

MCU Startup and Operations Summary



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Waste Management Technical Exchange

Agenda

- **Mission**
- **Process Overview**
- **Test Results**
- **Startup**
- **Processing Results**
- **Issues & Resolution Examples**
- **Summary**

MCU Mission

- **Process dissolved salt solution for disposal**
 - Receive Pu/Sr depleted and clarified waste from ARP
 - Remove Cs-137 ($DF \geq 12$)
 - Transfer to Tank 50H for Saltstone disposal
- **Provide operational experience for SWPF**
 - Equipment reliability
 - Process chemistry
 - Lessons learned

MCU Design Basis

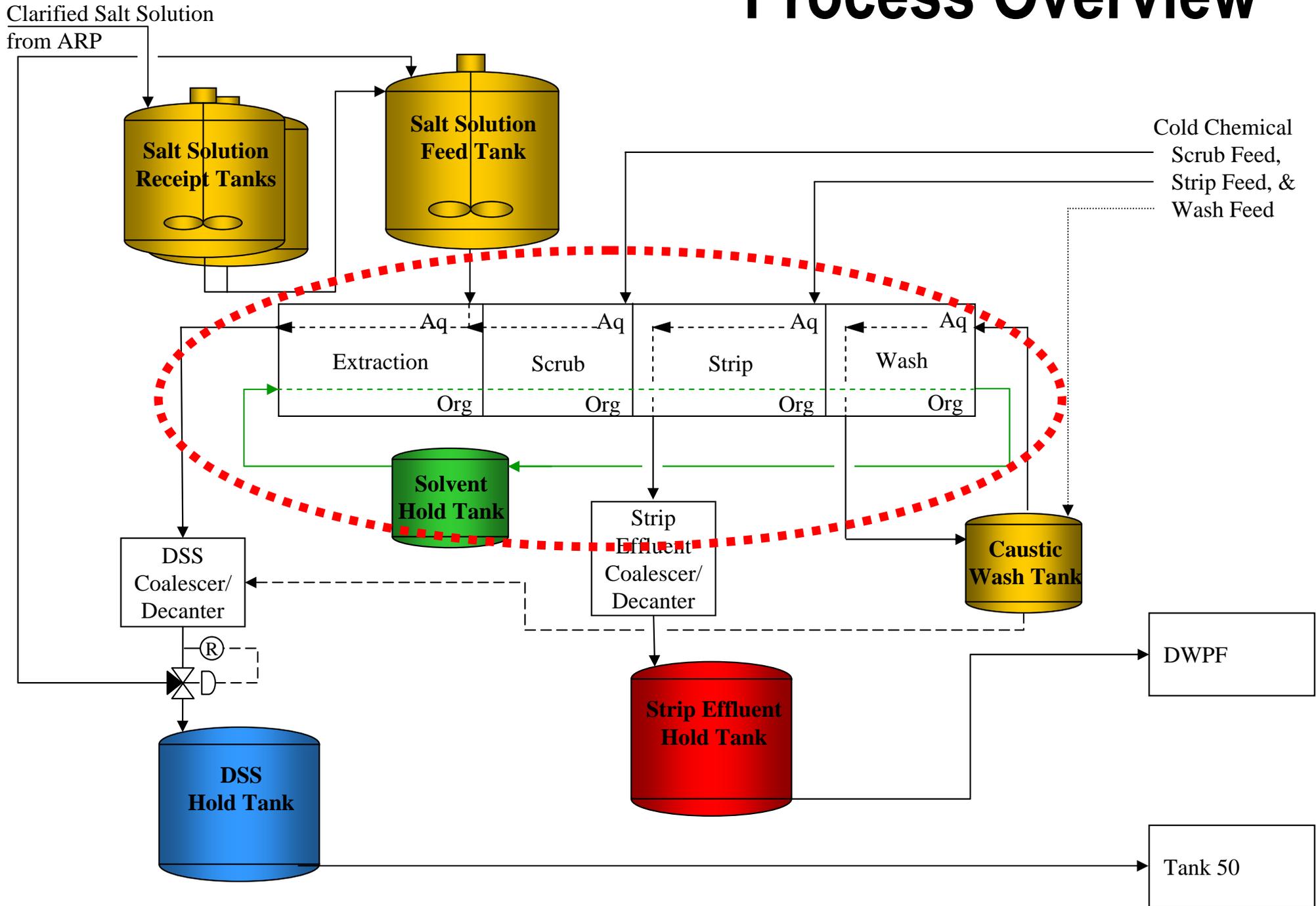
- **Feed**

- ≤ 1.1 Ci/gal
- CSS from 512-S (i.e. filtered)
- 4 gpm nominal

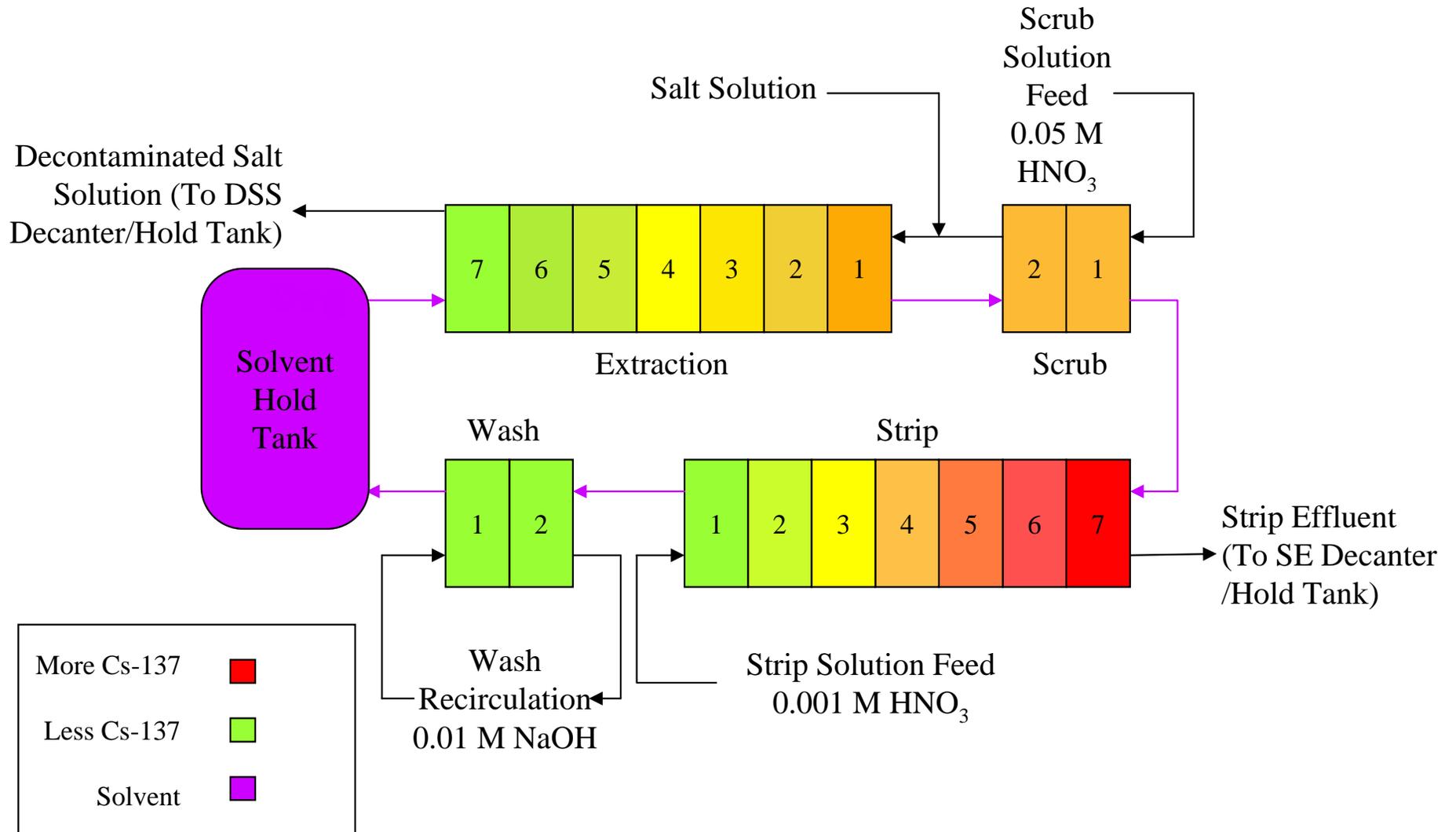
- **CSSX**

- Decontamination Factor (DF) ≥ 12
