

Clean Filtration Technologies, Inc.



Cleaning The Future™

Title 22

Water Reuse & Recycling

With CFT Turboclone™ Technology

Bear Valley History

- Regional Water Control Board issued Bear Valley NPDES permit No. CA0085146
 - Compliance required by May 22, 2010
 - Tertiary Treatment plant is required to meet the NPDES permit

Constituents	Units	Monthly Average	Weekly Average	7-Day Maximum	Daily Maximum	Daily Average
BOD ¹	mg/L	10	15	—	20	—
TSS	mg/L	10	15	—	20	—
Settleable Solids	ml/l	0.1	—	—	0.2	—
Total Coliform	MPN/100ml	—	—	2.2	23	—
Turbidity	NTU's	—	—	—	5	2

- Bear Valley board desires Title 22 unrestricted recycle reuse compliance

California Title 22 Waste Water Recycle Standards and Testing Requirements

Constituents	Units	Monthly Average	Weekly Average	7-Day Max	Daily Max	Daily Average
Turbidity	NTU				.5*	.2*
Total Coliform	MPN/100ml	23per/100ml	--	2.2	23	Not to exceed 240per 100ml

- Notes:
 - Turbidity (NTU) and Total Coliform are the only two tests required be the CDPHS for Title 22 unrestricted recycle reuse
 - CDPHS requires continuous NTU testing and monitoring
 - Total Coliform is tested daily and compiled into a weekly report
 - *Hollow fiber technology is held to a higher NTU standard of 0.2 because of its absolute filtration capability
 - Title 22 accepted ultra violet light disinfection is the final chemical free bacteria barrier

Bear Valley History

- Eco:Logic delivers preliminary design proposal
 - \$10+ million
 - Eco:Logic design
 - DAF for pre-filtration
 - UF system
 - UV disinfection
 - N*2
- CFT was contracted to deliver an alternative preliminary design proposal
 - \$2.6 million
 - CFT design (skid mounted, designed, engineered and built off-site in modular steel buildings)
 - Turboclone pre-filters
 - UF system
 - UV disinfection
 - Title 22 N+1
 - Proposed pilot program to validate CFT approach and design
 - \$225,000: Pilot cost to Bear Valley
 - Board approved May 2008, Pilot on line August 2008

