C-BETA L2 Internal Review - Tuesday November 15, 2016

1.01 - Project Management - LEPP Trailer Conference Room *Present: Karl, Georg, Ivan, Dave R., Chris C. Katie J, Rich G.*
Discussion:
Time: Karl must be at 100% (Katie) discussion regarding that Karl might not be 100% at through full project, has 20% of time invested in technical pieces. Heavy discussion regarding need to hire someone to replace 20% technical time (Katie notes that 20% of time on other projects, plus one week for travel, leaves little time for Karl to manage project) Samantha listed at 40% (50-60% more realistic, 70% to CMS, __% to CHESS-U - will discuss at a later date)

Travel: PI/PM travel 2-3 days month average
Int'l travel should be noted at $3K (currently at $2500)

Reviews: Machine Advisory Board (Currently, have a panel, would anticipate that Board would include individuals from J-Lab and Stanford who have similar machines)

How do we account for time in preparation for reviews? Karl anticipates that it would be 1 FTE/1wk (those in attendance feel that 20 hours at 20 staff is far too low)

Need to come up with estimate of amount of time needed for prep work and place it either in individual WBS's or in Project Management to be accounted for

FFAG '17 (at Cornell) and ERL '19 (sell the future of C-BETA) need to be cost neutral - who will organize, coordinate speakers, time and effort, etc. (this is not realistic)

Do we need to plan a workshop for the future usage of C-BETA?

Miscellaneous: "So far unexpected items have been $_____" (use as justification for dollar amounts in Design & Planning section) Capital Expenses - *Note: HVAC, Holes in Walls, Building chilled water system currently budgeted in planned costs in WBS.* Planning for unexpected Cornell PDC costs (IP&P (Infrastructure Planning and Projects) now)

Adding DLN - hold expenses associated with that? Katie agrees that $200K is too low, Dave R. agrees also, citing aggressive schedule (if large problems arise, they will need to be taken care of quickly)

Discussion that Design & Planning and Capital Expenses columns should add up to $500K

Monthly Electricity bill (from current bill supplied by Jerry Codner) factored into this PM calculation - discussion regarding if this is realistic (Klystrons will be on much more frequently for longer periods of time)

Discussion regarding how to repay the "debt" (currently at $500K) shielding block purchases for CHESS-U?

How to roll in GEN charges (not small, will be millions of dollars for C-BETA, not an inconsequential), and 14% overhead? (14% needs to sit in project management - "Lab Operations" or "Lab Support")

Training, Software, M&S, and Safety not listed here, Karl acknowledges that they are here in PM, feels that they should go under each individual WBS.

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Deliverables: Monthly 1-2 page technical report to NYSERDA (cost?) Monthly oversight board meeting additionally - hopeful that these reports could be one in the same (Steve and Karl responsible for this)

Assumption should not be made regarding CLASSE covering business office expenses if they ship drastically upward. Discussion regarding needing additional time (from Micci specifically) need additional time from Micci (Katie and Karl will discuss later)

Rick instrumental in process as we need to find a 2nd funding source ASAP as we will not be able to fund entire commissioning effort on current budget.

10% Mgmt, 20% Meetings, 14% Lab Overhead

Clear to group that another body needed in Project Management team - discussion regarding what that person looks like (administrator, administrative assistant, scheduler, etc?)

1.2 - Accelerator Physics - Wilson 374 *Present: Chris M., Dave Rubin, Ivan, Karl, Georg*

Discussed LOE for physics support
Need for Dave Sagan for more than 25% - discussion regarding 50% or more? Possibly different needs for different years
Scientist (Beam Dynamics) still needed at 100% - Ivan agrees this person is needed (emittance, feedback, ties to interface, beam break up, etc.)
4 Graduate Students - (William, Steve, Ninajian ??) Possibility of substituting 1 grad student for a postdoc (Ivan feels that 1 scientist is not enough) 1 work on Virtual Machine, 1 work on start to end simulations
Rubin doesn't like Milestones -
Discussion regarding M. Erhlickman's time - Chris would like it, Rubin says not possible
Rubin concerned this group is not enough to get project done
Discussion from Georg regarding $$ of having Scott Berg or Stephen Brooks - could they charge most of their time to eRHIC?
$25K for computing cluster (need to purchase/add to WBS)
$10K Travel - looks low
$25K for regular computing (desktops, laptops)

1.3 - Gun/Injector - Wilson 374 *Present: Colwyn, Luca, Chris M., Ivan, Karl, Georg*