- Target Concentration Factor (CF) = 12-15
- Organic Carryover ≤ 50 ppm Isopar (≤ 70 ppm solvent)

Process Overview



CSSX Overview



Equipment Testing

- **Individual V-10 & V-05 Testing**
 - Hydraulics, Air Flow
 - Mass Transfer, Solvent Carry Over
- **Integrated Testing**
 - Durability Testing
 - Mass Transfer
 - Solvent Carryover
- **Decanter Testing**
 - Solvent Carryover
 - Solvent Droplet Distribution



Non-Rad Testing Results

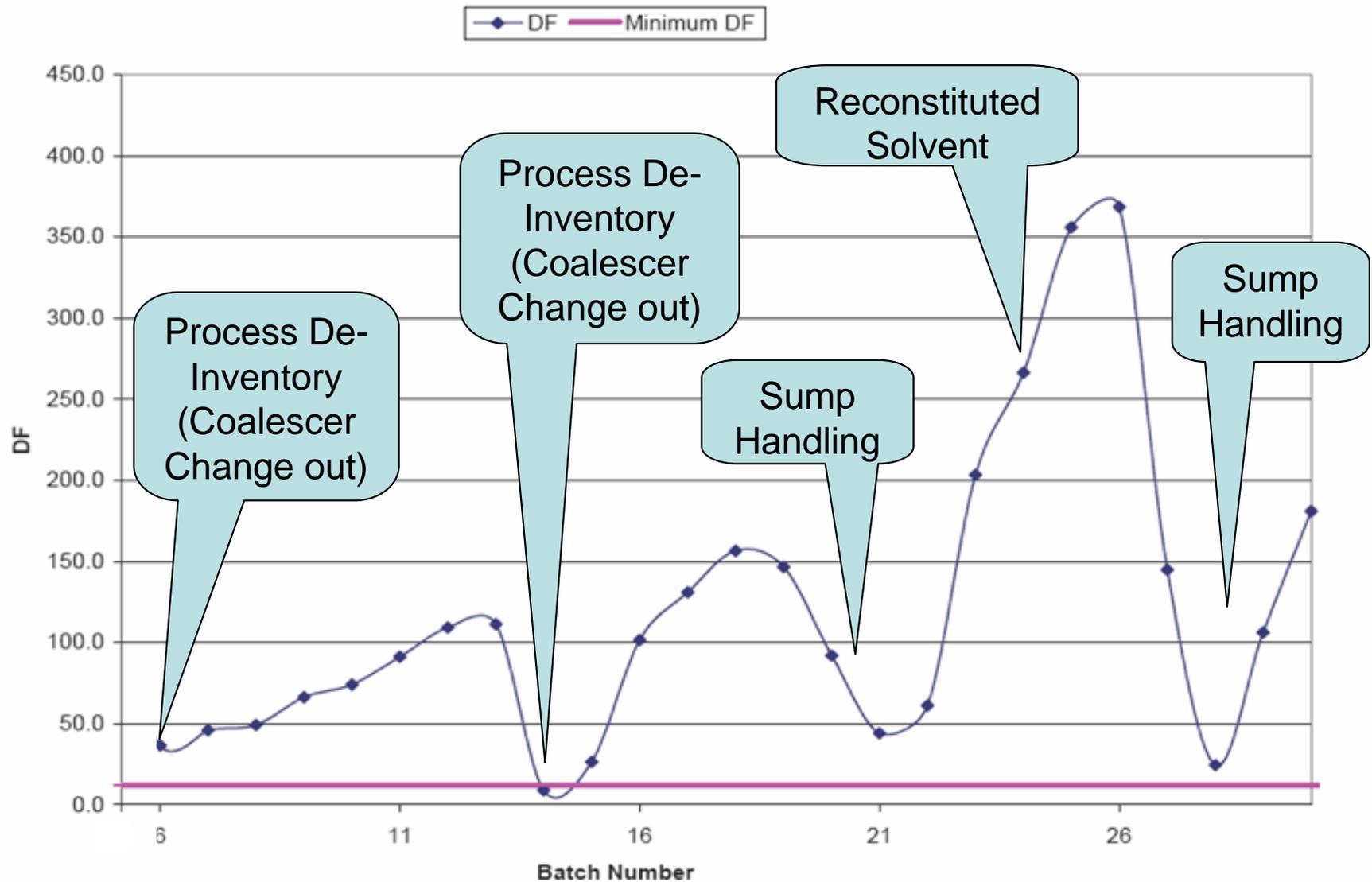
<u>Objective</u>	<u>Target</u>	<u>WII Results</u>	<u>SRS Results</u>
DF	≥ 12	33 – 250	210 – 687
CF	12 – 15	11.2 – 18	11.0 – 13.2
Organic Carryover (from Contactors)	≤ 1000 ppm > 1.5 micron by volume	350 – 1000 ppm Median \approx 5 micron by volume	150 – 750 ppm
Organic Carryover (from decanters)	≤ 50 ppm Isopar	< 10 ppm Isopar*	< 10 ppm Isopar