Location: Bear Valley

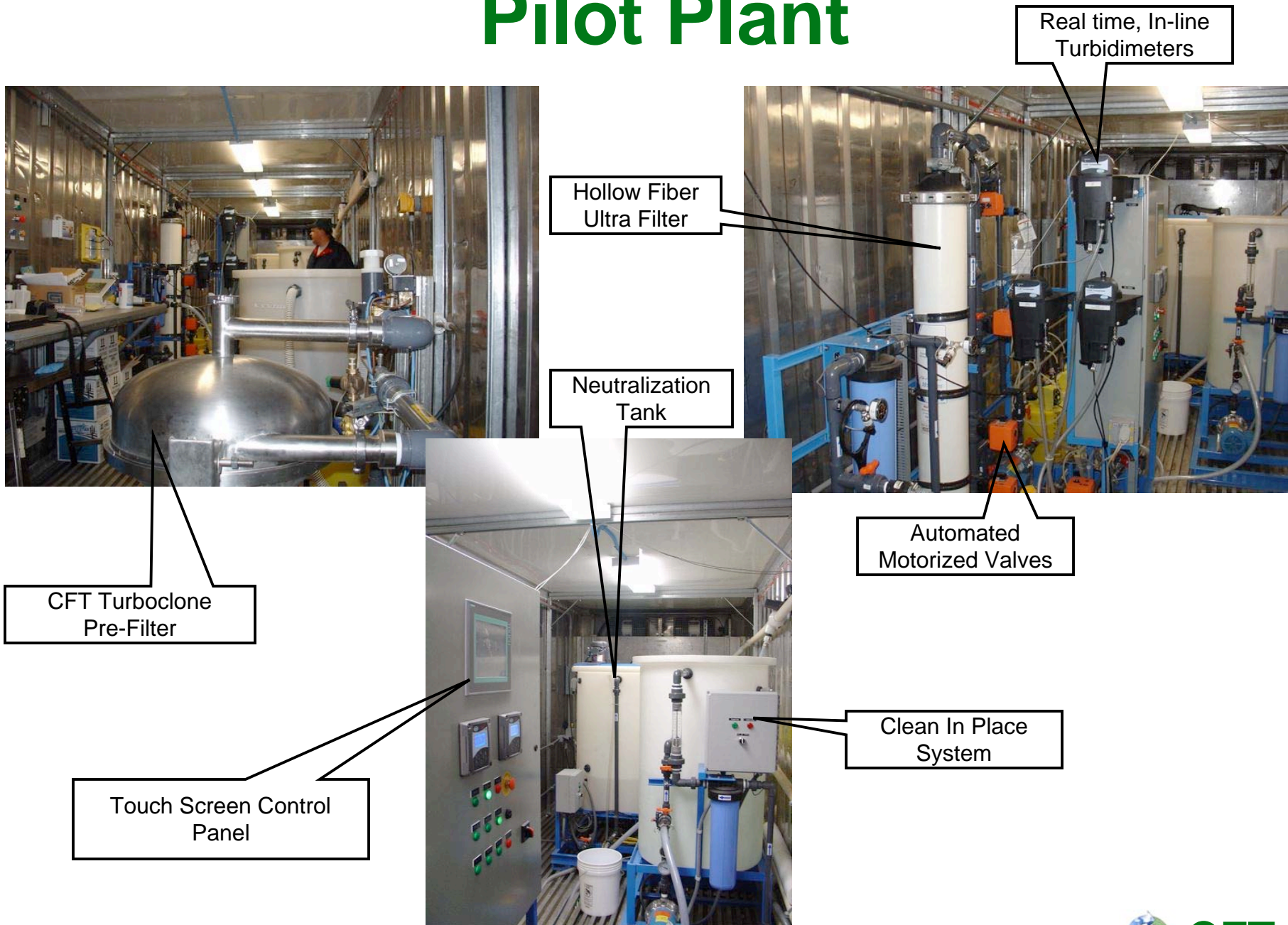


Exterior: Insulated Container
(Fall)



Exterior: Insulated Container
(Winter)

Pilot Plant



Pilot Plant: High Level Description

- 3 stage filtration train
 - 20 micron pre-filtration ⇒ .03 micron ultra filtration ⇒ UV light disinfection
- Influent
 - Aerated secondary wastewater
- Effluent
 - 30,000 – 60,000 GPD
 - Title 22 recycled water
- Main Equipment
 - California Title 22 certified filtration and disinfection equipment
 - Siemens Touch Screen Control System
- Building
 - Custom 40' mobile steel container
- Power
 - 460/480 volts, 40 amps
 - 110 volts, 20 amp (2x)

Pilot Plant Detailed Description

- Pre-filtration
 - 20 micron Turboclone
 - Automated back flush and cleaning cycles (as needed)
 - Automated end-of-day shutdown sequence
 - Variable speed programmable “smart” pump
 - Data acquisition and storage, with alarms
 - Pressure differential across filtration membrane
 - Flow rates
 - Real time in-line turbidity meters
 - Raw water influent
 - Effluent (from Turboclone)
- UF Filtration System
 - Dow Water Solutions 0.03 micron hollow fiber
 - Fully automated and programmable touch screen control and operation
 - Fully automated and programmable backwash cleaning cycles
 - Automated chemical injection pumps
 - Data acquisition and storage with alarms
 - Influent temperature, flow rates, turbidity, pH, effluent GPM, influent and effluent turbidity
 - Programmable variable speed “smart” pumps
 - 10 gpm - 25 gpm per filtration module
 - Can support up to 3 modules