Spreadsheet assumes that Luca will be spending 1.5 years straight growing cathodes
Ivan feels that we need to train someone up, and Luca should oversee (not realistic to spend full time for that long)
Add 2 postdocs - one for cathodes, one for lasers
Colwyn should be accounted for in WBS 50% and additionally 100% in commissioning - will need to figure this out
3000 hours, 1800 per year, does not seem sufficient
Cathode lab supplies (gloves, etc.)
Cathode growth system
Laser supplies
Tobey should be up to 25% - discussion regarding him being oversubscribed, need to hire additional dedicated technician based in Wilson (move Tobey over to Newman) that will work directly for Adam and Colwyn and their postdoc's

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Discussion regarding work/$ for reserve gun maintenance (2+ months if gun goes down)
Agreement that the spreadsheet we are working from is an old sheet - Karl and Colwyn to sit down and update sheet with Adam and increase hours

1.04 - RF - Wilson 374 *Present: Karl, Peter Q, Fumio, Rich, Matthais, Georg, James, Dan, Eric S*

Discussion:
MLC Testing - increase cryo control optimization hours from 20, group feels that 20 is too few hours for this time (needs to include preparatory hours)

Is testing necessary in current location, or could we move it and test it then? YES - testing necessary to determine microphonics needs (pad under, etc) - Testing hours needs to be increased, possibly call "diagnostics" instead.

Disconnection Cryo pump, etc. - group discussion regarding 1 week for 3 people (Elect. Tech, Eng, Tech) group feels this time is slightly optimistic - feel that it should be higher (Matthias - assumes 50% additional time, Karl and James second)

Paul Bishop, Greg Culino - would be important to factored timing for this project (disconnection specifically)

MLC in Final Location - should account for 4 engineers for 2 days (need surveying time allotted, time for consult) 8-10 people for 4 hours just to facilitate the move itself.

Design of pump skids layout - Time? Allow for Dan's time, Eric's time, and a drafter roughly 150-160 hours

EPICS Screens for new pump skids and controls in general need to be updated - should account for 2 weeks of labor for one person for this job

Add contingency line for moving rack, extending cables - if we have to move it, we need to have time budgeted

LLRF - Tuners & Piazo (sp?) Fast and slow ADC need to be accounted for. Time estimated is very low.

Cool down - Time somewhat accurate (1 person continuously 24/7 for 2 weeks) discussed adding add'l 50% to account for 2nd person to assist with setup

Cavity Testing - Matthias time needs to be increased, also discussed that all other times should be increased by 50%

LLRF - Mixers will go away completely
Tuner motor control system - network issues?
Piazo (sp?) amplifiers.
Master Oscillator - need to purchase, $50 - $100K

Cryogenics - 80 hours more realistic for design of transferline layout and elbow transferline as well. Add 16 hours for procurement time, Machinist time extremely low also - noted (by Dan) that once placement is finalized it will be much easier to finalize these numbers. For now, bump to 60 hours across cryo.

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General - hours seem low, group worked together to add many hours to this, typically adding a factor of 2.

Pump skid pricing almost 1 yr old - need to re-quote for current pricing (expecting 10% cost increase)

Over course of 3 years, how many need to be rebuilt? 6 (all of them, 4, via group opinion, would be chargeable to C-BETA) this should be noted in WBS for maintenance

Items from Discussion that need to be accounted for:
SSA - GUIs, Utilities, Tenuators, and Power Meters

Procurement time also should be allowed for time spent communicating with vendor, directional couplers at input coupler (purchase)

Contact Kurt (JLab) regarding where they purchase their 3 Stub Waveguide Tuners

Decision needs to be made regarding whether or not the stable field needs to be achieved before Aug 2017 (1st go/no-go date) will make large changes where effort is applied

From Karl:
Breakdown RF System Maintenance into smaller pieces

Slack power supply for klystrons (discussion regarding putting it into Infrastructure)

1 spare Klystron - do we need an additional? (no - however IOT and SSA risky - purchase 200W SSA for deflector?)

Discussion regarding if it is possible to determine how much of the cryo load is being taken by C-BETA for charging purposes. Determination made that 60% of helium cost should be charged to C-BETA (these do not need to be in the individual WBS just need to be discussed - Karl will add to PM WBS)

1.6 - Splitter/Combiner - LEPP Trailer Conference Room *Present: Karl, Dave B., John B., Yulin L., Len H., Jim C.*

Electromagnets
Possibly need to increase cost and labor regarding stages/motors used to adjust path length (check for duplication in 1.8&1.9) discussion whether or not these should be remote-controlled. Risk of having motors, expensive - risk of not having motors, lot of time wasted manually entering/changing.
Stages- dynamic mounts - off by factor of 2 (count)
Quads - should be 32 per splitter, 64 total
Septum and Common Magnet need to be separated from Dipoles
Vertical correctors missing from WBS - need to be accounted for (same qty as Quads)

Extraction Line Magnets
Discussion regarding quantities - need to look at drawings and revise.