* Decanter test decoupled from contactor

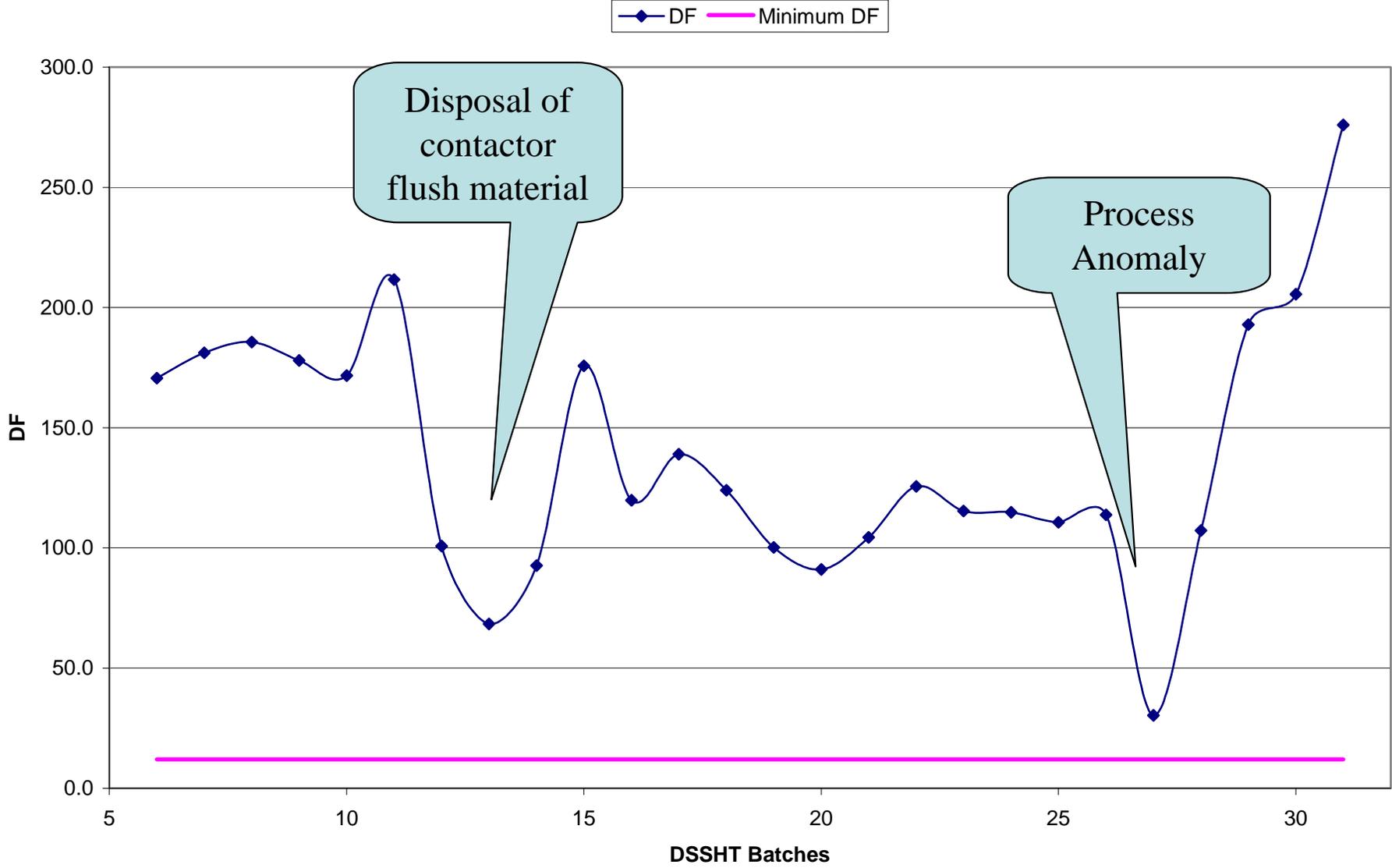
Startup

- **Successfully completed an FSA, MSA, & Contractor ORR.**
- **Completed a DOE ORR with independent SME oversight with only 1 pre-start finding.**
- **Safely operated the process through hundreds of hours of operation**
 - **Meeting or Exceeding Decontamination Factor (DF) and Solvent Carryover Requirements.**
 - **Processed >260 kgal Salt Waste**