Pilot Plant Detailed Description

- Control System
 - PLC integrated with Siemens Touch Screen
 - User programmable via engineering screens
 - Manual override function
 - Symbol touch screen control of all valves and pumps
- Data Acquisition
 - Data stored on SD card can be viewed using Microsoft Excel
 - Data stored on SD card can be viewed on Touch Screen Control Panel in Data Logging screens
 - Includes: GPM (raw water influent, Turboclone effluent, Turboclone return stream, UF effluent), pH (raw water, UF effluent, neutralization discharge stream), turbidity (raw water, Turboclone effluent, UF effluent), water temperature, membrane pressures (influent and effluent)
- Neutralization System
 - Hollow fiber cleaning cycles empty into neutralization tank
 - Automated pH balancing chemical injection pumps
 - Automated mixing and return to secondary treatment pond
- Clean In Place skid mounted system
 - Independent pump and controls
 - Operator initiated monthly

Control Systems

System Status Messages are displayed.

MAIN P&ID STATUS SCREEN

Displays all system operating parameters, normally operating mode or backwash sequence status, backwash alarm conditions.

Manual Control allows operators to start and stop pumps and open and close valves by touching the icon on the screen.

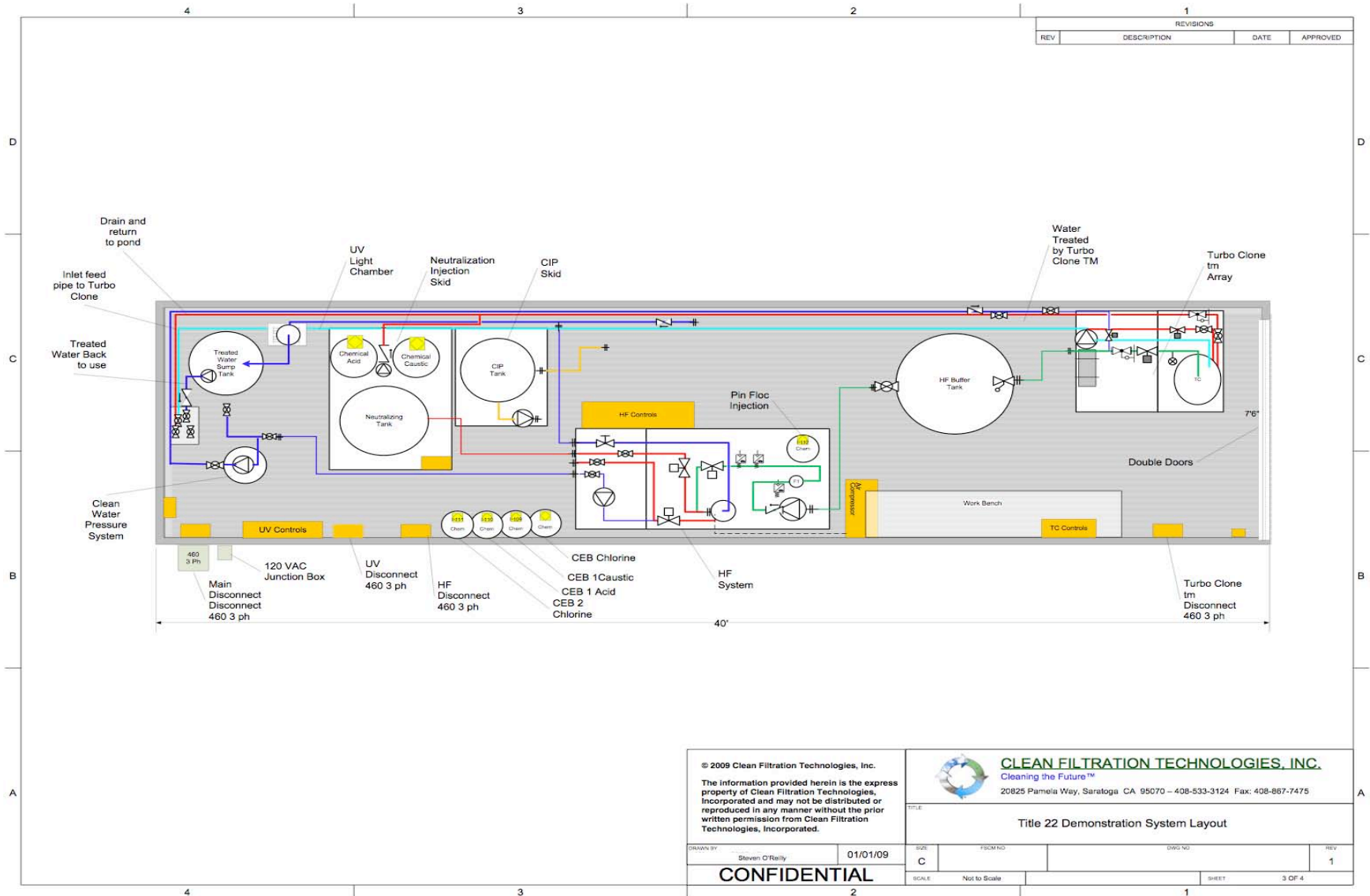
From the Main P&ID screen, operators can access the Turbolclone

