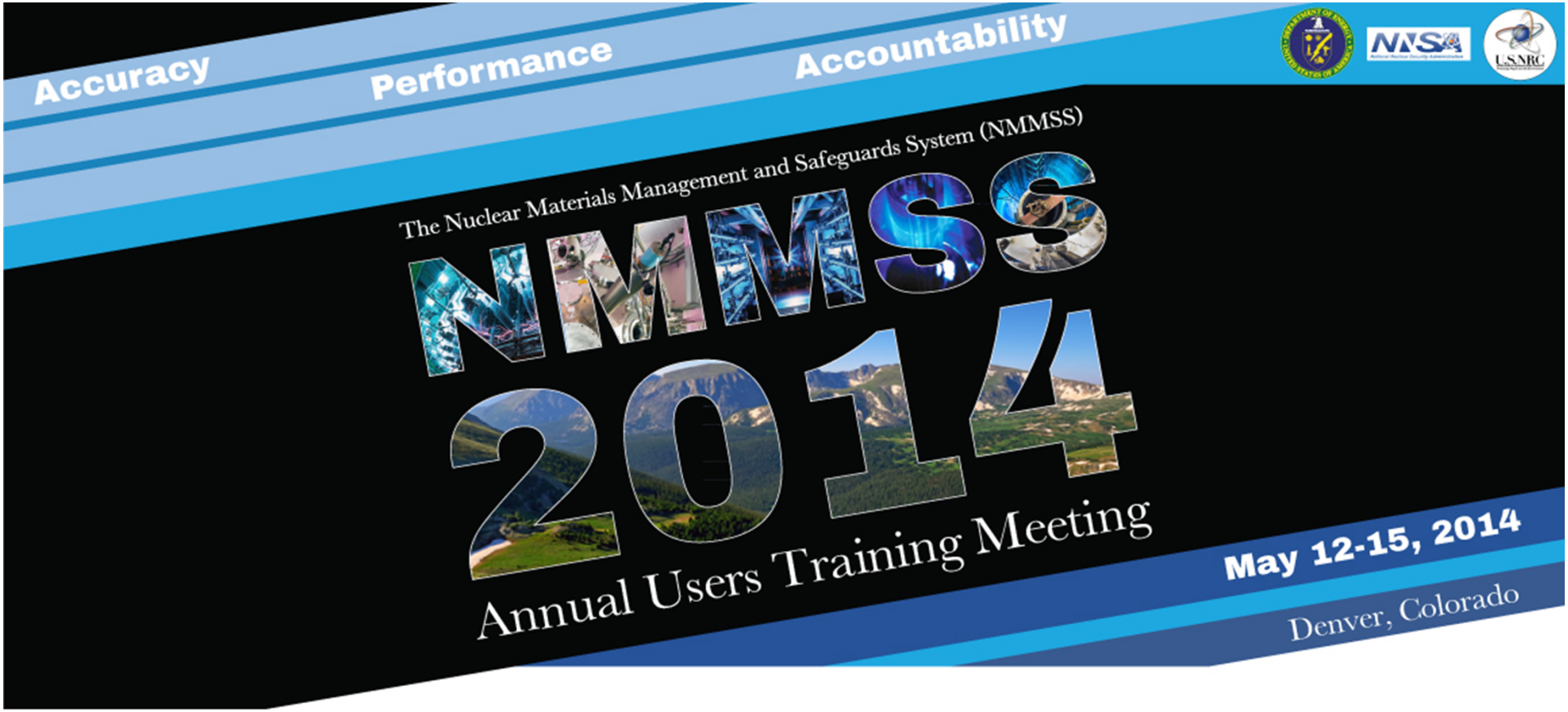


Lessons Learned Associated with Obtaining License for a New Enrichment Plant

Amy Johnson, URENCO USA

URENCO USA History

June to June – Combined License (COL) approval to production in 4 years

- 2003: License application to build in New Mexico
- 2006, June: COL issued by the NRC
- 2006, August: ground breaking
- 2007, July: first concrete placement - Central Utilities Building
- 2008, October: access to the Centrifuge Assembly Building
- 2009, September: first centrifuge installed
- 2009, December to 2010, May: NRC Operation Readiness Review
- 2010, June 10: NRC authorized URENCO USA to operate
- 2010, June 30: Full enrichment production in the first Cascade.
- 2012, August 14: First Project Phase II centrifuge in operation.