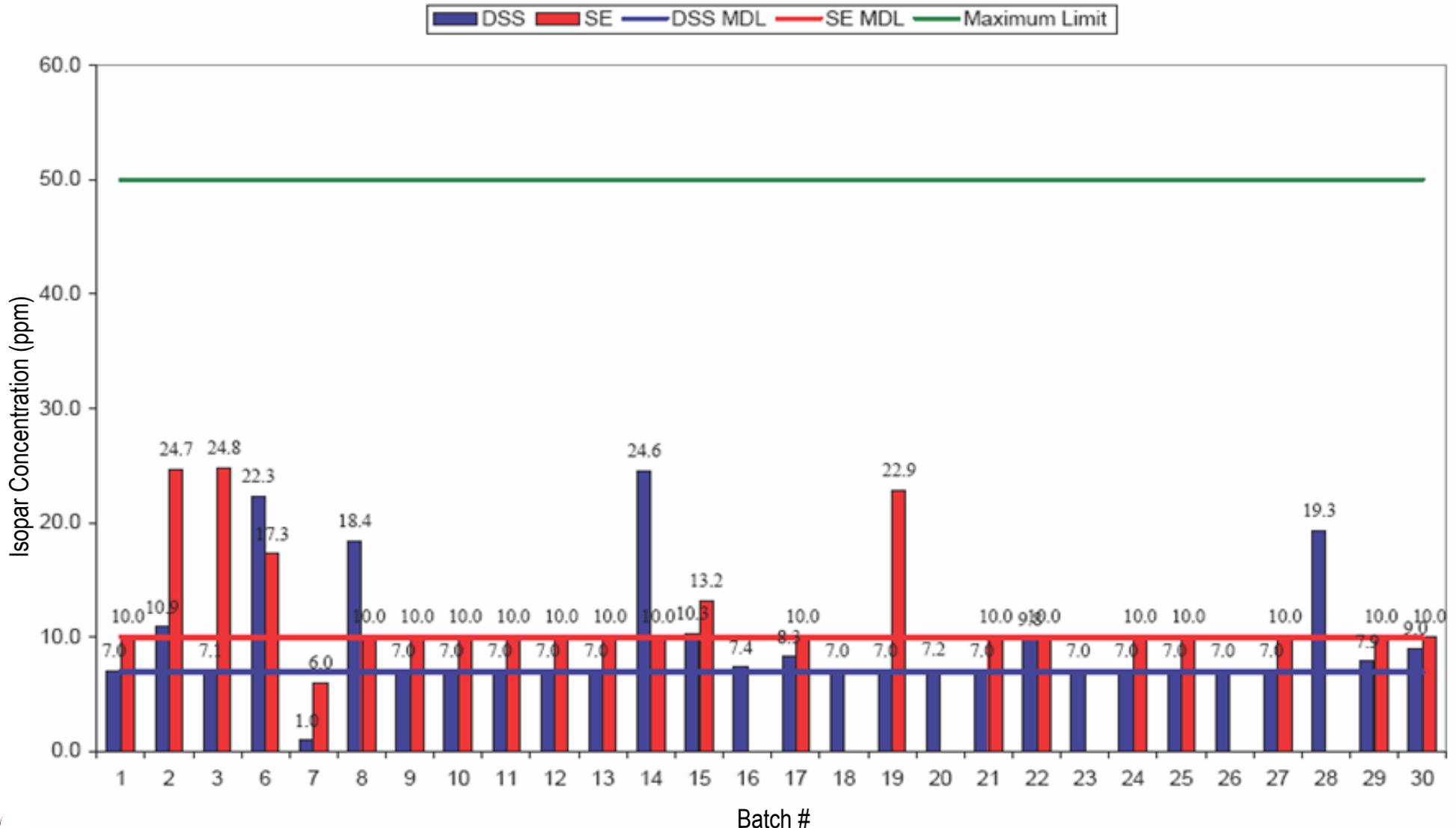
DF Hot Ops Results (Salt Batch 1)



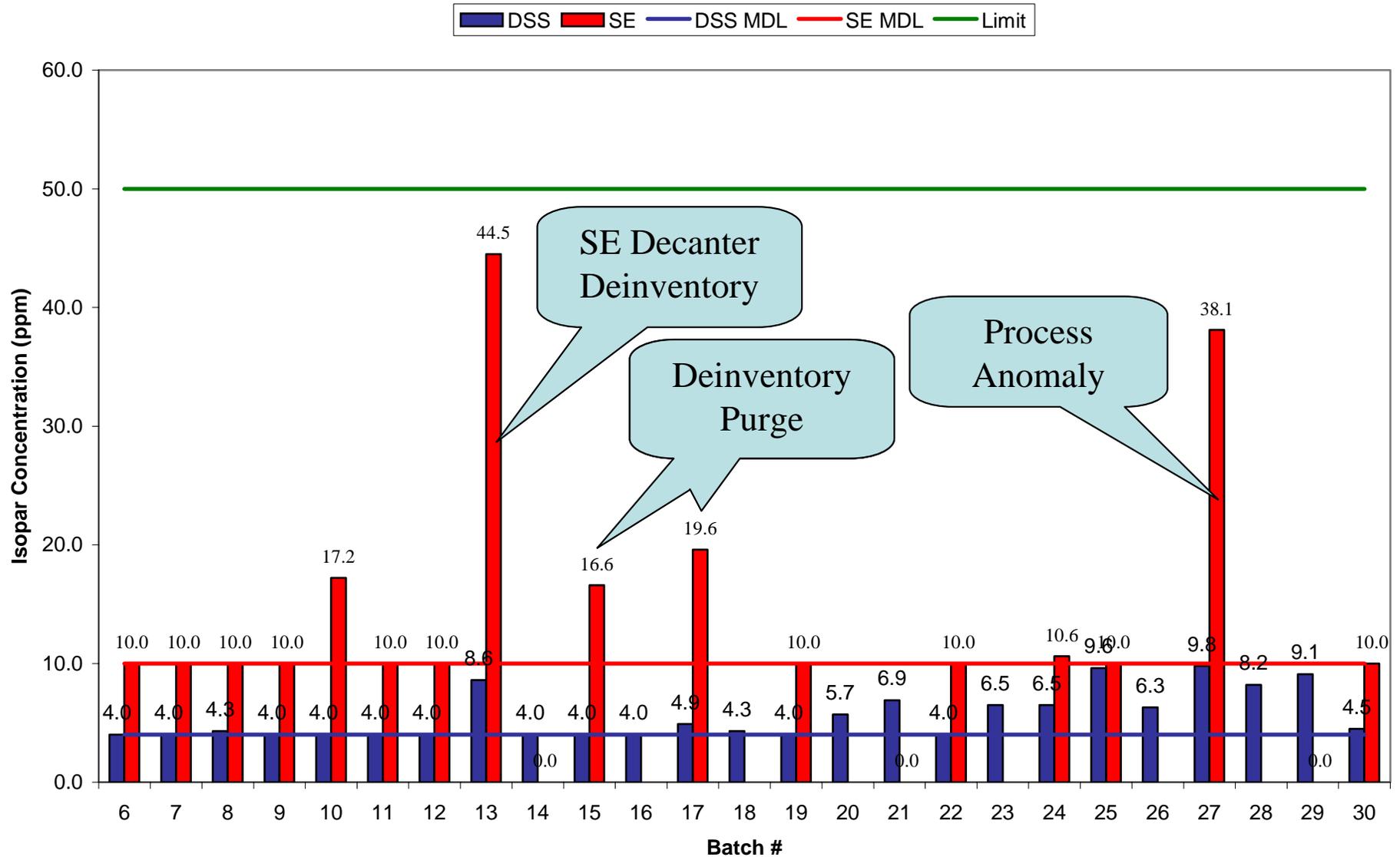
DF Hot Ops Results (Salt Batch 2)