From the Main P&ID screen, operators can access the Data Logging Screen.

From the Main P&ID screen, operators can access the Engineering Screen.

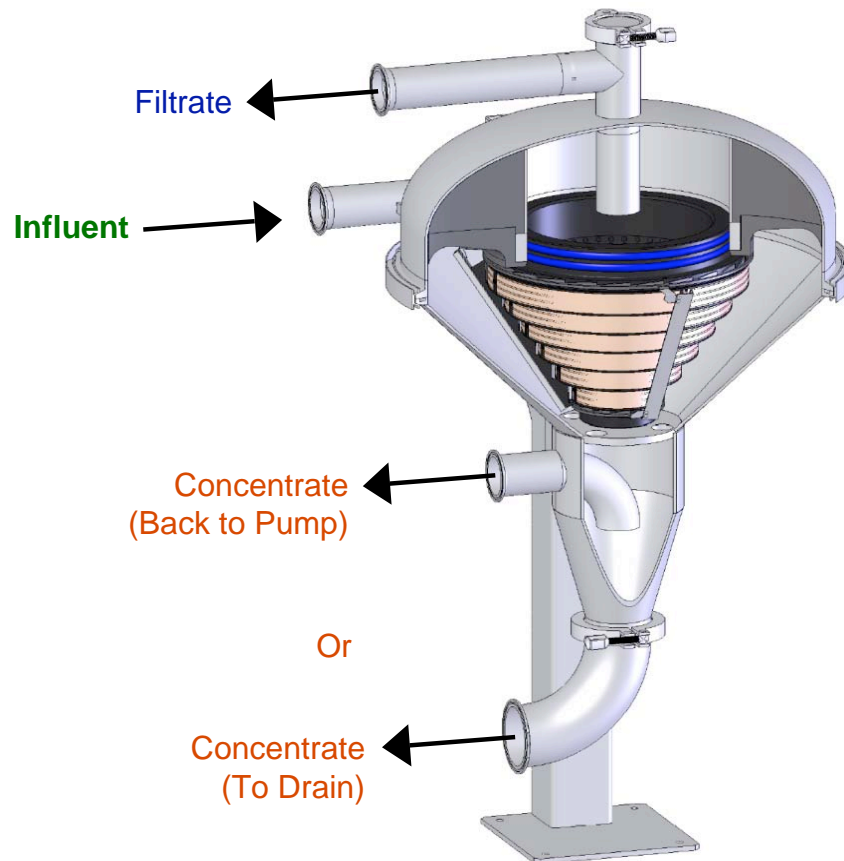
Automatic Start and Stop Sequences have been preprogrammed for operators to simply press this button to start operation in the morning. In the evening, the system is shut down by pressing the shutdown button. At shutdown the system will perform a final backwash sequence and chemically preserve the system during non-operation.

