Rocky Flats Process Experience

Jerry Stakebake
Beth Conrad

Authorization History

- > 80 wt.% Plutonium
- > 80 wt. % Total Actinides
  - > 8 wt. % Uranium
  - < 8 wt. % Uranium
- < 80 wt. % Total Actinides - November Start
  - Stabilized (500C)
  - Pre-Stabilization Needed
  - Pre-Stabilization not Required

Process History for 3013 Cans

- Metal - 423
- Oxide - 571
- Total to Date - 994
- Projected Total 3013 Cans
  - 2100 (SRS)
  - 1700 (400 to WIPP)

Stabilization Validation

- LOI Moisture
  - > 80- wt/ % Total Actinide
  - < 0.344 wt. % Weight Loss (Water)
- TGA/FTIR Moisture
  - All Actinides

LOI Measurement Controls

- Glovebox Moisture - 1000 ppm vs. 3500 ppm
  - At Dryer Location
  - At Sampling Location
  - In Container - ~ 40 ppm He
- Storage Times
  - After Stabilization - 24 hrs total
  - After LOI Heat Cycle- < 3 hrs

Summary Table of LOI Results

LOI Range (wt%)	Number of Cans Produced Pre Glovebox Dewpoint Meter Installation	Number of Cans Produced Post Glovebox Dewpoint Meter Installation	Total Number of Cans Produced (8/23/02 Data Extract)
0.000 – 0.050	20	82	102
0.050 – 0.100	51	217	268
0.100 – 0.150	26	130	156
0.150 – 0.200	4	30	34
0.200 – 0.244	3	12	15
0.244 – 0.344	1	11	12
Grand Total	105	482	587

Table - Problem 3013 Cans

Issue	Number of Cans Produced Pre Glovebox Dewpoint Meter Installation	Number of Cans Produced Post Glovebox Dewpoint Meter Installation	Total Number of Cans Produced (8/23/02 Data Extract)
Glovebox Moisture above 1000 ppm	3	164	167
3 Hour Time Limit not met	5	0	5
Total	8	164	172

