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Los Alamos National Laboratory, Kansas City Plant, and Lawrence
Livermore National Laboratory

Plutonium Sustainment Monthly Program Report

November 2012

UNCLASSIFIED

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LANL Executive Summary

In November of 2012 the Plutonium Sustainment program at LANL completed or addressed the following high-level activities:

- 1) Presented to the Los Alamos National Laboratory Weapons Working Group on the successful assembly of the Pollux experimental device as part of the Gemini series.
- 2) Attended a briefing summarizing current Pu processing enhancement activities with emphasis on Direct Oxide Reduction and Electro-refining.
- 3) Meetings:
 - a. Conducted the conceptual design review at SNL for the RTG.
 - b. Traveled to Y12 to support the Los Alamos cost comparison study being conducted by SNL SITS for NNSA.

All four MRT L2 Milestones (4622-4625) associated with Plutonium Sustainment are on track for success in FY13.

The earned value metrics overall for LANL are within acceptable thresholds, so no high-level recovery plan is required.

Each of the four major LANL WBS elements is discussed in detail below with two sections at the end that are provided by KCP and LLNL.

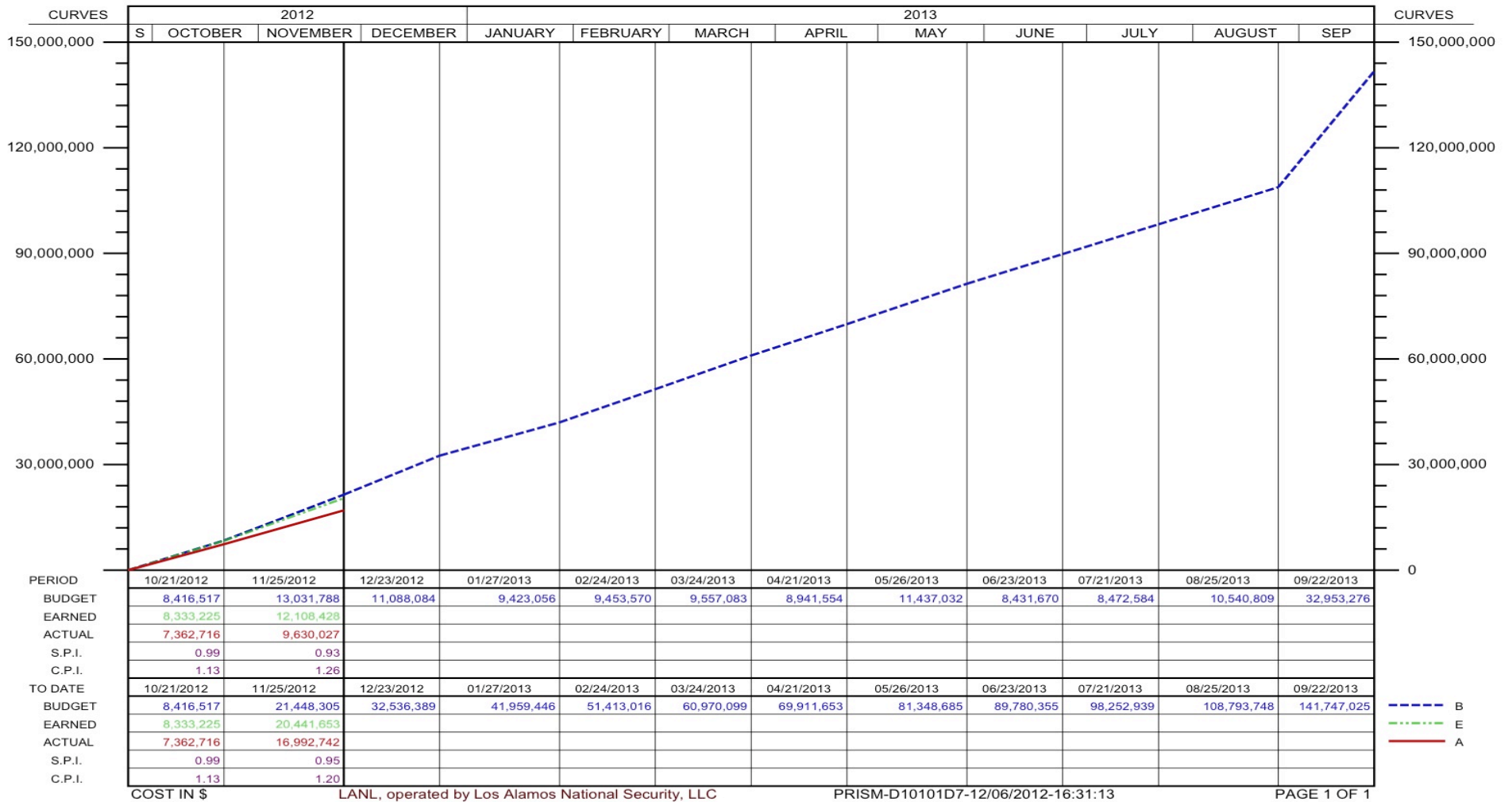
Table 1: November Baseline Change Requests

WBS	BCR #	BCR Description	Date Assigned	Date Approved	Impact	Cost Impact	Change Level
Power Supply	PSM-12-058	Conduct MSA	9/17/12	Cancelled	Cost/Scope	\$94k	3
Power Supply	PSM-13-005	Rate Adjustment	10/15/12	10/22/12	Cost/Schedule	\$430k	3
Power Supply	PSM-13-006	Rate Adjustment	11/13/12	11/20/12	Cost/Schedule	\$85k	3
Power Supply	PSM-13-007	Construction Contractor Bids Replacing Cost Estimates to Address Definitive Scope	11/19/12	11/20/12	Cost/Schedule	\$35k	3
Power Supply	PSM-13-008	Construction Fire Rated Ceiling Mods	11/19/12	11/26/12	Cost/Schedule	\$99k	3
Power Supply	PSM-13-009	Fire Suppression Hydro Test & Valve Box Concrete	11/20/12	11/26/12	Cost/Schedule	\$10k	3