Carryover Results (Salt Batch 1)



Carryover Results (Salt Batch 2)

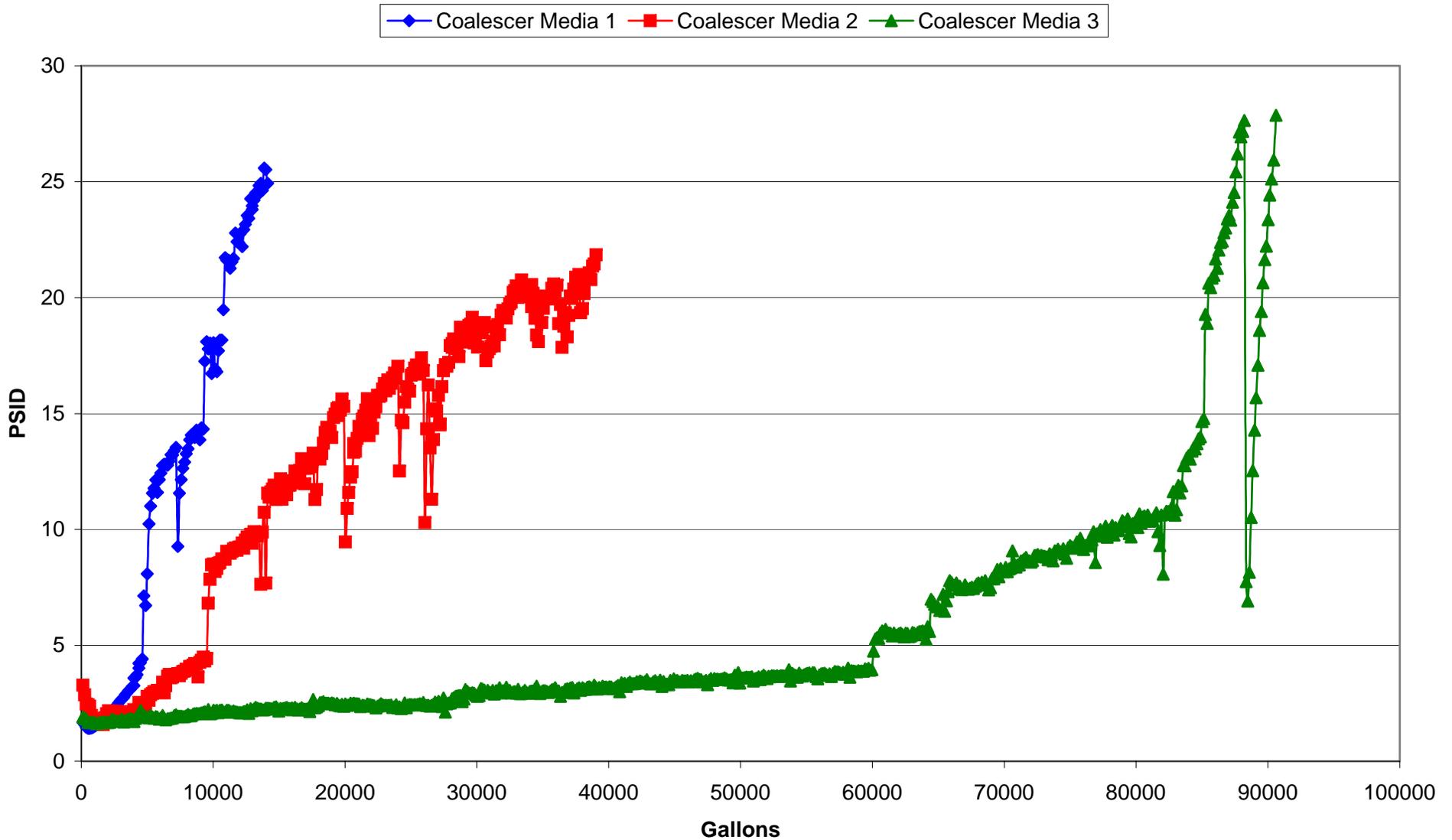


DSS Coalescer Fouling

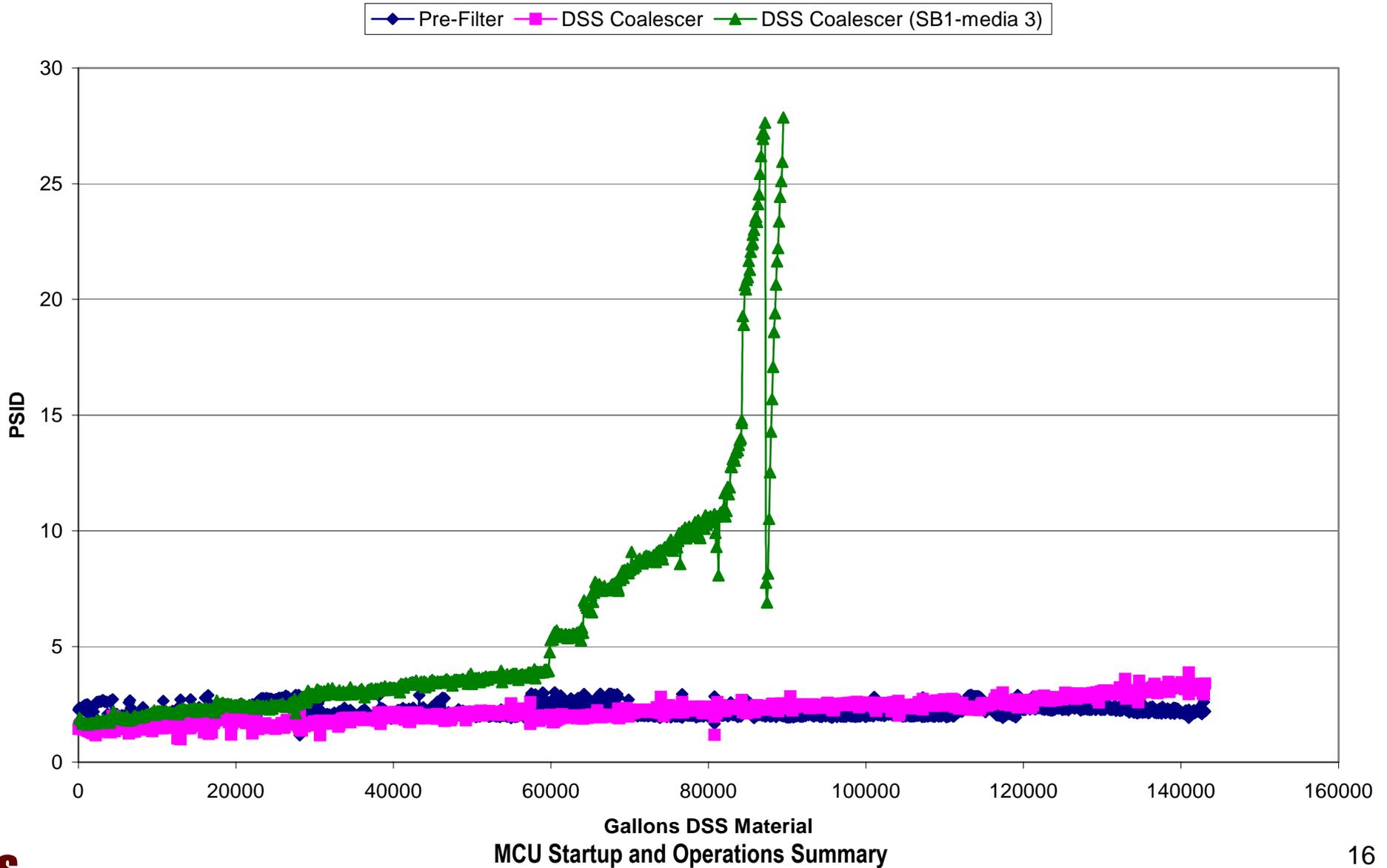
- **Cold Runs**
 - DSS Coalescer fouled due to NAS from simulant
 - Changed simulant recipe
 - Changed vendor Temperature requirements
 - Added Chemical (Nitric Acid) Flush capability