Figure Effect of GB Moisture on LOI

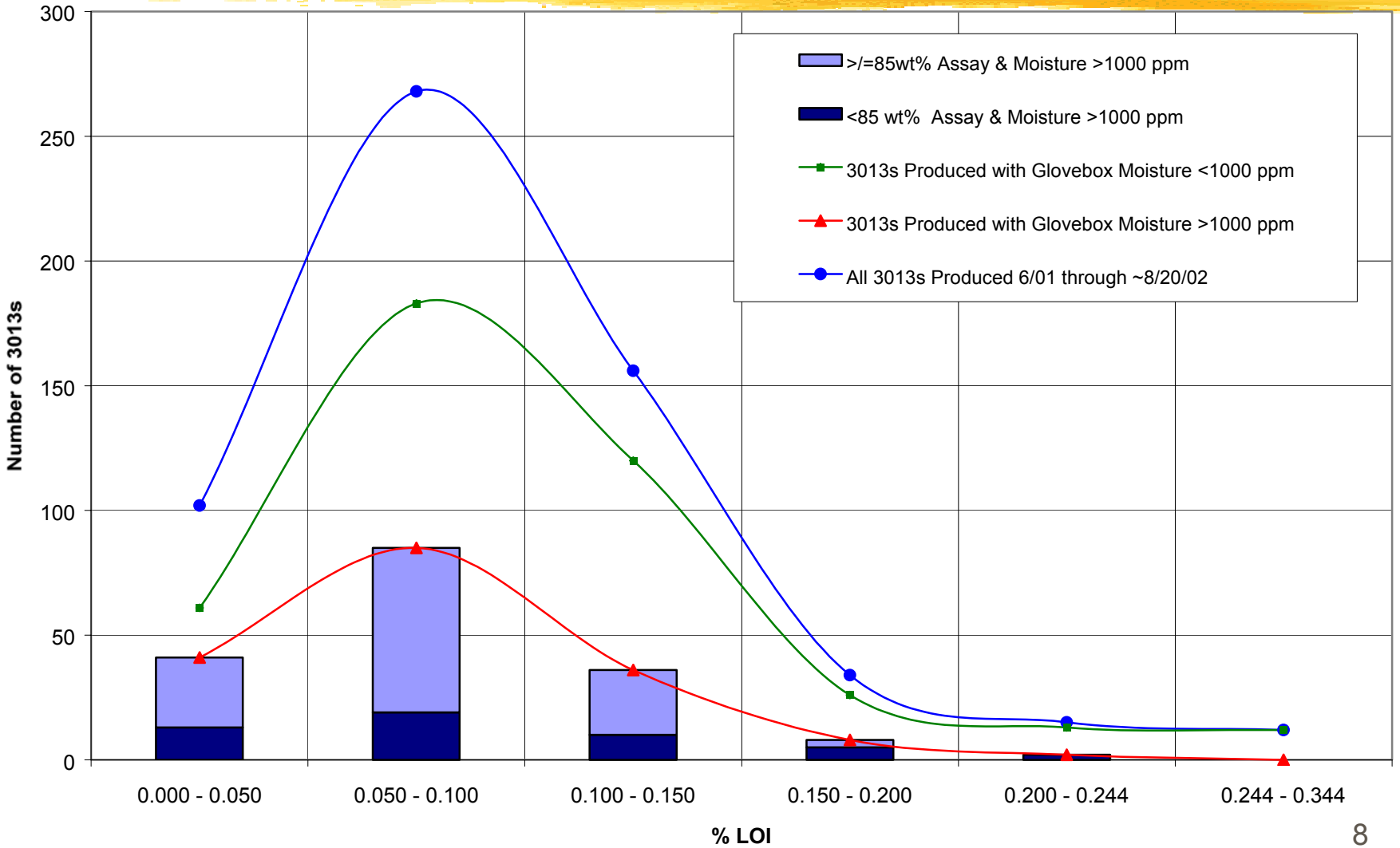
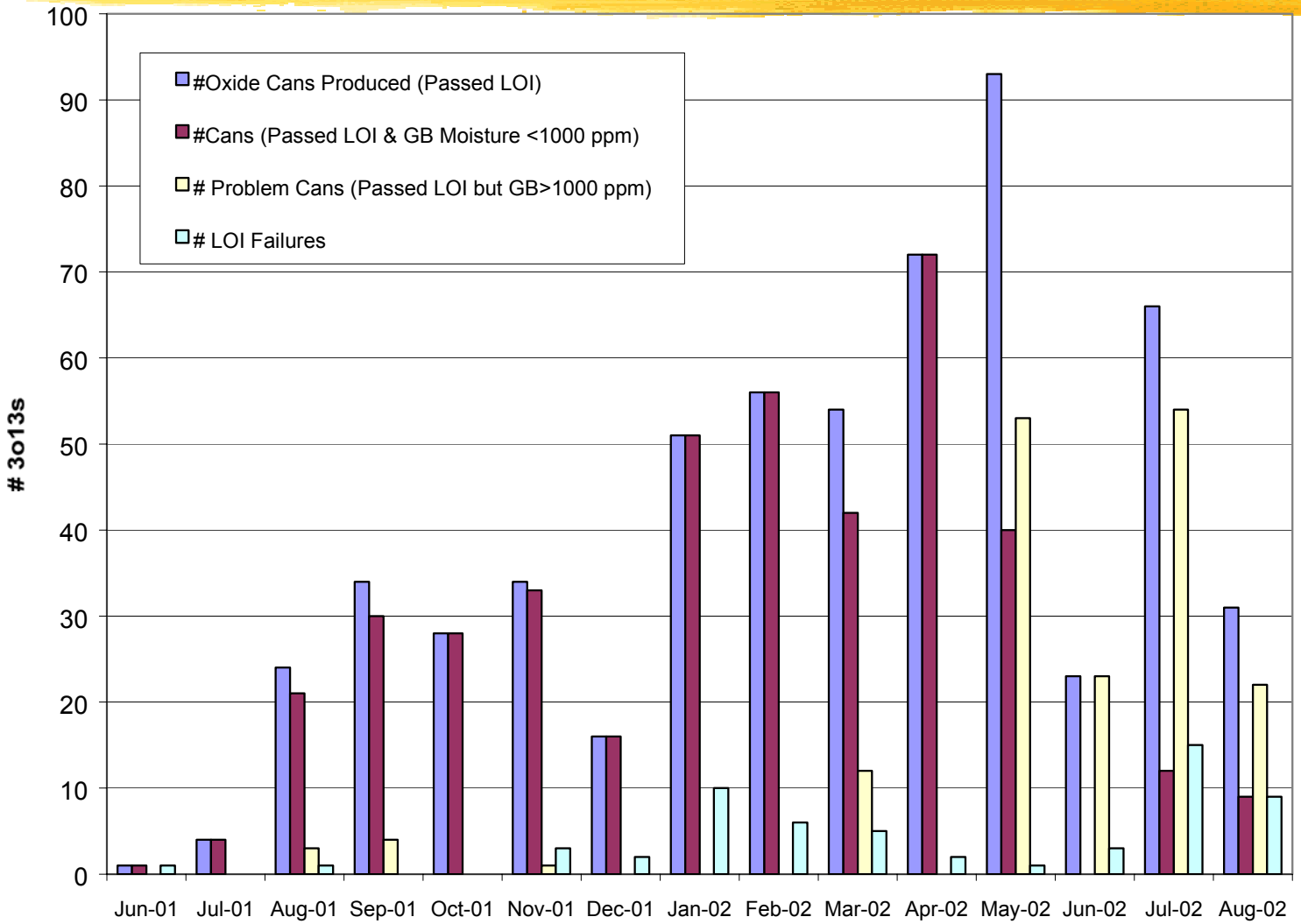