Pilot Layout Drawing



Turboclone™ Overview

The Turboclone™ is a symbiotic hybrid of a **Hydroclone** and a **Crossflow Filter**



- Can lower turbidity by up to 93%
- Extends life of membrane filtration equipment
 - 20 micron versus 200 micron
- Lowers capital cost of membrane filtration systems
- Lowers O&M cost of membrane filtration systems
- **Self Cleaning System** – Proprietary metal membrane integrated with a water-driven cleaning assembly prevents fouling
- **High Water Recovery** - Concentrate can be recirculated through the housing to achieve high water recovery rates
 - Up to 99.8% water recovery demonstrated with 10 NTU water

Average NTU Measurements (23 day Period) Pilot System - Bear Valley

<u>Date</u>	NTU		
	Raw/Source	Turboclone Filtrate	(Dow) UF Filtrate
9/11	9.47	5.50	0.04
9/12	7.20	5.02	0.04
9/13	6.33	5.20	0.04
9/14	6.70	5.09	0.05
9/15	8.26	4.77	0.05
9/16	6.13	5.02	0.04
9/17	5.39	4.73	0.04
9/18	9.24	4.55	0.06
9/19	6.17	4.75	0.04
9/20	6.55	4.96	0.04
9/21	6.49	4.34	0.05
9/22	9.69	3.37	0.05
9/23	6.09	3.95	0.04
9/24	7.54	3.32	0.04
9/25	5.75	3.78	0.05
9/26	5.47	3.96	0.04
9/27	5.28	4.61	0.04
9/28	7.74	4.18	0.06
9/29	6.66	4.20	0.04
9/30	5.52	4.49	0.05
10/1	10.90	3.43	0.05
10/2	8.55	4.70	0.04
10/3	14.00	3.90	0.06
Average	7.44	4.43	0.05

Advantages To The CFT Approach

- Turboclone pre-filtration
 - 20 micron
 - Improves flux (flow rates) through the ultra-filtration system lowering the cost of a ultra-filtration system
 - Lowers O&M costs of a ultra-filtration system
- Ultra-filtration
 - Dow Water Solutions Hollow Fiber
 - Outside-In filtration delivers tested and proven superior flux and recovery rates in wastewater applications
 - Tested and proven using the CFT Turboclone as the pre-filter at the Bear Valley waste water treatment plant
- Pilot Plant
 - Scaled down version of a larger Title 22 equipment approved Waste Water Tertiary Treatment Plant
- Modular and Skidded Design
 - Complete Waste Water Treatment Plant is designed and wet tested off-site
 - Metal modular building pre-engineered off-site
 - Treatment plant is integrated within pre-engineered building
 - Delivered to the site for final electrical and plumbing connections
 - Turn on and commissioning completed within 60 days
- Pilot Plant design is scalable to 2+ million GPD

Requirements To Use The Water From The CFT Pilot Plant Under California Title 22 Recycled Water for Reuse

- High Level Description of Process*
 - SRT would submit a system description for approval to the CDPH
 - Pilot plant must meet all preventive maintenance, operating, recording, reporting and reliability features required by Title 22
 - Upon approval from the CDPH, SRT would then prepare an Engineering Report to be submitted to the Regional Water Board to obtain a reuse permit
 - The permit would allow SAM to use the reuse water or discharge to the existing ocean outfall

*Based on CFT's discussion with the Jeff Stone at the CDPH. Engineering firms such as SRT would drive, execute, and manage this process.

CFT Project Approach

- **One – Water Analysis**
 - Review most current water test results
 - CFT Laboratory water analysis
 - Certified water analysis
- **Two - Discovery and Preliminary Design**
 - Project Guidelines
 - Customer requirements and discovery
 - Preliminary design proposal
 - Customer signoff
- **Three - Pilot Testing**
 - Establish pilot test criteria & create test plan
 - Assemble and test CFT Pilot System
 - Conduct pilot
 - Review pilot data results with customer
- **Four - Engineering and Testing**
 - Detailed design
 - Purchasing
 - Manufacturing
 - Integration and assembly
 - Customer coordination and communication
 - Testing
 - Shipping
 - Customer signoff
- **Five - Implementation**
 - Final site preparation
 - Installation
 - Startup/commissioning
 - Training and documentation
 - Final customer signoff

Next Steps

- Engage with CFT for Phase One
 - \$5,000
- CFT to provide proposal to SAM Board for Pilot Plant Project for upcoming Board Meeting