Construction

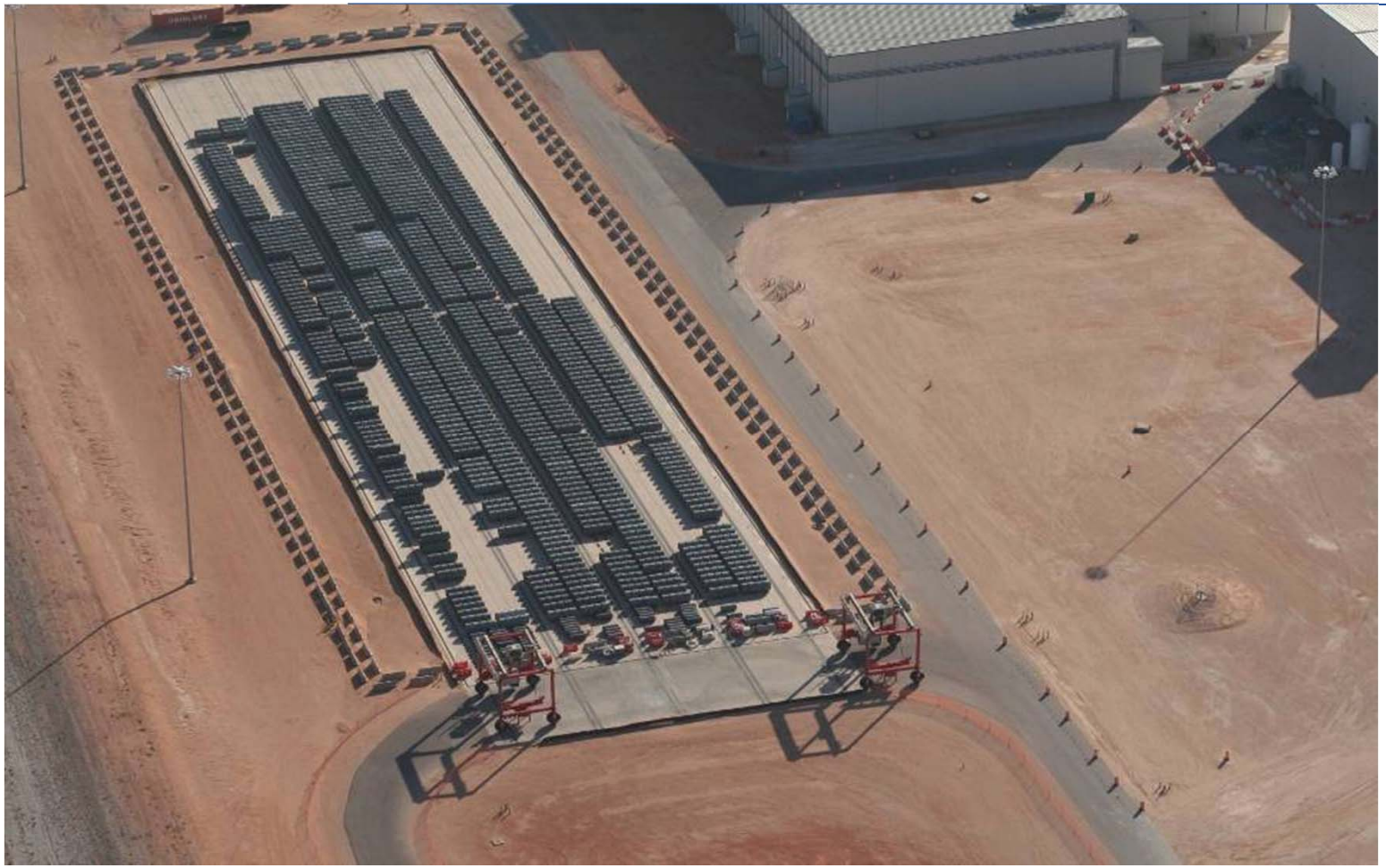
May 2013

SBM1001 UF6 Area

Phase III SBM 1005 Construction- April 2013

Phase III SBM 1005 Construction- April 2013

Uranium Byproduct Cylinder Pad



Feed Shipment

Product Shipment

UUSA Safeguards Organization

- Safeguards Manager
  - Material Accounting Specialist
  - Material Control Specialist
  - Material Measurement Specialist

Operations staff that perform reportable activities:

