LA-UR-19-28208

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Title: Metal Chlorination, Coalescence, and Direct Oxide Reduction Progress
Report: July 2019

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Intended for: Report

Issued: 2019-08-14

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Metal Chlorination, Coalescence, and Direct Oxide Reduction Progress Report

July 2019

David Parkinson

12 July 2019

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Report Overview

- Runs since June last year
 - Metal Chlorination
 - Coalescence
 - Direct Oxide Reduction
- Feed Can Opening

Metal Chlorination (MC)

- Only Molten Salt Extraction has been run. Chlorine system down.
- In December 1 run left under vacuum and oxidized producing much 76% yield and criticality safety issues
- In January and February there was 1 failed run each month from stirrer issues not allowing stirring

Month	Successful Runs	Pu out (kg)	Average Yield (%)
Aug-18	3	11.64	97.5
Nov-18	3	11.41	97.7
Dec-18	3	10.63	90.8
Jan-19	3	12.13	97.4
Feb-19	4	15.24	97.6
Mar-19	2	7.58	95.9
Apr-19	1	3.61	93.0
May-19	1	2.68	98.4
Jun-19	3	10.73	97.4
Totals	23	85.65	96.2 (Avg)

Coalescence (COL)

Month	Successful Runs	Pu out (kg)	Average Yield (%)
Aug-18	2	7.48	92.1
Nov-18	1	3.53	91.5
Feb-19	4	11.24	72.7
Mar-19	2	7.10	89.7
Apr-19	1	2.71	62.8
May-19	1	2.63	73.0
Totals	11	34.68	80.3 (Avg)

Total Feed to Electrorefining (ER) by Month

Month	MC Runs	MC Pu out (kg)	COL Runs	COL Pu out (kg)	Total Runs	Total
Aug-18	3	11.64	2	7.48	5	19.11
Nov-18	3	11.41	1	3.53	4	14.94
Dec-18	3	10.63	0	0	3	10.63
Jan-19	3	12.13	0	0	3	12.13
Feb-19	4	15.24	4	11.24	8	26.48
Mar-19	2	7.58	2	7.10	5	14.67
Apr-19	1	3.61	1	2.71	2	6.32
May-19	1	2.68	1	2.63	2	5.31
Jun-19	3	10.73	0	0	3	10.73
Totals	23	85.65	11	34.68	34	120.33

Direct Oxide Reduction (DOR) Progress

- Refilled scrubber with NaOH
- Removed quartz cell for UV-Vis Spectrometer on north box
- Ordered replacement quartz cells
- Began heating salt for multicycle run in south box, sparged with chlorine to dry the salt
- Saw haze building up in north box and flowing throughout the line while waiting for Radiological Control Technicians
- Paused work, turned off the chlorine system, shut down the run
- Suspected chlorine leak through mass flow controller
- Revised MC and DOR procedures to use internal ball valves instead of mass flow controllers as isolation valves

Pictures of Equipment/Gloveboxes After Haze Event

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Opening Metal Feed from Rocky Flats

- Wrote new procedure to operate the Severmaster Can Opener
- Three 3013 cans have been opened
- Three engineers and one operator are trained to use the procedure
- Container board studying the container degradation
- SAFE-NMCA approved plan for processing:
 - Measure items with cal/iso before introducing them into the glovebox line
 - Cut one open at a time and split off any oxide
 - Run the contents of each 3013 through Metal Chlorination as its own batch

Pictures of Severmaster Can Opening

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Future Plans

- Continue to receive metal from Savannah River/Rocky Flats and cut open cans to feed MC
- Separation factor studies on MC
- Calibrate the chlorine detection system with calibration gas generator
 - Allow for chlorine gas MC and multicycle DOR (MCDOR) runs
- In-line neutron counter for final NDA measurements
- Upgrade furnace controllers
- Continue to increase production:
 - Averaging 2.8 runs per month to feed ER over the past 12 months (with MC and COL combined)
 - FY20 pace planned for about 7 runs per month (2 per week for 40 production weeks).

Questions?