Figure LOI Distribution vs Time



Problems Encountered with Use of LOI -- Assay

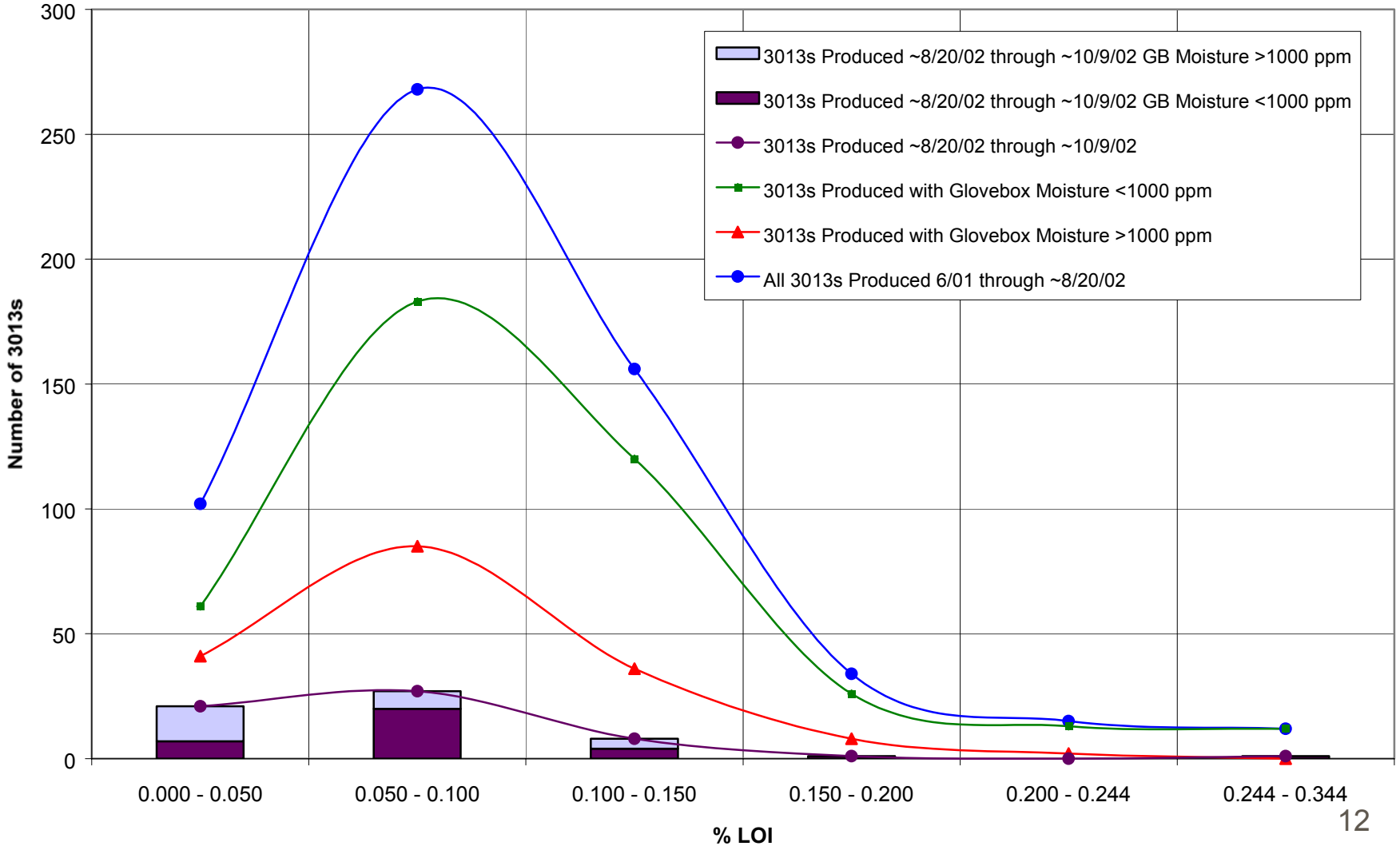
- Material Assay < 80 wt.% Actinide
  - Authorization Based on > 80 wt.% Actinide
  - Final 3013 Assay Range 50-80wt.% Actinide
- Assay for Uranium Nominally +/- 35%
- Assay for Plutonium Nominally +/- 2%