Earned Value Metrics

PERFORMANCE S-CURVE

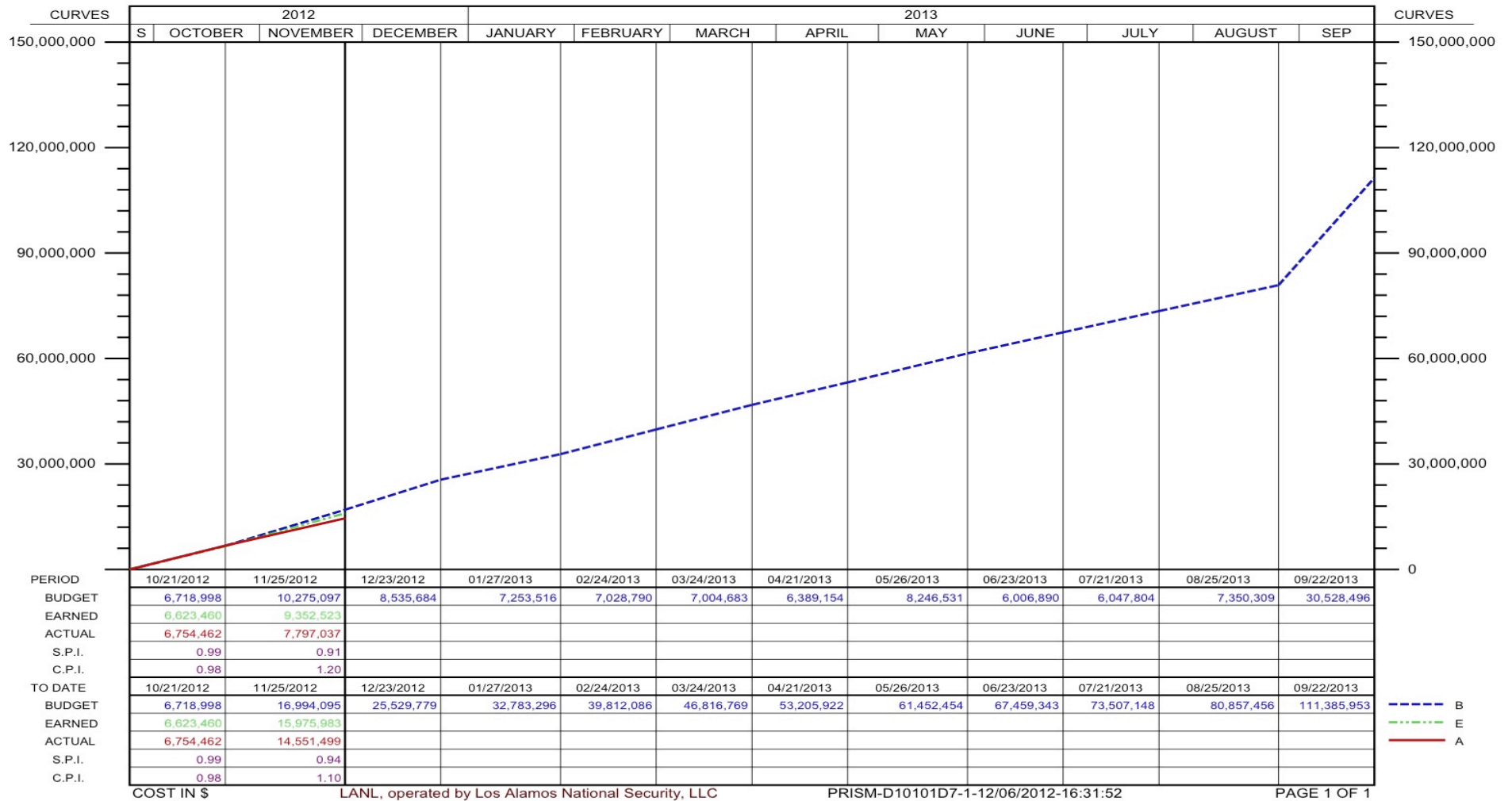
Pu Sustainment



UNCLASSIFIED

PERFORMANCE S-CURVE

Pu Sustainment W/O Facility Infrastructure



COST IN \$

LANL, operated by Los Alamos National Security, LLC

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1.0 LANL - Pit Development

MRT 4622		GREEN	Perform Activities to Sustain Base Pit Material Processing and Fabrication Capability		
1. Continue W87 legacy pit IPT activities.					
2. Maintain pit manufacturing capability by producing 4 pit-like builds and/or exercising the pit fabrication flow sheet.					
3. Continue to make progress on the Electro-Refining line, Plutonium Foundry, and Laser Beam welder projects.					
Builds		Baseline Date	Status/Comments	Completion Date	RGYB
Built Attempt #1	Start	October 4, 2012	Tube laser weld completed. Passed leak check and visual inspection	October 4, 2012	BLUE
	Complete	January 24, 2013			GREEN
Built Attempt #2	Start	December 3, 2012	Drill and press tube completed	November 14, 2012	BLUE
	Complete	March 28, 2013			GREEN
Built Attempt #3	Start	March 3, 2013			GREEN
	Complete	June 27, 2013			GREEN
Built Attempt #4	Start	June 3, 2013			GREEN
	Complete	September 30, 2013			GREEN
Equipment					
ER Line Start Construction		November 1, 2012		October 17, 2012	BLUE
ER Electrical/Mechanical Complete for Gloveboxes I, II, III, & IV		March 13, 2013	On track to meet milestone		GREEN
Complete Phase III Foundry Cold Testing		March 21, 2013	On track to meet milestone		GREEN
Complete Laser Welder system testing in the SM-66 cold laboratory		April 19, 2013	On track to meet milestone		GREEN
ER Electrical/Mechanical Complete for Trunklines II, III, and IV		June 27, 2013			GREEN
Foundry DCP - Approved for Construction		June 30, 2013			GREEN
Complete Laser Welder Testing in the PF-4 “cold” glovebox		July 19, 2013			GREEN
ER Electrical/Mechanical Complete for MTS Conveyor, Dri-train, Trunklines I & V		July 26, 2013			GREEN
Foundry Cooling System Upgrade Integrated Work Document Complete		July 30, 2013			GREEN
ER Electrical/Mechanical Complete for Braking Press, HPU, & Primary Staging Carousel		August 29, 2013			GREEN
Start construction of Foundry GB1		September 20, 2013			GREEN
ER Line Upgrades Complete		September 30, 2013			GREEN
Complete Laser Welder testing in the PF-4 “hot” Glovebox		September 30, 2013			GREEN
MRT 4623		GREEN	Progress towards competency to build W87 pits by achieving W87 EDU by September 30, 2013		
1. Complete W87 legacy EDU build - jointly reviewed by W87 legacy pit IPT by September 30, 2013.					
EDU Build		September 30, 2013	Build #1 is still viable for EDU		GREEN