- **Salt Batch 1**
 - Replaced DSS media twice
 - Fouling due to bayerite (aluminum hydroxide)
 - Added removable DSS Pre-filter (33x surface area)
 - Instituted [OH⁻] requirement for future salt batches
- **Salt Batch 2 – No DSS ΔP issues**



DSS Coalescer (SB1)

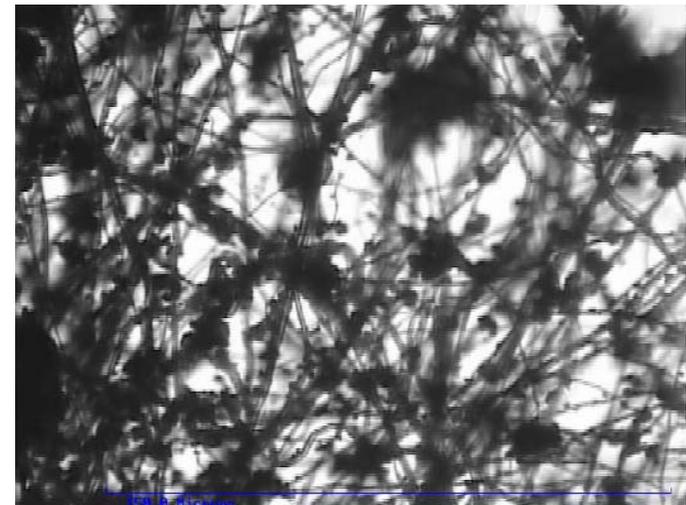
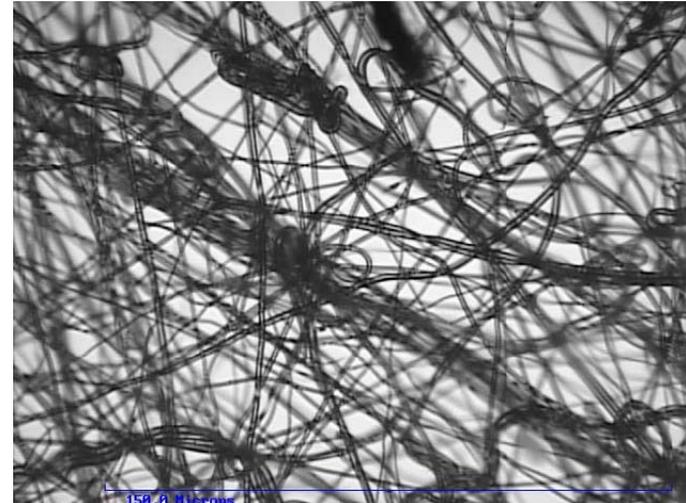


DSS Coalescer (SB2)