Table - Summary of Problem 3013 Cans by LOI & Assay

Est. Input Assay (wt%)	LOI Range (wt%)	Number of 3013 Cans by Input IDC														
		057	057/ 060	057/ 060/ 061	057/ 061	060	060/ 061	060/ 083	060/ U61	061	080	653	U61	U61/ Y61	Y61	Total
<85	0.000 – 0.050									2		1[i]			10	13
	0.050 – 0.100	1	1	2	1	1	1			2		1[ii]	1	2	6	19
	0.100 – 0.150	1				3				3				1	2	10
	0.150 – 0.200					2	1			2						5
	0.200 – 0.244					1								1		2
	0.244 – 0.344															0
Total <85		2	1	2	1	7	2	0	0	9	0	2	1	4	18	49
≥ 85	0.000 – 0.050	2	2	1		4[iii]	3[iv]			2		1	3	3[v]	7	28
	0.050 – 0.100	10	4			11	6	1		5	1[vi]	3[vii]	5	9	11	66
	0.100 – 0.150	1				5	2		1	4	1		5	5	2	26
	0.150 – 0.200									1	1		1			3
	0.200 – 0.244															0
	0.244 – 0.344															0
Total ≥ 85		13	6	3	0	20	11	1	0	12	3	4	14	17	20	123
Grand Total		15	7	3	1	27	13	1	1	21	3	6	15	21	38	172

[i] One can (R601213) produced prior to installation of glovebox dewpoint meter while dry air supply >1000 ppm during sampling.
[ii] One can (R601523) produced prior to installation of glovebox dewpoint meter did not meet 3 hour time limit.
[iii] One can (R601100) produced prior to installation of glovebox dewpoint meter while dry air supply >1000 ppm during sampling.
[iv] One can (R600199) produced prior to installation of glovebox dewpoint meter did not meet 3 hour time limit.
[v] One can (R601268) produced prior to installation of glovebox dewpoint meter while dry air supply >1000 ppm during sampling.
[vi] One can (R601627) produced prior to installation of glovebox dewpoint meter did not meet 3 hour time limit.
[vii] Two cans (R601450, R601522) produced prior to installation of glovebox dewpoint meter did not meet 3 hour time limit.

Figure - Summary LOI Distribution vs Moisture



Problems Encountered with Use of LOI -- GOI

- Gain on Ignition
- Associated with Mixed Oxides
- Gain Shown Following Restabilization
- Exposure Times Variable
- Resolution -- Accept as is

Table - 3013 Cans with GOI

3013 ID	IDC	# Stabilization Runs	Last LOI (%)	LOI Sample Δwt (grams)	Post LOI ΔTime (hh:mm)
R601910	Y61	1	-0.064	-0.020	1:41
R601915	Y61	4	-0.078	-0.022	1:37
R601972	Y61	2	-0.015	-0.005	1:37
R601983	Y61	2	-0.042	-0.014	2:11
R602003	Y61	3	-0.0079	-0.002	1:42
R602146	Y61	2	-0.058	-0.005	1:37
R602512	Y61	1	-0.003	-0.001	2:42
R602521	Y61	3	-0.049	-0.013	2:42

Corrosion Issues > 80wt.% Oxide

- Two Significant Furnace Incidents
- Inconel Tray Corrosion
  - Lifetime - Expendable
  - Replaced with Aluminum Coated
- Thermocouple - Inconel Sheath
  - Lifetime - Expendable
  - Replaced with New Sheath
- Hearth - Stainless
  - Lifetime - 15Expendable