

Produced Water Processing for Reducing ▸ Disposal Volumes

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Rio Resources Proprietary Process



License- Rio Resources Proprietary Oil and Gas
and Industrial Centralized Waste Treatment
Technology

Rio Ultra Technologies, Inc.

Wholly-Owned Subsidiary Working in Concert
with Hunt, Guillot & Associates, LLC

Rio Ultra Objectives

Opportunity for Conservation of Resources

- Repurpose produced water to stream and irrigation standards meeting Texas and EPA standards.
 - Target Grades 1 and 2 irrigation water standards as outlined by Irrigation Water Quality Standards and Salinity Management Strategies
- Repurpose produced water for use as high-quality fracturing water
- Repurpose solids for land application.
- Repurpose Industrial Wastewater
- Competitive cost to SWD



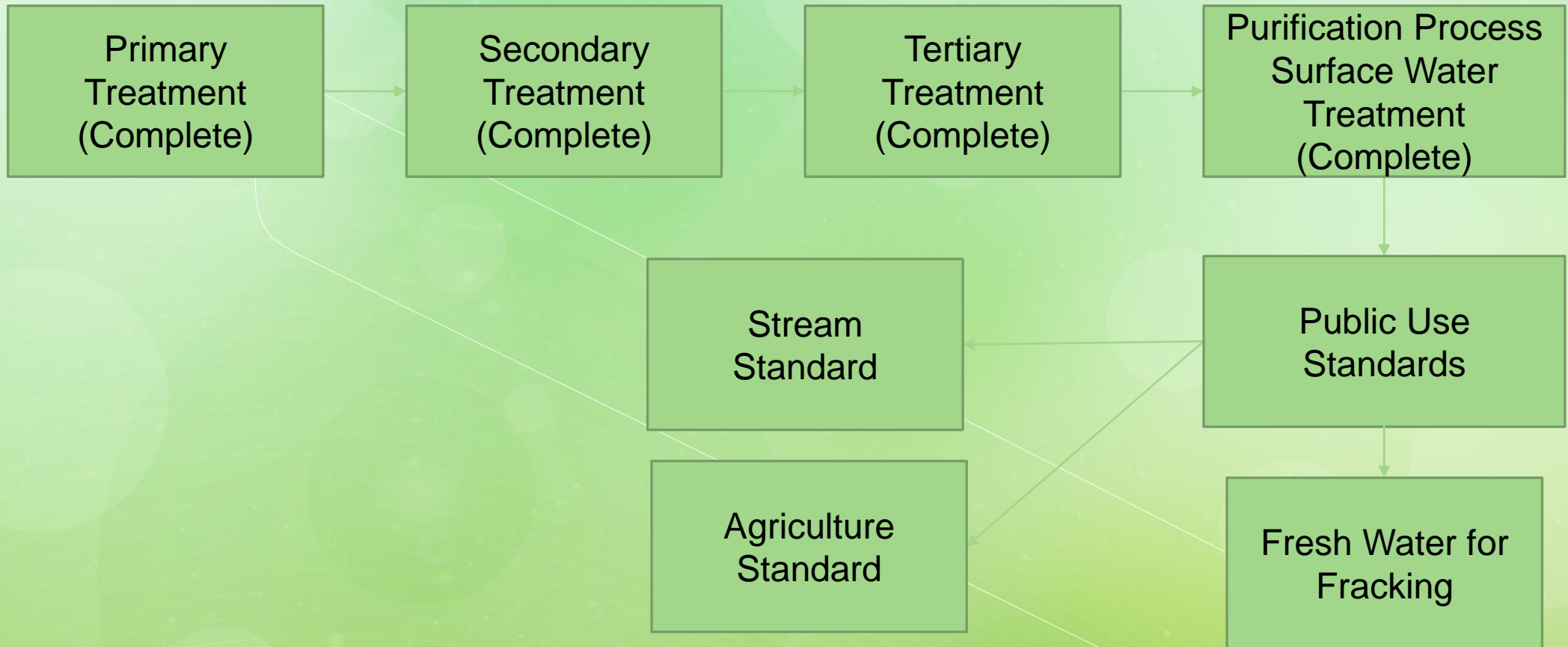
Process Technology

Technology Advantages

- **Recycle** Oil Field Waste to Surface Reuse
- Reduce Energy Requirement and Costs
- **Green Engineered** Process
- Environmentally Friendly
- Recycle Water for Industrial or Public Use
- Mobile, Modular or Stationary
- Cost Effective