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Add Girder (80-20)

Magnet Measurement
Group feels that the estimated time for this portion of the WBS is very low and should be increased (1 week each)

Tables
Discussion with John Barley regarding which cabling costs were covered in WBS - determined that these cables would not cover magnet to power supply, but magnet to termination block.
Do in house? Send out? (ADC - very expensive)
Questions from John Barley regarding how many of each of these things will sit on the table, do we have a plan/layout so that power supplies can begin looking at integration? Lots of discussion on how to run cabling (bulkhead?)
Time also needs to be increased for this portion of WBS

Table Assembly
Need to add an additional design engineer?

Tooling/Packaging/Storage
Packaging and storage can be removed from WBS - taken care of in PM WBS

General Support
Needs to cover travel (plan for 2 trips to danfysik at least $2500, local travel to machine shops), Software support (Opera) Laptop

1.7 - Power Supplies - Wilson 374 *Present: Dave R., Mike B., John B.*
Discussion:
Wise to have rack over shielding wall
"Handoff" point discussed, John's WBS covers wiring to magnet, and wiring back to Ethernet switch
Discussion also regarding need for interlocks in certain areas (FFAG connectors)
Magnet temperature monitors not included - no one has discussed cost of this (if needed)
At present time, no H20 cooling
D. Rice raised concerns about documenting time for purchasing (was there enough)
M. Billing wanted a discussion with the production magnet folks to make sure interface between systems is flushed out
Discussed adding additional hours in some of the commissioning times
10-15% typical need "on hand" for spare parts, with multi-channel chassis, needs increase
Discussed using 8 channel unit for only 6-7 connections, leaving a "spare", also discussed physical location and storage of spares (DLN or warehouse not ideal)
Lock out tag out - need to figure out switch gear and procedure (and specific location)
Increase testing hours to include another person
Test cart/equipment not included - should be
Add set up for test facility - space concerns raised again - if DLN is used, need for rigger time back and forth should be added to WBS as well
Time to draft organized map for labeling and storage of racks at DLN (increase overall drafting hours)

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1.9 - Instrumentation - LEPP Trailer Conference Room *Present: John D., Nate, Mike B., Karl, Mike F., Ivan, Georg*

Discussion:

DAQ and BPM coming from Brookhaven, close to $1M, plus labor (close to $1M)

Thomas (BNL?) promised that BPM development would be paid for out of eRHIC (sp?) money -

Regardless of building or buying - Need to add line for CU resources for integration, test, and iteration (large amount of labor not accounted for on our side when BPM's get here)

Need to account for resource outside of John Dobbins - 2 or 3 FTE first two years, at least 1 FTE after that (Re: too much work for one person, other obligations, etc.)

Much offline discussion regarding "who" will be responsible, who we could hire to be responsible for other things so that John D. could focus on this.

Heavier discussion regarding need to finalize what needs to be done and how it needs to be done before actual staffing concerns can be addressed.

Beam loss monitors have never been used for machine protection in ERL (could never make it work)

Open question regarding necessary quantity of view screens

1.10 - Vacuum - Wilson 374 *Present: Karl, Dave B., Brent J., Yulin L., Aaron L.*

80 hours for design seems conservative for some WBS elements

Should be 6 sets of BPM housing (currently shows 4)

Welding hours - seem conservative - should be 1 day per chamber

Should make line item in WBS to account for additional heat tapes ($6K)

BPM's - $2K for 7 units seems light - request that Yulin double check figures/multiplier on this one

Beam viewers (currently at $4K) group feels should be closer to $10K

Discussion regarding whether or not the beampipe material needs to be bent through dipole?

Beampipe machining time - under estimated - should be at least 10 FTE days

Flanges seem low in price as well - Karl and Aaron feel flanges of that size would be closer to $1200-$1500/ea

Machining times seem low across section, however, total $325K seems OK

Inject BL and Dump BL time needs to be upped to at least 5 FTE days

Beam viewer - did Instrumentation also count for this? Yulin will discuss with John D. to insure that $$ is not duplicated

1.11 - Systems Integration - Wilson 301 *Present: Karl, Dave R., Rich G., Chris C. (1st half) Georg (2nd half)*

Remove L0E Vacuum Lab

What is in scope regarding Laser lab and Vacuum? Move (Karl believes this is correct)? Or re-setup (does Ivan feel this is the case?) Very "grey" area now - Ritchie and Ivan are discussing now.