- Nuclear Material Custodians
- Logistics Uranium Accountant
- Weigh System Operators
- TID Applicators

Current Facility Status

- UUSA began operation in June 2010 with 1 cascade online
- Currently 48 cascades/4 assay halls online and producing SWU
- Future is 6 halls and a total of approximately 72 cascades
- Each hall has its associated feed/withdrawal stations in the UF_6 Areas with a potential of 140 stations

Licensing Challenges

- FNMCP written to match NUREG
- Theory vs. reality
- Most technically correct approach is not always the right choice
- Pitfalls of “get it approved, you can change it later”
- 17 revisions resulted in 1 re-write
- Timelines to submit/process/approve changes
- Configuration Control
- All-inclusive? Not always best approach
- Partially functional facility
- Operations vs. construction challenges
- Proof of process

Accounting Lessons

- Started with a Spreadsheet as the official accounting system
- NMMSS database not changed to recognize our facility as an enrichment facility
- IAEA Selection process and its special challenges with NMMSS and intergovernmental treaties
- A new nuclear facility, in an oilfield economy, with no nuclear work experience, trying to hire local citizens and train them to be MC&A experts
- Changing market conditions predicate unexpected changes in reporting – private vs. government owned material
- Negotiated company contracts involve new nuance with US facility that is not anticipated by our European colleagues (obligation and ownership swapping)

Statistical Lessons

- Hold-up (and residual numbers) are constants and they become less significant as throughput increases
- Pick your accountability systems appropriately, example is individual station load cells
- Using the WOHWA/Troemners as the standards for systems tied to NIST
- Working Standards vs. Primary Standards
- Difficulty of reconciling annually when MT89 is reconciled bi-monthly

Statistical Lessons

- Proficiency gained at reconciling bi-monthly from staff experience in determining where problems are just by the bottom line numbers
- Incorrect initial measurement models. Do not make assumptions - NaF traps example
- Expend the resources needed appropriately to the result. It was easy in the very beginning to get bogged down with statistics
- Over-commitments in the beginning renegotiated thru experience and data gathering to support our changes
- Transparency with the regulator a huge key

Operational Experience*

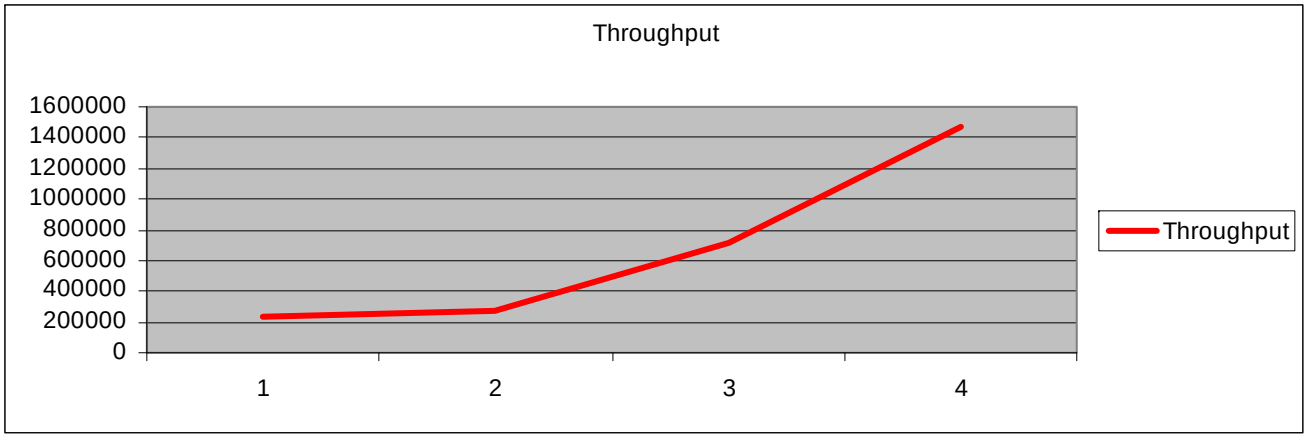
- August 2010, NDA measurements on all traps (8 Aluminum Oxide traps, 4 Carbon Traps, a mixed bed trap, various moveable cart mixed bed traps) plus applicable NaF sets
- First inventory 8/2010: total ^{235}U = 230,000g, traps = 2g/0.001% of total, 3 NaF = 400g/0.017% of total.
- Inventory on 7/2011: total ^{235}U was 276,000g, traps = 44g/0.02% of total, 6 NaF = 400g/0.015% of total.
- Inventory on 4/2012: total ^{235}U = 715,000g, traps = 47g/0.01% of total, 12 NaF = 400g/0.06% of total.

