- Disposal Considerations
- Liquid Residual Types
- Solid Residual Types
- Liquid Residual Disposal Options
- Solid Residual Disposal Options
- Transporting Waste & Waste Brokers
- Alternatives

# Acronyms & Abbreviations

<b>AA</b>	<b>Activated Alumina</b>
<b>BAT</b>	<b>Best Available Technology</b>
<b>CESQG</b>	<b>Conditionally Exempt Small Quantity Generator</b>
<b>CWA</b>	<b>Clean Water Act</b>
<b>DOT</b>	<b>U.S. Department of Transportation</b>
<b>ED/EDR</b>	<b>Electrodialysis/Electrodialysis Reversal</b>
<b>HMO</b>	<b>Hydrous Manganese Oxide</b>
<b>IX</b>	<b>Ion Exchange</b>
<b>LLRW</b>	<b>Low Level Radioactive Waste</b>
<b>LQG</b>	<b>Large Quantity Generator</b>
<b>NPDES</b>	<b>National Pollutant Discharge Elimination System</b>

# Acronyms & Abbreviations

<b>PFLT</b>	<b>Paint Filter Liquids Test</b>
<b>POTW</b>	<b>Publicly Owned Treatment Works</b>
<b>RCRA</b>	<b>Resource Conservation and Recovery Act</b>
<b>SQG</b>	<b>Small Quantity Generator</b>
<b>SSCT</b>	<b>Small System Compliance Technology</b>
<b>TBLLs</b>	<b>Technically Based Local Limits</b>
<b>TCLP</b>	<b>Toxicity Characteristic Leaching Procedure</b>
<b>TENORM</b>	<b>Technologically Enhanced Naturally Occurring Radioactive Material</b>
<b>UIC</b>	<b>Underground Injection Control</b>
<b>USDW</b>	<b>Underground Source of Drinking Water</b>

# Disposal Options Depend On...

## ➤ Waste characteristics

- Liquid or solid
- Type and concentration of contaminants
- Classification of waste
  - TENORM
  - Hazardous Waste
  - Source Material
  - Mixed Waste
  - Radioactive waste



# Disposal Options Depend On...

- Federal, state, & local regulations
- Disposal facility policies
- System & disposal site location



# Liquid Residuals

BAT/SSCT	Brine	Backwash	Rinse Water	Acid Neut. Water	Concentrate
IX	X	X	X		
RO					X
AA		X	X	X	
Coagulation/Filtration		X			
Lime Softening		X			
Green Sand Filtration		X			
Co-Precip. w/ Barium Sulfate		X			
ED/EDR					X
Pre-formed HMO Filtration		X			

# Solid Residuals

BAT/SSCT	Spent Resins/ Media	Spent Membranes	Sludge
IX	X		
RO		X	
AA	X		
Coagulation/Filtration	X		X
Lime Softening	X		X
Green Sand Filtration	X		X
Co-Precip. w/Barium Sulfate	X		X
ED/EDR		X	
Pre-formed HMO Filtration	X		X



# Disposal Options

Residuals	Possible Disposal Options			
	Direct Discharge	Discharge to POTW	Underground Injection	Landfill
Liquids	X	X	X	
Sludge		X	(X)	X
Spent Resins/Media				X
Spent Membranes				X

# Liquid Disposal: Direct Discharge

- Must have accessible & appropriate receiving body
- NPDES permit limitations
  - No federal regulations in place for radionuclides



# Liquid Disposal: Discharge to POTW

- Must meet TBLLs
- POTW can refuse waste if it will:
  - Interfere with treatment process
  - Contaminate POTW sewage sludge
  - Cause NPDES permit violation
- May need local permit or contract



# Liquid Disposal: Discharge to POTW, cont.

- Domestic sewage exclusion
- Restrictions on source material
- State TENORM regulations may apply



# Liquid Disposal: Underground Injection

- UIC regulations define “radioactive”
- Additional state restrictions may apply
- Class I wells
  - Possible option for radioactive & hazardous residuals
  - Stringent requirements
  - Limited disposal of sludge/solids