1.1 Technical Progress

- Completed the tube laser welding operation successfully on the first W87 build. Girth welding is schedule for late December.
- Completed the drill and press operation on the second W87 build.
- Completed producing three of three planned ER rings for November, six of six planned for FY13 first quarter.
- Completed two shape castings as planned. This completes the shape castings planned for FY13 first quarter.
- Continued BCR planning for Sheffield to take data in FY13. Due 12/21/12.
- Submitted draft CMM test plan to be used as the basis for the draft Process Qualification Plan due 12/21/12.

1.2 Equipment

- The plan to meet the grading criterion #3 for L2 milestone MRT 4622 includes the following:
 1. The Laser Welder Upgrade - complete all planned laser welding system upgrades and release both the “cold” and “hot” glovebox for welding operations by September 30, 2013.
 2. The Plutonium Foundry Upgrades - complete cold testing, issue an approved design for construction, and start construction on the first of three foundry gloveboxes by September 30, 2013.
 3. The Electro-Refining Upgrade - complete all mechanical and electrical construction activity associated with the eleven electro-refining boxes and systems by September 30, 2013.
- Laser Welder
 - Project has transitioned from equipment fabrication to technical development. The welding controller skid has been fabricated and installed in the cold testing laboratory at SM-66.
 - The team is working to develop functional operation at SM-66.
 - Primary construction design is completed and approved for execution in PF-4
- Electro-Refining Line Upgrade
 - PF-4 trolley relocated
 - Material Transfer System (MTS) program logic controller (PLC) and Breaking Pressing hydraulic pressure unit (HPU) are on site prior to installation in PF-4
 - Engineering support contract awarded
 - ER controller software support contract solicitation issued
- Foundry Upgrade
 - Assembly of the cold test foundry at 80%
 - GB1 vacuum system installation at 65%
 - Preparation of integrated work document (IWD) for GB1 cooling installation at 50%
 - Started GB2 and GB3 Decontamination & Dismantlement IWD
 - Received 3 furnace chambers for use in GBs 1-3, melt and mold coils, and polished piping

