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| SuperCDMS at SNOLAB Project Office BASIS of ESTIMATE FORM (BoE) | | Document Number: | |
| | | Date of Estimate: 26-Mar-16 | |
| | | Prepared by: Scott Oser | |
| UID Number: | WBS Section: 1.6.9 | | |
| Task Name: DAQ/Trigger Management and Travel | | | |
| Cost Type: | Costing Method: | <input checked="" type="checkbox"/> Prior purchase or experience Source: _____ | <input type="checkbox"/> Catalog Price Source: _____ |
| <input checked="" type="checkbox"/> M&S <input checked="" type="checkbox"/> Labor | <input type="checkbox"/> Engineering Estimate <input type="checkbox"/> Vendor Quote (attached) | <input type="checkbox"/> Other- Description: _____ | |
| Attach Relevant Documents (including but not limited to): RFP, Responses to RFP, Technical Evaluation of RFP, Vendor Quotes, Technical Specifications, drawing numbers | | | |
| Task Duration: (calendar weeks, 85% achievable): weeks (this applies only for BoE's written at lowest task level) | | | |
| Task M&S Cost (FY14\$): \$161.1K See cost table below Task M&S Contingency (%): 15 % | | Task Labor (resource type & work hours or % for duration of task, 85% efficiency assumed): 1800 hours See labor table below Task Labor Contingency (%): 30 % | |

Change Log

| Date | Description |
|-----------|--|
| 2015/8/21 | Initial version |
| 2015/9/3 | Corrected typo in total M&S cost |
| 2016/3/24 | Renumbered WBS (was previously 1.6.8, is now 1.6.9). Consolidate all travel for 1.6 in this L3 |
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Details of Estimate: A summary of the costs at level 4 is included in the table below. Tasks are separated by M&S and labor. Labor is estimated in hours.

This BoE contains project management and travel costs for the DAQ/Trigger. This includes the effort of the L2 manager (Scott Oser, UBC) and the deputy L2 manager (Dave Toback, Texas A&M), and travel for each of them to attend two project management meetings a year.

Based on the time commitment to date the time is estimated to be 5 hours per week for both people. The L2 manager and L2 advisor are not supported by project funds, and so their efforts are billed at an hourly rate of \$0/hr. Only time after January 7, 2016 is included for FY2016. The hiring of a DAQ programmer at TRIUMF on project funds is listed as a milestone for use in scheduling work by this programmer in other WBS tasks.

Each L3 in WBS 1.6 has estimated the number and nature of trips required in order to complete the work in that WBS. The following table breaks down the list by year and institution, as well as showing the total cost. The bulk of the trips are work at test facilities to test and debug the DAQ and trigger system with detectors.

| Trip description | Cost/trip | FY2016 trips | FY2017 trips | FY2018 trips | FY2019 trips | TOTAL COST |
|--|-----------|-------------------------------|--|--|----------------------|-----------------------------|
| 7 days at test facility (SLAC/UMN/UCB) | \$1930 | TRIUMF: 3 USD: 3 UMN: 1 | TRIUMF: 2 USD: 6 TAMU: 1 UCB: 1 | TRIUMF: 2 TAMU: 4 | | 23 x \$1930 = \$44390 |
| 14 days at test facility (SLAC/UMN/UCB) | \$3260 | TRIUMF: 5 USD: 3 UMN: 2 | TRIUMF: 1 | TRIUMF: 4 TAMU: 6 USD: 1 UMN: 1 | | 23 x \$3260 = \$74980 |
| 3 day project management meeting (SLAC/FNAL) | \$1170 | TRIUMF: 2 TAMU: 2 | TRIUMF: 3 TAMU: 2 | TRIUMF: 3 TAMU: 2 | TRIUMF: 2 TAMU: 1 | 17 x \$1170 = \$19890 |
| 14 days at SNOLAB | \$2920 | | | | TRIUMF: 2 FNAL: 1 | 3 x \$2920 = \$8760 |
| 21 days at SNOLAB | \$3960 | | | | TRIUMF: 2 | \$7920 |
| 14 days at TRIUMF | \$2160 | | | FNAL: 1 | | \$2160 |
| 21 days at TRIUMF | \$2970 | | | UCB: 1 | | \$2970 |
| TOTAL | | \$50,790 | \$28,410 | \$61,680 | \$20,190 | \$161,070 |

The following table spells out the cost breakdown for trips of different types. All prices are in US\$. Meals are charged at \$50/day in the local currency. Hotel, flight, and rental car expenses are estimates based on recent experience with travel to these locations.

| Trip description | Flight | Hotel | Local transport | Meals | Cost/trip |
|--|--------|--------|-----------------|-------|-----------|
| 7 days at test facility (SLAC/UMN/UCB/Queens) | \$500 | \$980 | \$100 | \$350 | \$1930 |
| 14 days at test facility (SLAC/UMN/UCB/Queens) | \$500 | \$1960 | \$1000 | \$700 | \$3260 |
| 3 day project management meeting (SLAC/FNAL) | \$500 | \$420 | \$100 | \$150 | \$1170 |
| 14 days at SNOLAB | \$840 | \$1280 | \$270 | \$530 | \$2920 |
| 21 days at SNOLAB | \$840 | \$1920 | \$400 | \$800 | \$3960 |
| 14 days at TRIUMF | \$500 | \$1060 | \$70 | \$530 | \$2160 |
| 21 days at TRIUMF | \$500 | \$1600 | \$70 | \$800 | \$2970 |

| W.B.S | Item | Labor type | |
|-----------|-------------------------------------|------------|-------------------|
| | | L2 manager | L2 deputy manager |
| 1.6.9.1 | FY16 project management (9 months) | 180 | 180 |
| 1.6.9.2 | FY17 project management (12 months) | 240 | 240 |
| 1.6.9.2.1 | Milestone: DAQ programmer hired | 0 | 0 |
| 1.6.9.3 | FY18 project management (12 months) | 240 | 240 |
| 1.6.9.4 | FY19 project management (12 months) | 240 | 240 |
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| | Total | 900 | 900 |