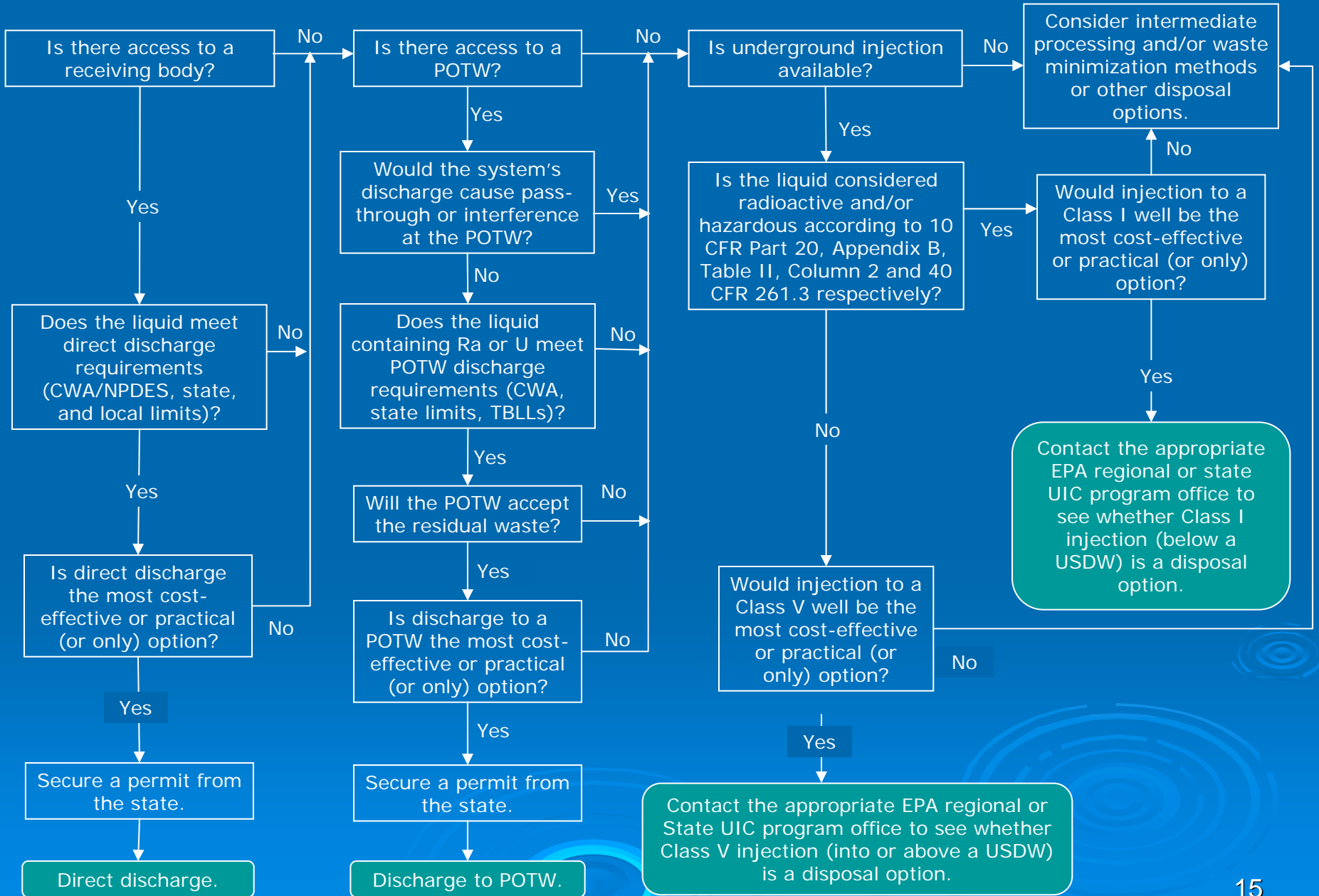
# Liquid Disposal: Underground Injection, cont.

## ➤ Class V wells

- Shallow wells
- May not accept radioactive waste
- No hazardous waste disposal



## Liquid Residuals Disposal





# Solid Residuals: Pre-testing

## ➤ Determine if waste is hazardous

- Process knowledge and/or
- Analytical testing



## ➤ TCLP

- Predicts leaching of hazardous waste
- Levels set for 8 metals & 32 organics
  - Does not apply to radionuclides



# Solid Waste: Pre-testing, cont.

- Testing for free liquids
  - Paint filter liquids test
  - > 20% solids
  
- Landfills do not accept waste containing free liquids



# Solid Waste: Pre-testing, cont.

- Intermediate processing to remove liquids
- No federal requirement to test residuals for radionuclides



# Hazardous Waste Generators

Status	Generation	Storage
<b>Conditionally Exempt Small Quantity Generator (CESQG)</b>	<b>&lt; 100 kg</b>	<b>&lt; 1,000 kg</b>
<b>Small Quantity Generator (SQG)</b>	<b>100 – 1,000 kg</b>	<b>1,000 – 5,999 kg</b>
<b>Large Quantity Generator (LQG)</b>	<b>&gt; 1,000 kg</b>	<b>&gt; 6,000 kg</b>

# Solid Residuals: Municipal & Industrial Landfills

- RCRA - Subtitle D
- Municipal solid waste landfills
  - Non-hazardous TENORM
  - Hazardous waste from CESQGs
- Industrial solid waste landfills
  - Non-hazardous TENORM
- Landfills may monitor waste



# Solid Residuals: Hazardous Waste Landfills

- RCRA – Subtitle C
- All generator classes
- Land Disposal Restrictions (SQGs & LQGs)
- May not accept TENORM
- Possible permit conditions



# Solid Residuals – LLRW Landfills

## ➤ Barnwell - South Carolina

- Limited use after June 2008

## ➤ Richland - Washington

- Certain types of TENORM
- Limited licensed source material disposal
- No hazardous or mixed waste