1.3 Issues

- None

1.4 Variance Analysis and Recovery Plan

- None

1.5 BCRs

- None

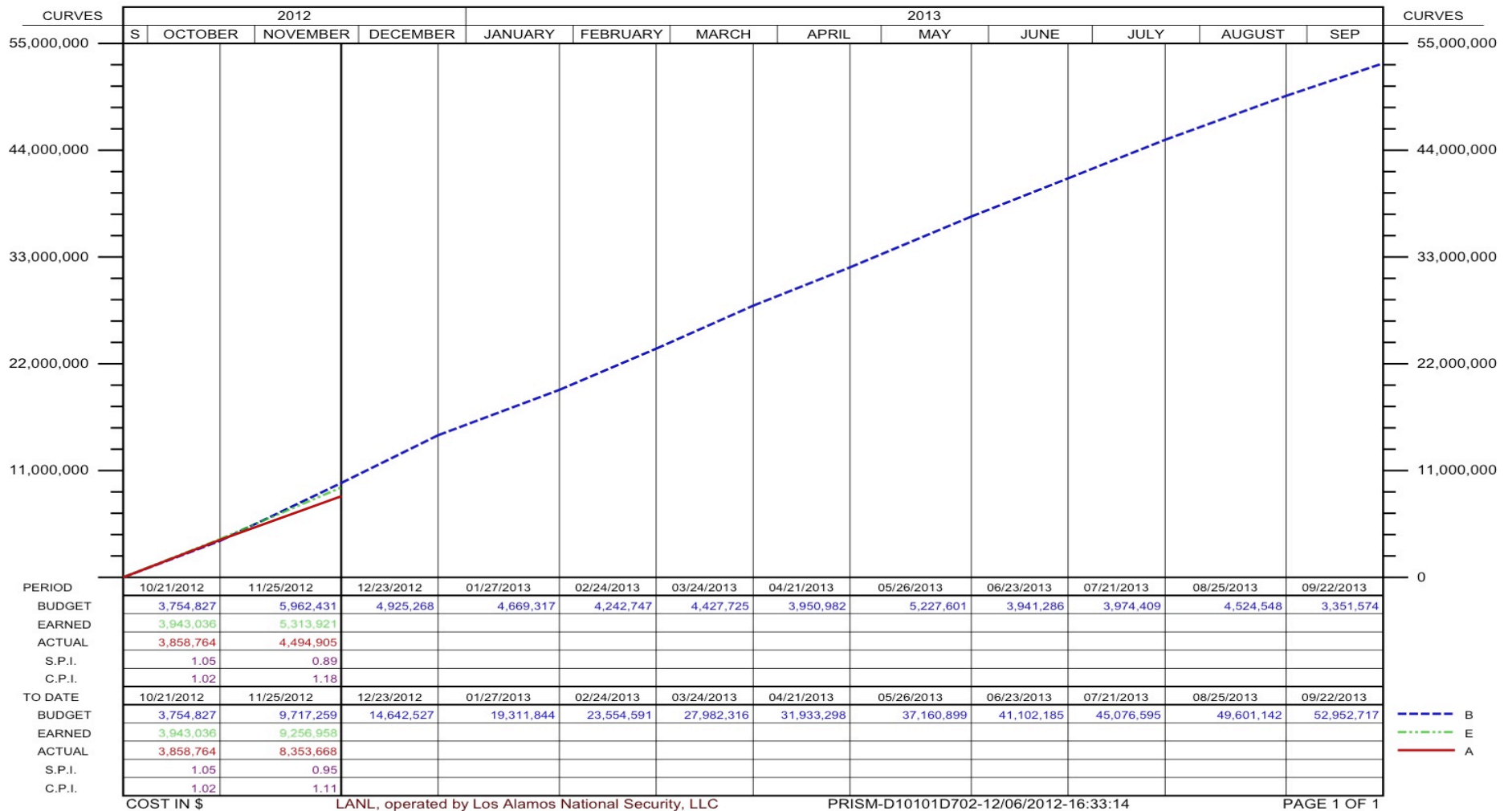
1.6 Risk Table

Work	Description	Handling Strategy	Status
Laser welding upgrades will conflict with the 4 th pit build attempt in FY13.	The laser beam welder upgrades are expected to occur in the summer of 2013 and take the system out operational status. The pit manufacturing Flow sheet cannot proceed without this capability. This could delay the 4th pit attempt that is planned in FY13 until early FY14. This 4th pit build also is potentially the W87-like build.	If possible the subassembly for the 4 th pit will be built ahead of schedule, to downstream activities for the 4 th build to occur as planned in late FY13. If this cannot be accomplished, the build will occur in FY14.	
Laser welding capability will not be available.	The pulsed laser will be used on tube welds prior to the completion of the continuous laser welder upgrade. This is the least understood of the assembly operations and may require significant process development.	If the tube weld process cannot be performed to a sufficient quality to perform the first build successfully, a weld development study will be undertaken to identify effective welding parameters. Also, a continuous laser welder is being installed in FY13.	
Maintenance is insufficient to maintain reliable systems for scheduled work.	Preventive maintenance supported by a large infrastructure has been replaced with a modified corrective maintenance approach. Preventative maintenance will be performed only on Safety Significant Systems required to meet DSA-based TSRs. Most equipment will be run until corrective maintenance is required. Spare parts would be replaced as limited funds permit. Current stocks will be drawn down. Given the age of many mission critical systems, the time to repair and return to service is not predictable. Due to the sequential and interrelated processes involved in manufacturing, long lapses in fabrication are possible.	The risk handling strategy for limited maintenance is basically to accept the risk of equipment failure and the corresponding delay in W87 pit development. Maintenance on mission critical systems has been prioritized. If unrecoverable (within 3 weeks) events occur, scope and funding will be revised via a BCR to reduce deliverables and repair or replace equipment.	
Critical pieces of equipment are known single-point failures. If any of the equipment fails catastrophically, pit development will stop until a replacement is installed. This would most likely delay the FPU.	Given the age of mission critical equipment, unrecoverable failure is probable. Equipment installation in PF-4 takes years to complete. A replacement time of 1-4 years would be expected, which in turn will delay the W87 pit FPU.	Three elements, ER Line, Pu Foundry, and Laser Beam Welder, of the pit production line already have installation and upgrades underway. These three projects are fully funded. Other areas of concern in inspection, welding, and machining will have planning completed for requirements analysis, cost estimate, and options. This will permit these projects to be available to start should funding become available or in the event of equipment failure, funds can be moved from other parts of the program to start the replacement.	The Bostomatic mill was down for several weeks in October and November. The mill was serviced successfully and is now functional for drill and Press operations.
Analytical actinide chemistry may lose the support from other programs at LANL.	The NA-20 funded ARIES program is considering the option to transfer chemistry out of LANL. Currently the Program and ARIES are the primary funding sources for this capability. The Program has already reduced the number of samples for chemistry analysis. This potential for an ARIES elimination and Program reduction in funding could result in loss of the chemistry capability altogether for actinide samples at LANL.	1) Senior managers at LANL and LASO are working to resolve this issue. 2) The Program could increase the amount of chemistry work beyond the minimum required to explore issues of lower importance in order to maintain this competency.	

1.7 Earned Value Metrics

PERFORMANCE S-CURVE

Pit Manufacturing



2.0 LANL - Power Supply

MRT 4624		GREEN	Complete FY 2013 RTG material recovery activities		
1. Dismantle 95% of the Pantex items received by June 30, 2013 (up to 450 items) 2. Recover and store the oxide by September 30, 2013.					
L3 Milestone	Baseline Date	Status/Comments	Completion Date	RGYB	
Fuel Recovered & Stored – July 2012 Shipment	October 16, 2012		September 12, 2012	BLUE	
Fuel Recovered & Stored – August 2012 Shipment	November 8, 2012		December 11, 2012	BLUE	
Fuel Recovered & Stored – November 2012 Shipment	February 6, 2013			GREEN	
Fuel Recovered & Stored – January 2013 Shipment	April 17, 2013			GREEN	
Fuel Recovered & Stored – March 2013 Shipment	June 11, 2013			GREEN	
Fuel Recovered & Stored – May 2013 Shipment	August 13, 2013			GREEN	
Fuel Recovered & Stored – June 2013 Shipment	September 3, 2013			GREEN	
MRT 4625		GREEN	Install the RTG-AFT equipment and upgrades		
1. Complete construction of the RTG-AFT by September 30, 2013 2. Turnover RTG-AFT facility to Operations by September 30, 2013					
L3/L4 Milestone	Baseline Date	Status/Comments	Completion Date	RGYB	
Ductbank Installation Complete	October 12, 2012	Asphalt installation tied to milestone.	October 18, 2012	BLUE	
Process Equipment Ready for Delivery to PF-5 Basement	November 19, 2012	Equipment delivery has been delayed to the week of 12/17/12.		RED	
HVAC Installation Complete	November 21, 2012	Condenser has been shipped from vendor. Delivery has been delayed to 12/21/12. This is a L4 milestone and is not expected to affect completion of the L2.		RED	
Installation of Process Equipment Complete	December 13, 2012			GREEN	
Construction Complete	February 19, 2013			GREEN	
Release to Operations	June 3, 2013			GREEN	

2.1 Technical Progress

- Material Recovery
 - Received FY13 Shipment #1, #2 and #3 (received in July, August and October).
 - All units from the shipments are dismantled.
 - Completed fuel recovery and storage of Shipment #1 and #2 in FSOs.
 - FSO radiography delayed due to equipment failure. Radiography is scheduled to resume the week of January 7, 2013.