Change wording to "move" (currently, setup)

Hours - if really just "moving" hours are fine, anything more than that, need to increase drastically

MLC Relocation

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All agree that this should be in 1.4 WBS

Relocate East RF System
$100K - what should this number be?
3K hours seems accurate, 2 FTE for 1 year

L0E East Wall
Hours too low, and agree that $$ should also be increased too
PD&C Technician - would we need them to come in and do quote?

Survey and Alignment
Need to add additional time for labor (2 people)
Survey team does not have enough equipment to facilitate high precision surveying (need to add line for this - $50K)
Need to train additional staff

Modify CESR 85F Cooling System
Discussion regarding what Kate wants to purchase vs. what Rich wants to purchase (performance vs. as quickly as possible) Stainless Steel tank could change number by $20K

Laser Room
Discussion of Adam's time "finalizing" things, agreed that the time should be listed in 1.12

Shielding
Radiation testing and Val's hours are in Safety, they do not need to be included in 1.11 - however, time needs to be included here for Chris M's time to determine loss from machine.
Overall - hours seem low
Recommendation: Shielding should be custom on turns to maximize space in L0E

Mezzanines
No longer needed in middle area, definitely need mezzanine for water system
Hours seem accurate

Electrical Systems
Feel dollar amounts are too low, by about a factor of 2 ($25K) should account for lighting and beam phones

Compressed Air Systems
All agree should stay low - very few requirements

Environmental Controls
Concern that temperature swing in room is 5 degrees, Karl being asked for much smaller variance. Need to take measurements over large period of time (over summer?)
Need to increase hours (40 hours scientist, 40 hours engineer)

Network and IT Support
Software needs? $$

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WiFi? - needed for servicing on the machine (think regarding tunnel)
600 magnet correctors needing Ethernet connections

General Support/Comments
Possibly need to add additional costs for another vehicle through Cornell Fleet Services to be up at DLN or go back and forth to DLN - forklift for DLN either?
Unexpected maintenance and repairs to Crane?
Trench Floors need to be updated (fill with concrete?) for stability reasons
Electric? Will need spreadsheet to determine if any panels will need to be updated/added

1.12 - Commissioning - LEPP Trailer Conference Room *Present: Ivan, Adam, Mike F., Karl, Chris M., Georg*
Discussion:
Adam believes that 2.5 FTE's are enough, Ivan ("badly lowballed"), Chris respectfully disagree.
Discussion regarding whether or not to budget for 2 Cornell shifts per day (4.5 FTE's)
Technical Support: ½ RF Person, ½ vacuum person (maybe 1/3?), cathode support (Luca - in addition to his time in operations), Gun Support (Karl) Ivan supporting (summer) Jim C (control room) option? ½ Control Support (John Dobbins/John Barley/Charlie S.) ½ Operator (John Dobbins) Michnoff? Berg? Brooks?

Adam should be in charge, and allow 2 operators (from group of trained individuals - Harsha 100% (shadow Adam), Luca 50%, to run accelerator) 2 additional Grad students, Additional Postdoc?

Ivan (Chris seconds thought process) - Generic Operator 1 - 8 (2 per shift, 3 shifts, plus alternates) names not necessarily of highest importance now. Need to start planning plan for people to be available for "off hours" now.
Ivan believes in order to be successful 3rd shift is necessary to complete the amount of work necessary in the time allotted.

Mike 2nd advocate for 3rd shift - allows for continuity, lower start up/shut down costs, would have a strong advantage for keeping things stable.

If we expect Hirsha, Jim C, etc. to be helpful at time of commissioning - need to front load training and get them in the control room earlier. Same would apply to Brookhaven staff (Michnoff, Berg, etc.)
Group expressed that with normal operations we take the time it "should take" and mult x2, feels that with this level of newness and uncertainty, should multiply by a factor of 3.

1.12 - Safety - Wilson 374 *Present: Karl, Georg, Brian H., Dwight W., Mike R.*
Overall - hours are much improved, account for roughly 2 years of time which group feels is an accurate measure
Discussed possibility of external review - pros/cons
Safety analysis - should be slightly higher hours
Floor plan documents are not in BOX folders where they need to be (M. Ray interested in floor plan layout)
Add $5-10K for conduit wiring/panels/etc.
Definitely agree there is a need for neutron monitors
All internal reviewers seem happy with account of radiation badges, digital dosimeters, etc.
Reviewers also agree that radiation monitoring for Diagnostics should be costed in other WBS's

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