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Title: 1L Target TMRS MK IV Overview of the Cost Estimate

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1L Target TMRS MK IV

Overview of the Cost Estimate

August 15, 2017

by

Joseph A. O'Toole

Agenda

- Basis is the MK III
- Development of the Mk IV Estimate – Budgetary Quotes
- Development of the Mk IV Estimate – LANL labor
- Adjustments to reflect the Mk IV design – consume Mk III spares
- The new Mk IV design vs. the Mk III
- Adjustment to reflect the Mk IV design – considering the differences
- Mk IV Cost Estimate – method overview
- Mk IV Cost Estimate
- Spending Profiles
- Summary

Basis is the Mk III

- **All** of the information from the Mk III effort is saved & available.
- Most of the Mk IV design is the same as the Mk III.
 - Minor change to one Lower Tier Water Moderator
 - New Upper Tier Design
- The Mk IV design is actually less expensive than the Mk III due to no Be in Upper Tier
- Use of the Mk III spares significantly reduces the cost of the Mk IV

Development of the Mk IV Estimate – Budgetary Quotes

- Quotes obtained in late 2016 for exactly what was done for the Mk III.
- Quotes from the same companies that did the Mk III.
- Budgetary because requested by engineering not procurement – but quality is the same as if they were firm-fixed price quotes.
- Quotes for 76% of all of the purchased components/parts, that is all of the major items.

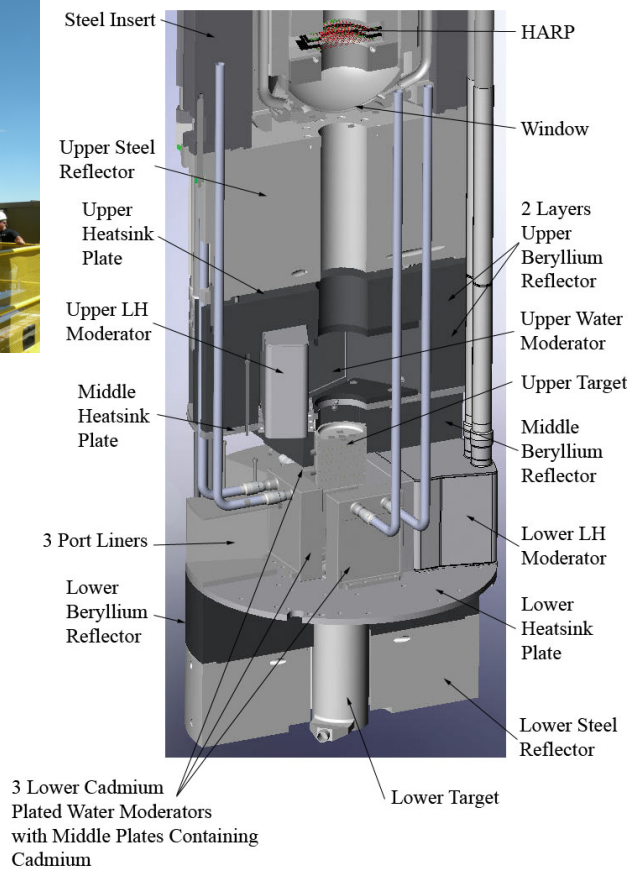
Development of the Mk IV Estimate – LANL Labor

- Analysis of the changes in LANL labor costs using FY10 and current FY16 labor rates & LANL burdens
- Some “inflation” due to inflation of base labor rates
- Some “inflation” due to changes in LANL burdens business practices
- Estimate uses a factor on LANL labor costs that accounts for both types of “inflation.”
- Have breakdown of LANL labor costs for the Mk III’s various engineering efforts, assembly, and installation.
- Estimate uses this factor which is based on the average LANL labor rate, the Mk III & IV use engineering and tech labor so a factor based on the average “inflation” is appropriate.

Adjustments to reflect the Mk IV design – consume MK III spares

- Use Mk III spares:
 - Instrument Insert with HARP
 - Window Insert
 - Upper Target tantalum clad tungsten target disks
 - Lower Target tantalum clad tungsten target rod
 - Three Lower Water Moderators central web with 0.002-inch vapor deposited Gadolinium
 - Various tooling items
- Make use of Mk I Cask & lifting fixture

The new Mk IV design vs. the Mk III



TMRS MK III Design

- MK III
 - 2 Targets
 - Upper Tier Water & LH Moderators
 - Upper Tier Be Reflector
 - Etc.
- Mk IV
 - 3 Targets
 - Upper Tier Water Saddle Shield
 - Middle Target ~one less disk than Mk III Upper Target
 - Lower Target same as MK III
 - One lower water moderator has new outer water cavity, operations with water or He
 - Etc.

Adjustments to reflect the Mk IV design – considering the differences

- Following items are changed:
 - No Upper Tier Heatsink Plate
 - No Upper Tier Be reflector parts
 - No Upper Tier Water Moderator
 - No Upper Tier LH Moderator
 - New Middle Target based on Mk III Upper Target design
 - New Upper Target design
 - New Upper Tier Water Saddle Shield
 - Set of 3 spacers between Middle Heatsink Plate and Upper Steel Reflector
 - Results in modifications to Middle Heatsink plate, to parts above for cooling lines passage including the Steel Shield Plug, and new jumpers to headers
 - Revised design of one Lower Tier Water Moderator to add outboard water cavity with its own water cooling lines
 - Results in modifications to adjacent Port Liner, Be reflector part, Lower Heatsink plate, to parts above for cooling lines passage including the Steel Shield Plug, pair of new jumpers to headers

Summary

- Estimate unusually solid it being based on Mk III
 - Budgetary Quotes from companies that did the Mk III components/parts
 - Actual detailed LANL labor costs adjusted to current rates
 - Portion based on Mk III with inflation factor
 - \$1.5M of the overall \$8.00M
 - Inflation factor based on budgetary quotes on other items & current LANL burden
 - 44% contingency on this portion of estimate if apply all of unallocated funds
 - 9% contingency based on overall project costs