- RTG Process Development
 - Completed welding a set of 10 liners. The liners have been sent to SNL for use in setting up impact analysis.
 - Pro-Beam, the LVEBW vendor has been working with LANL to complete operator training for both the PF-4 and SM-39 systems.
 - Continuing to revise the LANL Production Strategy.

2.2 Equipment

- Radioisotope Thermoelectric Generator - Assembly & Testing Facility (RTG-AFT)
 - Continued installation of the vacuum piping system.
 - Continued installation of xenon and regeneration gas tubing.
 - Received signatures for fire barrier upgrades engineering judgment report.
 - Anchored new switchgear and started feeder installation to new transformer.
 - Finished ridge ceiling in the shipping and receiving room, started same in the test rooms.
 - Completed placement of milled asphalt near Station 61 at requested by TA-55 environmental representative.
 - Continuing installation of the HVAC system. The condenser unit of the HVAC unit will be delivered the week of 12/17/12. The Project is working additional hours/shift to complete ceiling installations and then equipment installations.
- The Low Voltage Electron Beam (LVEB) Welder
 - Working on the operational and maintenance procedures.
 - Continued preparation for LANL MSA. 90% of DCP closeout files have been collected and electronically stored.
 - Completed LANL ALARA review.
- Analytical Chemistry glove boxes (Pu Assay and Radiochemistry)
 - Completed anchoring glove boxes
 - Working on the Zone 2 ductwork for installation. 50% has been completed.
 - Completed mechanical bulks installation.
- SM-39 Development Laboratory
 - Continued electricity installation for process equipment.
 - Exercised the LVEBW and GTA systems.