## ➤ EnergySystems – Clive, Utah

- Dedicated TENORM disposal
- Certain kinds of mixed waste



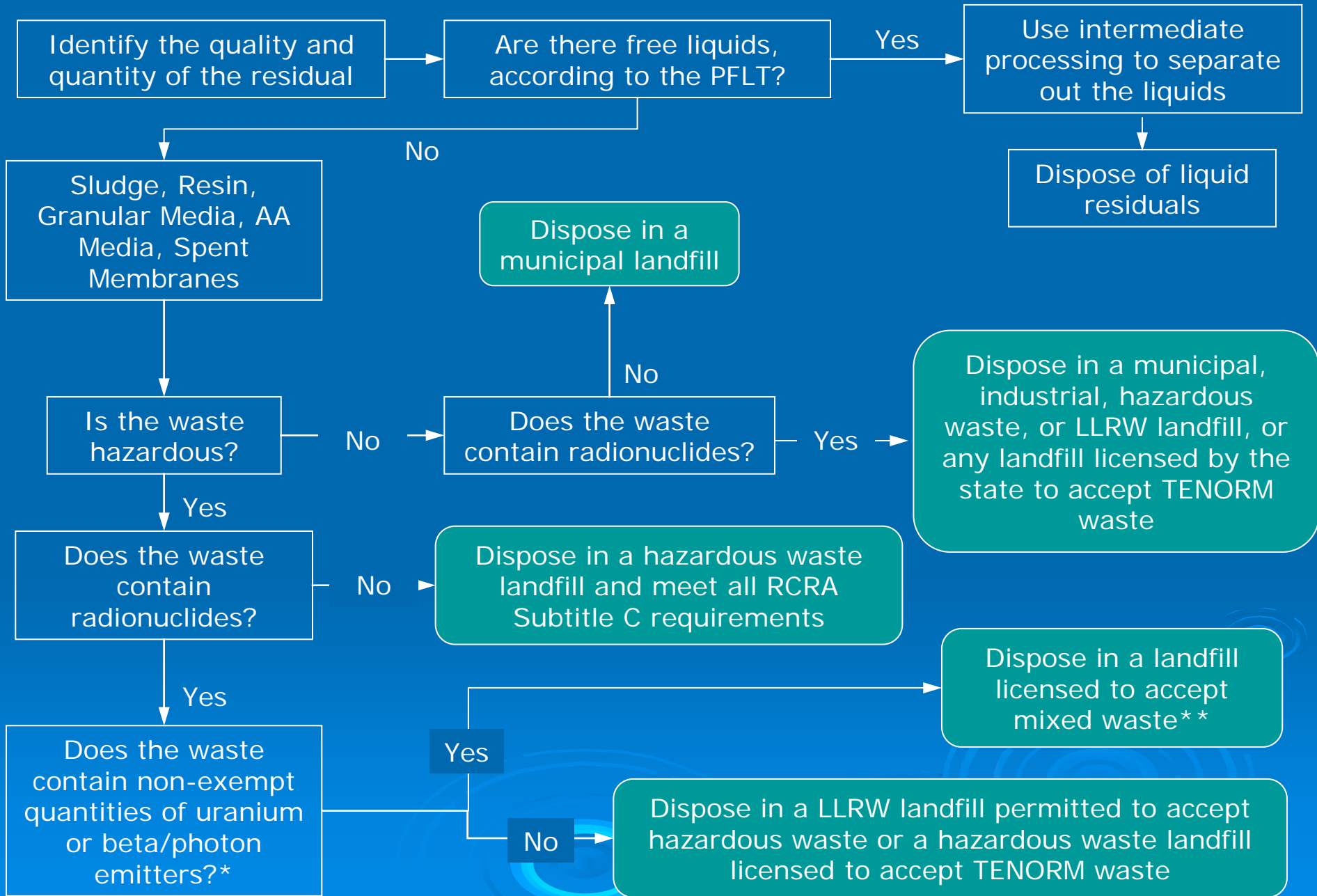
# Solid Residuals – Mixed Waste Facilities

- EnergySystems – Clive, Utah
- Perma-Fix Environmental Services
  - East Tennessee M&EC
- NSSI





# Solids Residual Disposal





# Transporting Waste

- DOT radioactivity limits may apply
- Transporting hazardous waste
  - May require EPA ID number
  - Uniform Hazardous Waste Manifest
- Costs can be significant



# Waste Brokers & Transporters

- Private firms that may
  - Remove residuals from on-site
  - Process residuals as necessary
  - Transport residuals to disposal site
- Treatment vendors may offer similar services



# Alternative Options

- Incineration
- Evaporation ponds
- Surface impoundments
- Sludge dewatering

Intermediate processing methods create additional residual streams

- Land application or soil mixing

Not encouraged unless there is a demonstrated benefit, weighed against potential hazards & risks

Questions?