Produced Water Process



Proprietary Microbiome

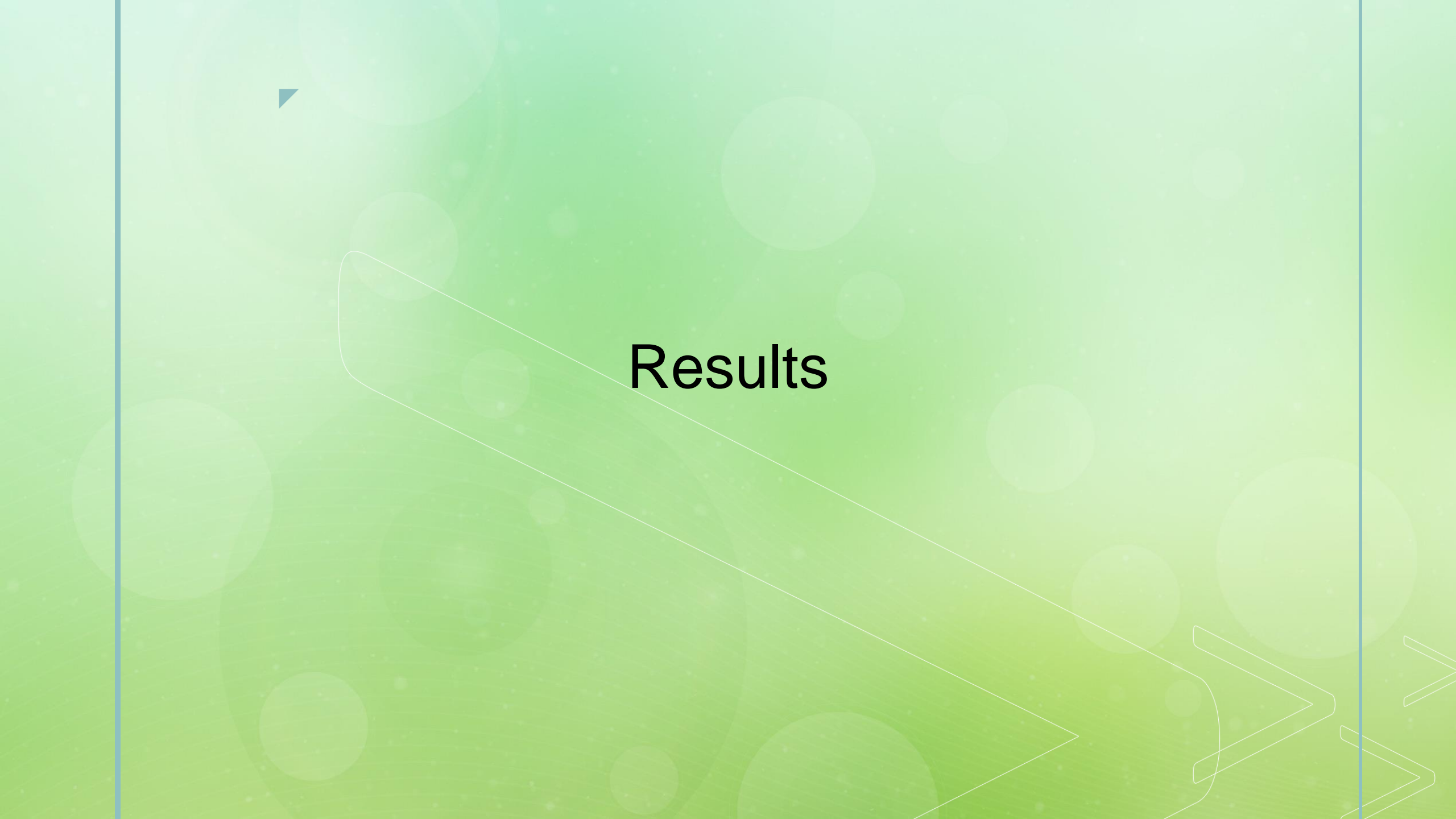
(US Patent 11,001,518)

Metagenomic Evaluation-16s rDNA sequencing

- 2.41E+8 cells/ml based on DNA yield
- Classes Identified: 8
- Species Identified: 214

Primary Physiological, Metabolic and Traits of Interest identified

- Aerobes
- Anaerobes
- Biofilm
- Fermentation
- NRB
- Sulfidogen
- SRB



Results

Produced Water Primary and Secondary Treatment

Parameter	Received Produced Water	Received Produced Water Variance (%)	Primary & Secondary Processed	Primary & Secondary Processed Variance (%)	Stream Water Standards
Arsenic (mg/L)	0.11	5.77	0.0182	-82.5	0.104
Barium (mg/L)	4.41	121	0.451	-77.5	2.0
Cadmium (mg/L)	<0.004	-	<0.002	-	0.0102
Calcium (mg/L)	2850	-	387	-	-
Chromium (mg/L)	0.00896	-97.2	<0.004	-	0.323
Lead (mg/L)	<0.02	-	<0.01	-	0.16
Magnesium (mg/L)	434	-	98.4	-	-
Potassium (mg/L)	557	-	87.8	-	-
Sodium (mg/L)	46800	-	6310	-	-
Selenium (mg/L)	0.633	-	0.0173	-	-
Silver (mg/L)	<0.004	-	<0.002	-	0.0351
Chloride (mg/L)	76400	-	10600	-	-
Fluoride (mg/L)	47.5	4650	<10.0	-	1
Sulfate	305	-	571	-	-
Mercury (mg/L)	<0.001	-	<0.0002	-	0.000739
Toluene	1.26	-	0.554	-	-
Total Suspended Solids (mg/L)	2490	8037	60.5	97.7	30.6
BOD (mg/L)	467	781	15.2	-71.3	53
Specific Conductance (umhos/cm)	174000	-	32000	-	-
Sulfide, total	None Detected	-	None Detected	-	-

*All organic parameters were below detection limits in the Processed Brine Water Sample except Toluene as reported above

Parameter	Received Water	Post RO
Bromide (mg/L)	202	Below Detection Limits
Calcium (mg/L)	414	0.64
Magnesium (mg/L)	52.7	Below Detection Limits
Potassium (mg/L)	174	0.9
Sodium (mg/L)	13800	20.7
Chloride (mg/L)	19700	23.6
Sulfate (mg/L)	342	0.544
Nitrate as N (mg/L)	Below Detection Limits	0.133
Nitrite as N (mg/L)	Below Detection Limits	Below Detection Limits
Total Dissolved Solids (mg/L)	39000	68.5

***All organic parameters were below detection limits in Processed Water Samples reported above**

Summary

- Defined Green Engineered Process for Repurposing Produced Water to EPA Land and Stream Standards
- 10,000 BPD Train System Allowing for Straight-forward Expansion
- US Patent Protected with Continuation and PCT Patents Pending
- Limited Containment Needed
- Process Technology Useful for Repurposing Industrial Wastewater
- Process Technology Provides Significant Advantages Over Current Methodologies

Questions



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