2.3 Issues

- None

2.4 Variance Analysis and Recovery Plan

- None

2.5 BCRs

- None

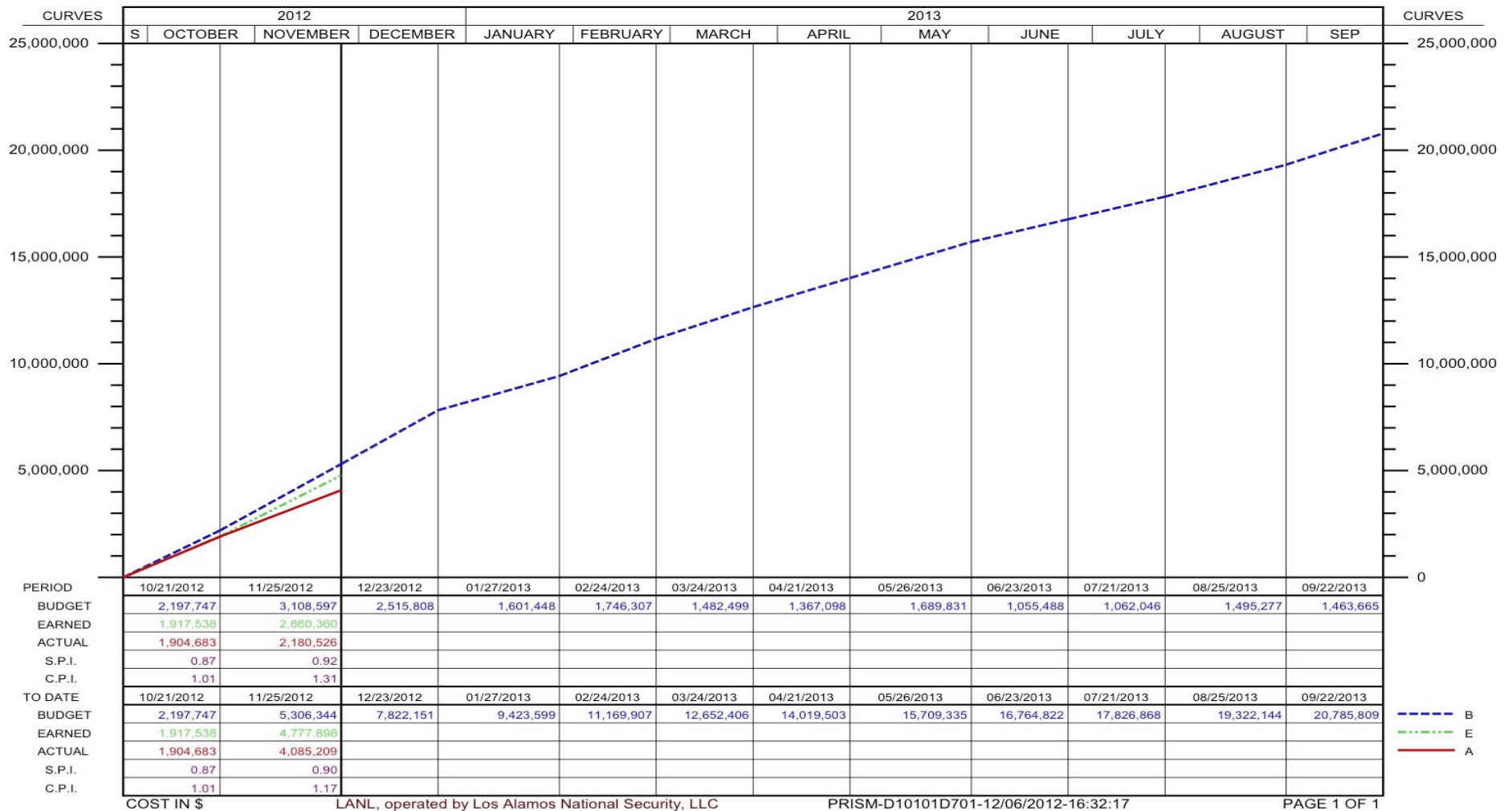
2.6 Risk Table

Work	Description	Handling Strategy	Status
Workforce development and recruiting	Dedicated staffing and depth of trained operators are both at risk to support the development, PPI, and Qual series for RTG manufacturing development. The plan to start hiring in FY13 for dedicated staffing will not occur. Staffing is shared with other programs and may not always be available as scheduled. Note that the increase in staff also was planned to maintain lower dose rates in the staff as part of LANL ALARA goals.	1) Communicate and integrate frequently with RTG surveillance, NE-75, and other programs to make the best use of available staff. 2) Request LANL and LASP management to allow for increase dose in staff assigned to this work. 3) Delay non-critical patch activities until they become critical path for FPU.	Daily work planning meetings continue to ensure availability of staffing resources.
Harvesting ²³⁸ Pu	Pantex may not be allowed or able to ship the expired RTGs to LANL at a rate of 80 every two months. This would prevent LANL from harvesting in FY13 the ²³⁸ Pu required for the production run.	1) Harvest in FY14 and FY15 but at a greater expense to the program. 2) Use existing ²³⁸Pu already at LANL to backfill what Pantex does not ship. 3) Start production with less fuel and compromise the planned scrap rate allowance. This puts the ability to meet production rates at risk.	A review of available material against PRT requirements has been completed. Currently performing a review of material present at LANL that could be used to meet mission needs.

2.7 Earned Value Metrics

PERFORMANCE S-CURVE

Reconstitution of Power Supply Manufacturing



3.0 Program Management and Support

3.1 Program Management

- Reviewed Earned Value and actual cost reporting for October and November.
- Completed initial Pu Capability Planning Assessment to support the December Defense Programs Review.

3.2 Support

- Document Control, Records Management, and Training
 - A total of 123 controlled document requests were created in November.
 - A total of 75 controlled documents were released.
 - The final W88 build records are nearly all dispositional through to final end-state. This should be completed in December.
- Formal OJTs were developed and approved for support processing operations in chloride and nitrate.

3.3 Issues

- None

3.4 Variance Analysis and Recovery Plan

- None

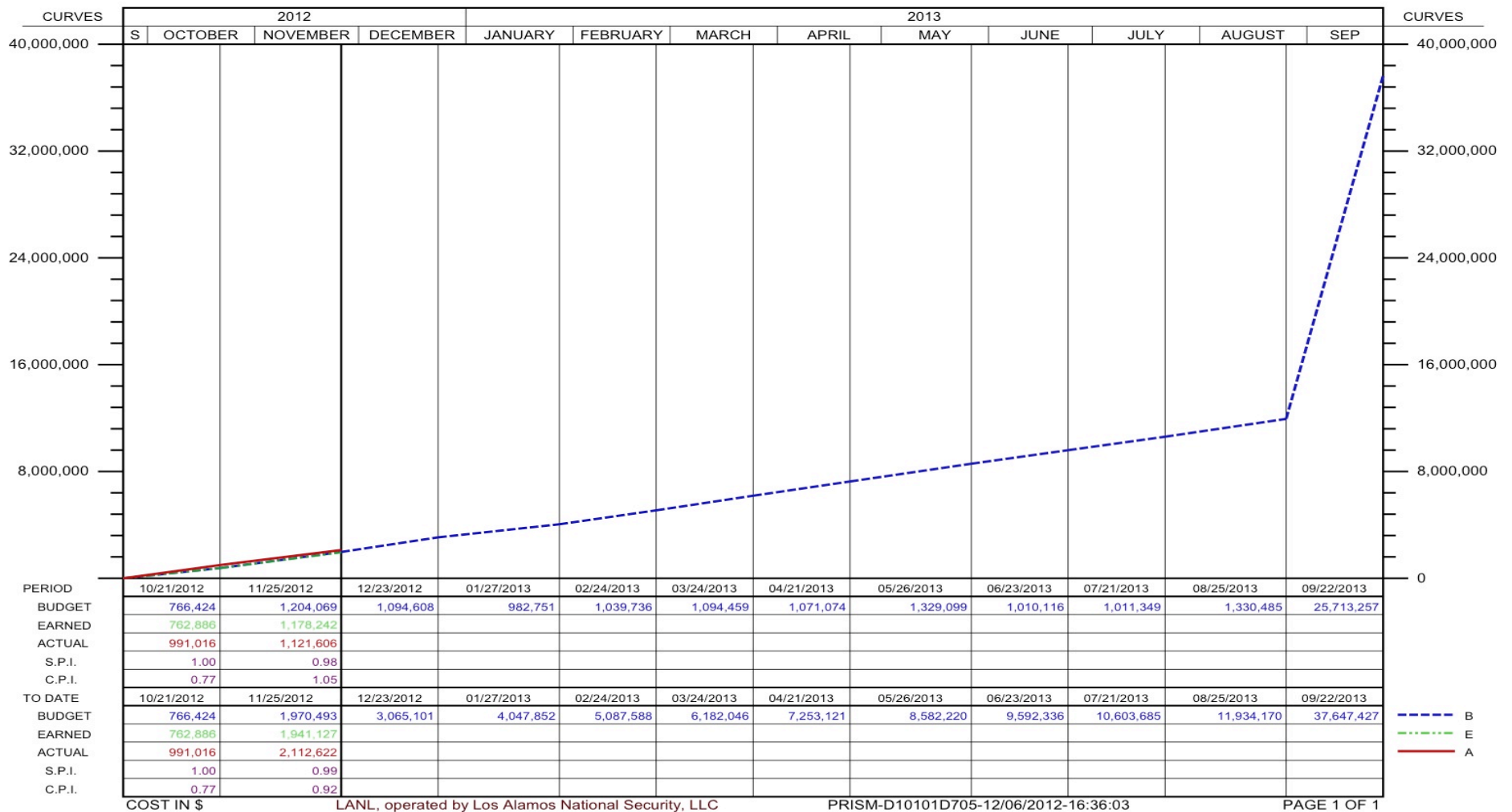
3.5 BCRs

- None

3.6 Earned Value Metrics

PERFORMANCE S-CURVE

Program Office



4.0 Facilities, Waste and Institutional Support

4.1 Technical Progress

- PF-4 Facility Availability: October N/A%
 - 100 Area: N/A%
 - 200 Area: N/A%
 - 300 Area: N/A%
 - 400 Area: N/A%

4.2 Equipment

- N/A

4.3 Issues

- N/A

4.4 Variance Analysis and Recovery Plan

- Note that the actual costs are well below the planned costs. This is an artifact of the monthly billing by RTBF. The costs came in after the financial end of the month. There is no concern at this time nor is there an expectation that this will under run and provide budget for other scope.

