HEX Contingency Analysis Report

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Summary

The cost contingency for HEX Beamline project is extremely low as the current estimates prior to CDR are above both the $25M funding level from NYSERDA and the $5M funding level from NSLS-II. Any significant cost overruns will have to be dealt with through a reduction in scope. This contrasts with DOE projects which are normally expected to carry a 30-40% contingency at the start of a project. The project team used several ways to determine the risk value which will help identify the scope contingency items by PDR. The risk value calculated using different approaches is summarized below:

Risk Register - $656K (see Risk Register)

Top down risk assessment at WBS level - $4.45M (see Risk Assessment)

Bottom-up Estimate uncertainty - $3.99M (see Cost Book Report)

Different Approaches

Risk Register-

A detailed risk registry was created in MS Excel at L2 WBS level with inputs from Control Account Managers, Project Engineer, Project Controls, Beamline Lead Scientist, Program Manager and Portfolio Manager. The up to date Risk Register will be maintained in the HEX SharePoint site and the project intends to update it periodically (at least quarterly). Each risk carries a unique identifier which will be maintained throughout the project. The cost of Risk event (impact/mitigation) is multiplied with the probability of the risk event happening to arrive at a risk value. All these risk values are summed up to arrive at a total risk value captured in the risk register. At the time of writing this document, the risk value identified in the risk register equals $656,500.

Top down Risk Assessment-

Top down risk assessment was initially done in Excel and was transferred to CEB. Risks at the WBS level are identified by the Core Project Team using factors and multipliers by schedule, cost and Technical sources as defined in the Assumptions document (NSLSII-27ID-PLN-001). The sum product of these gets us an overall risk value. The CEB output of this exercise is posted as “Risk Assessment”). At the time of writing this document, the risk value identified using this approach equals $4,454,276.

Bottom-up Estimate uncertainty-

The uncertainty of the estimates at resource level within each activity is determined from the Basis of Estimate (BOE- examples VQ-Vendor Quote, HC-Historical Costs, PJ-Professional Judgement etc.). The uncertainty percentages for the BOE types were determined by the HEX Management team as defined in the Assumptions document, but the CAMs are able to override these percentages with a valid explanation. Estimate costs multiplied with the uncertainty percentages gives us the uncertainty value which are all summed up to arrive at the total value of Estimate uncertainty. At the time of writing this document, the estimate uncertainty identified using this approach equals $3,990,488.

Determining Scope Contingency Value at PDR

The project team compared the values calculated using the above three approaches and selected a Risk value to determine the scope contingency based on below formula:

Required Scope Contingency value =

(Top down risk assessment value + 4 times risk register value + Bottom-up uncertainty estimate)/6

The above formula is chosen to give more weightage to the risk register, but at the same time take other two approaches into consideration.

$$= \frac{\$4{,}454276 + 4 * \$656{,}500 + \$3{,}990{,}488}{6}$$

= $1,845,127

Scope Contingency at PDR

Item	WBS	Value	Decision date	Mitigation or consequence
Satellite building contingency	7.05.07.02	$617k	Nov-2018	Contingency held within WBS will be apparent if needed at time of bid evaluation.
Hutch descoping (B-hutch)	7.05.04.01	$265k	Nov-2018	Increased long term cost and inconvenience from separate installation.
Beamline components descoping	7.05.03.01	$130k	Oct-2019	Reduced usability and more complex commissioning
End station fitout	7.05.03.03	$1,314k	Oct-2020	Use existing equipment from NSLS
Controls (DAMA) descoping	7.05.06.02	$100k	Aug-2021	Less software functionality
Total		**~ $2.4M**		
Very radical solution (last resort, and would need NYSERDA concurrence)				
Delay procurement of SCW, install borrowed PM wiggler (from Australian synchrotron, would need agreement)	7.05.05.02	>$1M	Sept-2018	PM wiggler would have a significantly low critical energy which would impact the beamline performance.

Table 1: Scope Contingency