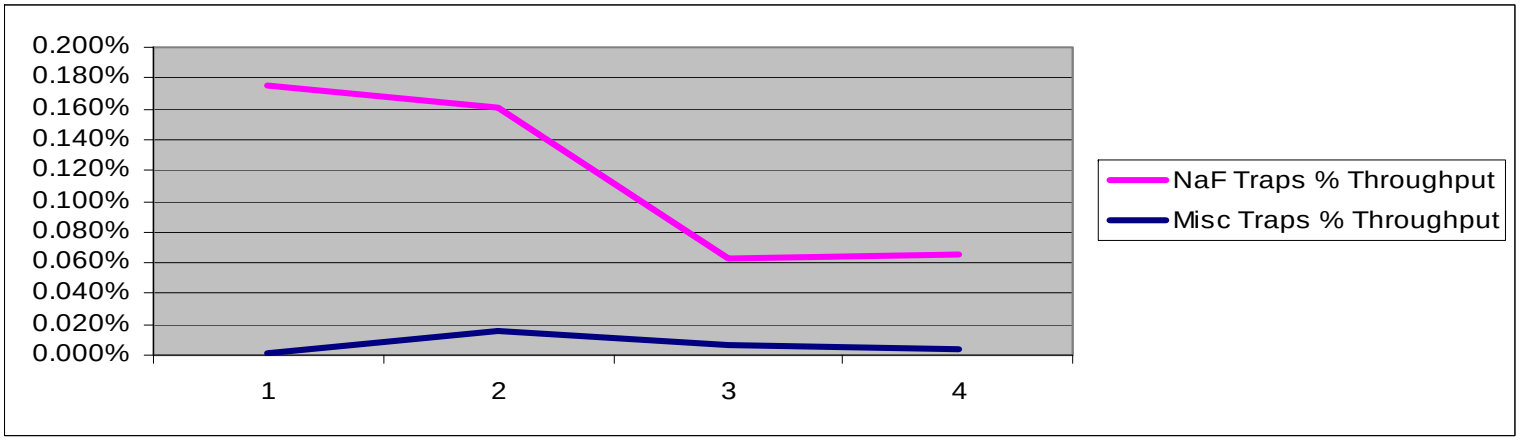
Here we stopped measuring traps individually as a result of 18 months of data = 9 inventory periods

- Inventory on 4/2013: total ^{235}U = 1,470,000g, traps = 55g/0.004% of total, 28 NaF = 900g/0.06% of total.

* All values are approximated

Learning Curve





Resource Load - TIME

- All measurements are a full hour each, both for background and item
  - Each 1001 NaF set = 5 hours
  - Each 1003 NaF set = 4 hours
  - Each misc trap = 3 hours
  - QC checks take 15 min before and after each measurement
- If we had to measure all traps and NaF sets, it would take 3 systems a total of 4 full 24 hour days with current capacity

Resource Load – COST*

Each measurement costs approximately $300 per hour = $1200 per measured item and $1200/1500 per NaF set

- 8/2010 Inventory
  - $20400 for 2g of ^{235}U + $4500 for 400g of ^{235}U
  - Total Cost of $24900 for 0.017% of total throughput
- 7/2011 Inventory
  - $20400 for 44g of ^{235}U + $9000 for 400g of ^{235}U
  - Total Cost of $29400 for 0.015% of total throughput
- 4/2012 Inventory
  - $20400 for 47g of ^{235}U + $18000 for 400g of ^{235}U
  - Total Cost of $62400 for 0.06% of total throughput
- 4/2013 Inventory
  - Would have been $20400 for 55g of ^{235}U + $42000 for 900g of ^{235}U
  - Potential Total Cost of $62400 for 0.06% of total throughput
  - **Actual Cost = $4800 (4 - 1003 sets only)**

* All values are approximated

Rewards

- As production increases, the total amount of material in process relative to amount of material in traps gets exponentially larger, making trap values less significant
- Quantities of material in traps are interim values
- Final values will be taken using the SGS
- The time and cost per shot vs. the return per shot doesn't make fiscal sense
- Eliminate delays releasing processing areas back to Operations until all measurements done

Questions?

Thank you for your time