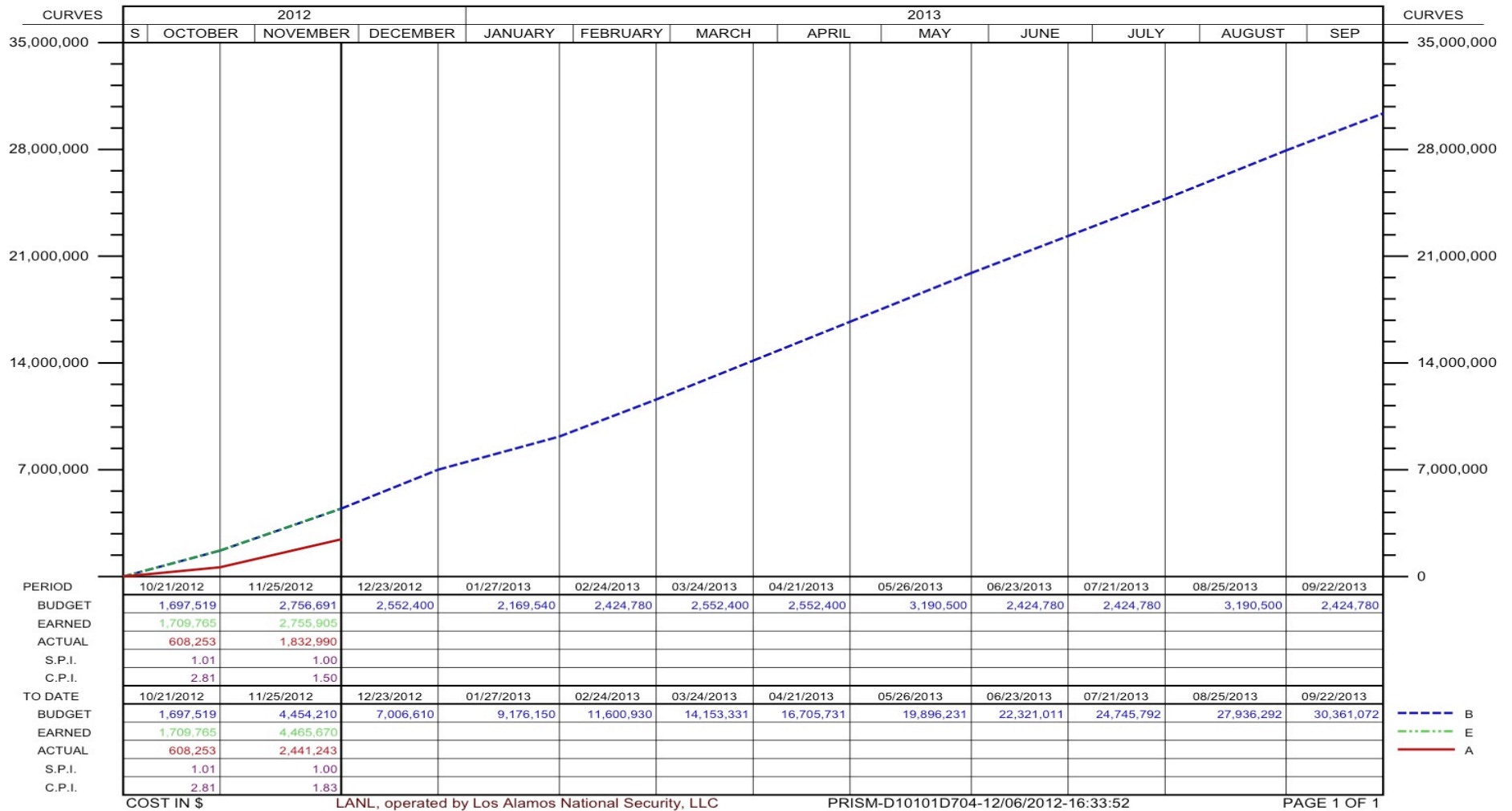
4.5 BCRs

- N/A

4.6 Earned Value Metrics

PERFORMANCE S-CURVE

Facility Infrastructure



COST IN \$

LANL, operated by Los Alamos National Security, LLC

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5.0 KCP

MRT 4750		GREEN	Begin Development of Non-Nuclear Component Manufacturing capability		
1. Purchase and install new precision lathes by 9/30/13 2. Procure development material by 7/31/13 3. Start fabrication of one of three development shell sets by 8/31/13					
L2 Milestone	Baseline Date	Status/Comments	Completion Date	RGYB	
Purchase and install new precision lathes	9/30/2013	2 ea. vendor visits complete. Pending receipt of response to RFQs		GREEN	
Procure development material	7/31/13	Material Specification review		GREEN	
Start fabrication of one of three development shell sets	8/31/2012	4th quarter FY13		GREEN	

5.1 Technical Progress

- KCP visited Material Sciences Corporation to discuss rolling process and procurement activities.
- KCP performed a review of the hydro form equipment and vendor. The tooling being built for the current hydro form will fit on the new hydro form.
 - KCP hydro form tooling is in work with a January completion date planned.
- Surrogate material was identified and an order placed for early development hydroforming and machining plates.
- Meetings set up with LANL/LLNL to discuss material specifications
- VTC with LLNL to review material requirements and procurement plans. A follow on VTC was planned prior to visiting Wah Chang.

5.2 Equipment

- The procurement specification for the T-base lathes was completed and is in management review. The quoting vendors increased their spindle size to meet our requirements.