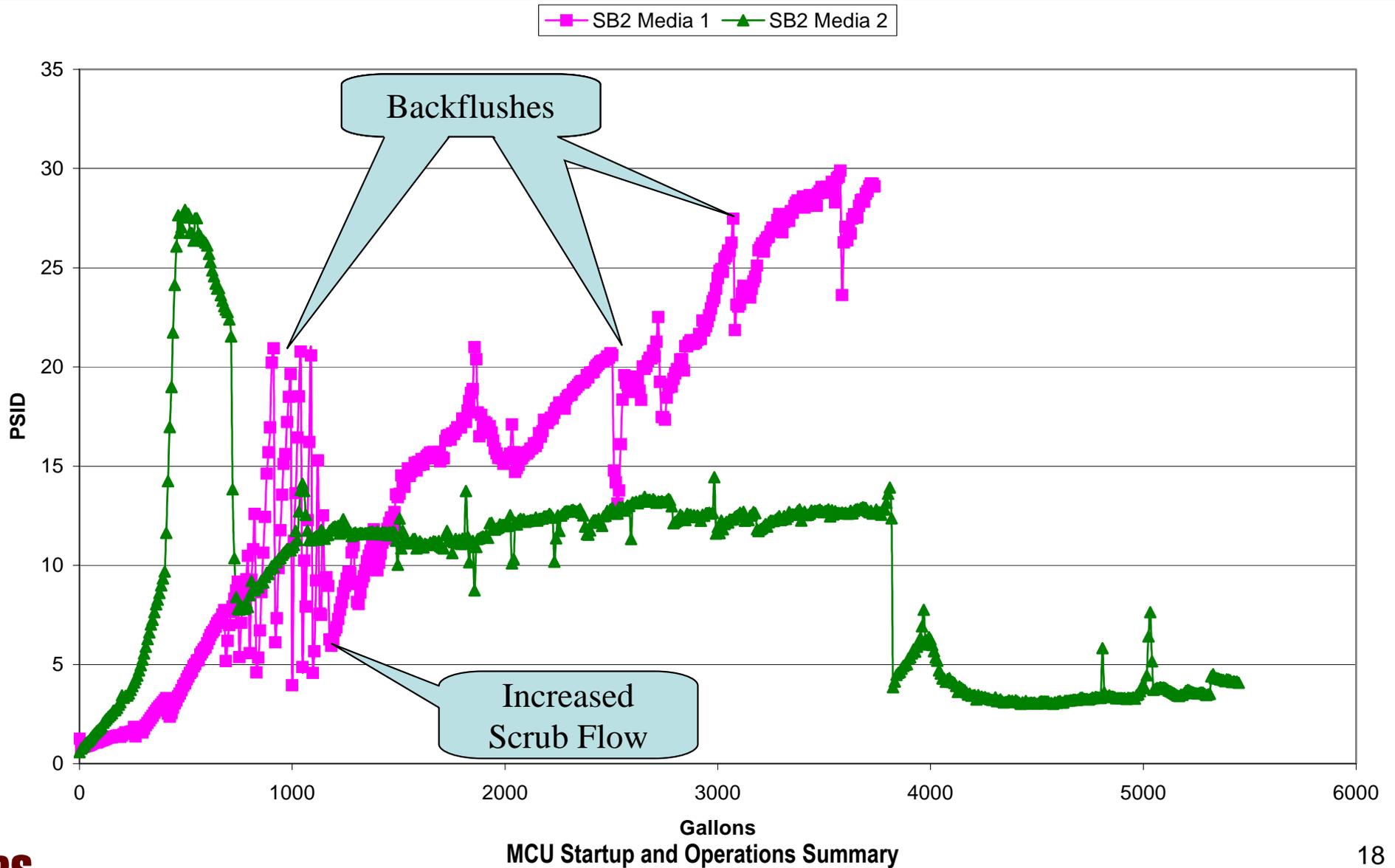


SE Coalescer Fouling

- **Salt Batch 1**
 - dP increased, but corrected during processing
 - No replacement required
- **Salt Batch 2**
 - Replaced media once
 - Increased scrub flow (partially successful)
 - Independent evaluation recommended changes to media pretreatment



SE Coalescer (SB2)



Equipment Challenges

- **Flow Meters**
 - Rheotherm flow meters highly dependant of fluid physical properties
- **Sampler Valves**
 - Modification of reused canyon sample system
- **Pumps**
 - Suppliers may modify manufacturer's equipment
 - Buyer beware (test, test, test...)

Summary

- **Process is exceeding design basis**
 - DF
 - Organic Carryover
- **First-of-a-Kind deployment ⇒ Challenges expected**
 - Simulant testing with actual equipment is critical
 - Expect the unexpected
- **Operating experience proven valuable for SWPF**
- **Production continues to improve as challenges are overcome.**