5.3 Issues

- None

5.4 Variance Analysis and Recovery Plan

- N/A

5.5 BCRs

- BCR initiated and approved re-allocating \$1M contingency funding from capital equipment to un-allocated spend plan

5.6 Risk Table

Work	Description	Handling Strategy	Status
Development material availability	If suitable material in appropriate quantities is not readily available, then additional lead time will be required to obtain raw material, possibly delaying KCP support of PPI schedules.	Mitigate. This cost estimate includes funding to begin vendor development as early as possible to ensure that required material is available when needed. KCP will use material already available to support development.	
PPI and Qual material availability	If existing material at KCP is restricted from use then new material will be required. The procurement time on new material is (6 to 18 months) before they start making and rolling the material. The material may not be available to support PPI and Qual schedules.	Mitigate. Efforts are underway to update the material specification and work with the supplier to reduce cost and time to delivery. Alternate suppliers are also being considered provided the material can meet the specification.	
Funds availability	The timing of funding becoming available to KCP is critical to enabling KCP's support of this new mission.	Accept. KCP would take on more risk by compressing the development process. This compression may not allow enough time to develop adequate WR processes.	Initial discussions and comparison of LANL material procurement indicate the cost of new material and rolled material will be higher than estimated resulting in a shortfall of funding to support life of program material needs.
T-base Lathe availability at Bannister Facility	The T-base lathe currently installed in the "cold room" at the Bannister facility is the only machine currently available upon which to begin process development. It has marginal capability to hold the required tolerances in production. Its availability is critical to begin process development while new equipment is being procured & installed.	Mitigate. The first phase of process development would have to be eliminated in order to use the T-base lathe, which is moving during that time period. This compression may not allow enough time to develop adequate WR processes.	The first phase of process development roughing operation is planned for an existing lathe. The new T-base lathe's procurement is on track and both vendors indicated they can support a July delivery date.
Hydroforming equipment	Hydroforming equipment is required for this project and the current equipment is not planned to be moved to Botts.	Mitigate. Procurement cost (\$1M) of required equipment has been included in contingency in FY13.	The purchase of the equipment is on track and a location identified at Botts for the equipment. Expected delivery in May.
CMM Part Acceptance	The current inspection method utilizes the Sheffield and a fixture (\$250K) which both are unavailable at KCP. If an alternate method to verify part acceptance is approved it will take a team to determine the probing density and fixturing requirements which may exceed the funding allocated to this activity.	Mitigate. LLNL is going to send two representative parts to KCP for fixturing design and practice CMM probing. The teaming activities will be included around IPT meetings to minimize travel. Data sets will be transmitted electronically for team member review.	

5.7 Earned Value Metrics

- \$4.1M-Full Funding
- \$2.94M-Spend Plan
- \$2.88M-Management Authorization
- As of end of Nov = \$88,512 Actuals

Graphical report will be initiated in December.

MRT 4749	GREEN	Perform Activities to Enable Plutonium Sustainment Program Goals			
1. Continue to support and lead the W87 legacy pit IPT as the DA 2. In coordination with LANL PA, maintain Sheffield measuring device for process qualification 3. Document and provide design for W87-like build no later than December 31st, 2012 4. In conjunction with LANL PA, complete W87-like build 5. Receive and process special items					
L2/L3 Milestone	Baseline Date	Status/Comments	Completion Date	RGYB	
W87 IPT and Pit Certification					
Support completion of W87 EDU build	9/30/2013			GREEN	
Update W87 metal specification	7/30/2013			GREEN	
Complete weld certification tests	3/31/2013			GREEN	
Initiate readiness review for compatibility tests	9/30/2013			GREEN	
Special Items Processing					
Receive shipment from SRS and begin processing	1/1/2013	Shipment received and processing started	11/30/12	BLUE	
Complete processing first set of special items from SRS and/or receive shipment of special items from NNSS	9/30/2013			GREEN	
Complete initial demonstration of purification and recovery of desired materials	6/30/2013			GREEN	
W87 Like Fabrication at LANL					
Document and provide design for W87-like	12/31/2012	Design provided to NNSA and LANL	11/30/12	BLUE	
In conjunction with LANL PA, complete W87-like build	9/30/2013			GREEN	
Complete material characterizations for "W87-Like" components shipped to LLNL	9/30/2013			GREEN	
Modern Foundry Cold Testing					
Complete integrated test of material transport system	6/30/2013			GREEN	

- W87-like build design provided to NNSA and LANL. LLNL completed drawing to procure new tube design, as well as continuing to evaluate fabrication processes.
- Draft work control documents are being prepared for packaging and shipping special items from Nevada. Site visits and conference calls are being conducted, as appropriate, with NSTec, NSO, and LSO personnel to coordinate project activities. An Integrated Project Team has been formed and is functioning.
- Completed superblock radiation safety review for special item processing
- Completed changes to OSP for special item purification, in process of acquiring signatures
- Started processing some of the Special Items from SRS
- Casting samples from runs performed last FY have been cut, mounted in epoxy, polished, and photographed. This was started in October and completed in November.
- The coring plan to obtain samples for specification development was completed and issued to LANL. Coring will take place in December at LANL.

- Discussions were held which led to planning a December meeting at LANL for scoping the work and use of equipment for the compatibility test.

6.2 Equipment

- None

6.3 Issues

- None

6.4 Variance Analysis and Recovery Plan

- None

6.5 BCRs

- None

6.6 Risk Table

Work	Description	Handling Strategy	Status
All work packages	Availability of required unit operations at LANL or LLNL	Work to integrated schedule and adjusts as needed	
Program management/LANL Office	N/A	N/A	
Special Items Processing	Receiving items from SRS	Get information to SRS by the end of FY12 and work any SRS issues during October 2012	
W87-Like fabrication at LANL	Design incompatible with LANL welding and assembly hardware	Adjust design or provide equipment fixtures as needed	
W87-Like fabrication at LANL	Loss of key personnel due to medical issues or retirement	Adjust schedule if loss is temporary or adjust staff to critical needs if loss is permanent	
Modern Foundry Cold Testing	Loss of key personnel due to medical issues or retirement	Adjust schedule if loss is temporary or adjust staff to critical needs if loss is permanent	

6.7 Earned Value Metrics

PERFORMANCE S-CURVE

LLNL