Questions



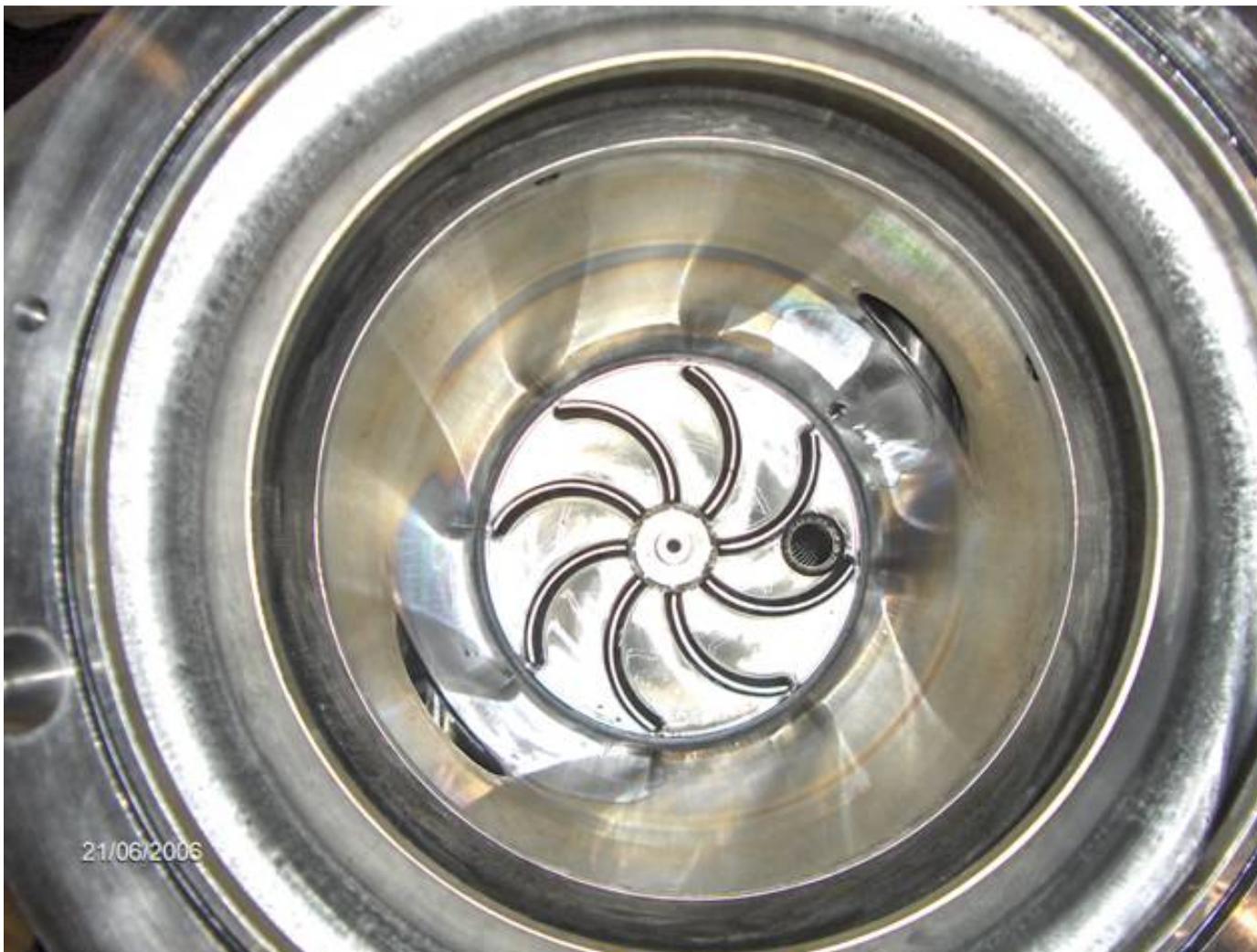
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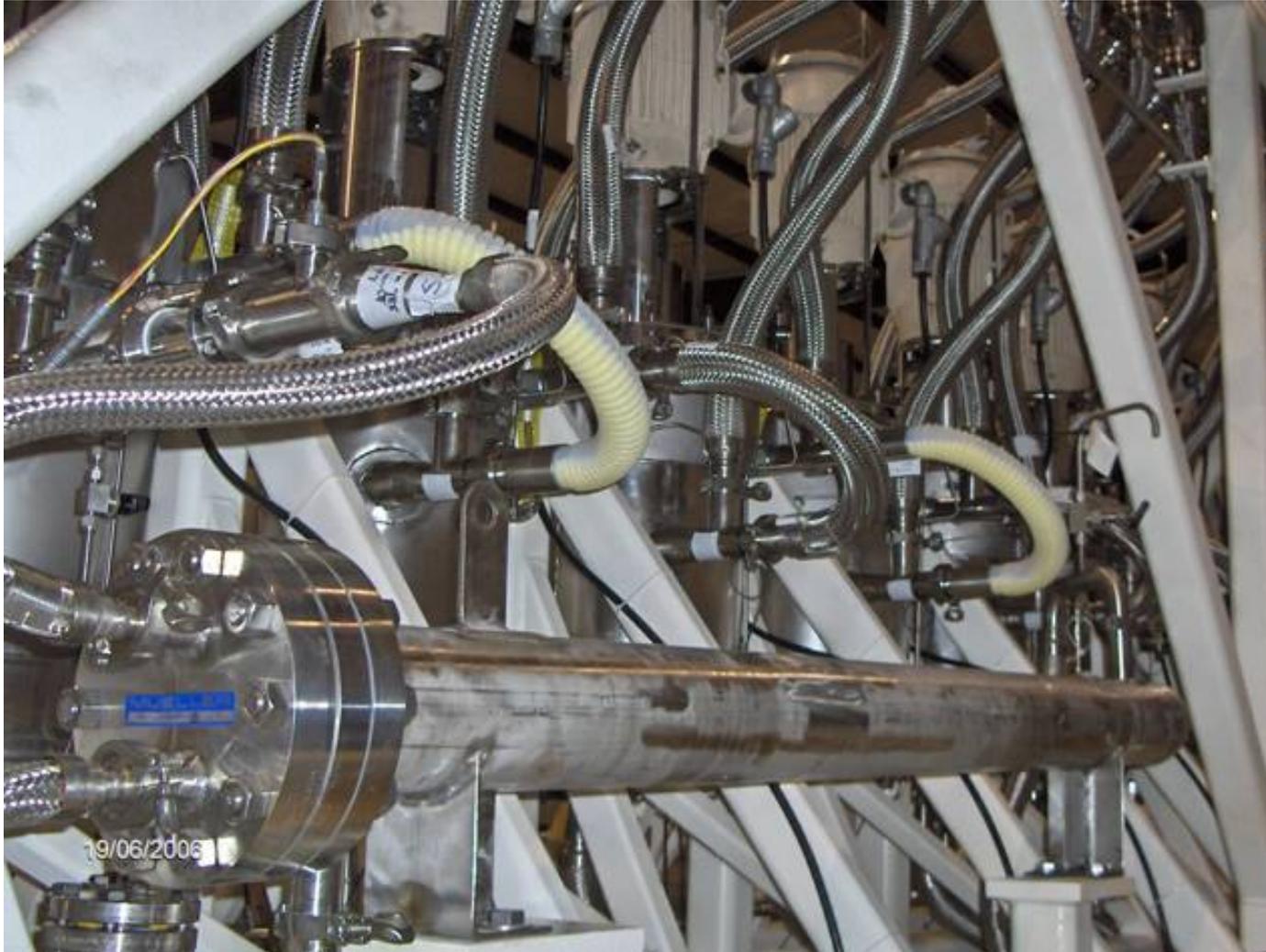
V-10 Bearing Housing



Contactors Skid



Extraction Bank – Organic Side



Modular Tank Arrangement



