ORKA Review Committee Report
on the Design & Cost Review of
ORKA

April 2013

EXECUTIVE SUMMARY

A review of the ORKA project was held from November 2012 to April 2013. The review was performed by a committee of internal and external experts chaired by Ralph Brown (retired) at the request of Prof. Doug Bryman (UBC) and Dr. Bob Tschirhart (FNAL). The purpose of the review was to develop and document the project technical and cost requirements for the detector, beam-line and infrastructure facilities as detailed in the original ORKA proposal dated November 28, 2011 (DocDB-1365). The reviews were based on the latest Work Breakdown Structure (WBS) with presentations from proponents of each subsystem. Proponents were asked to review the design, refine the requirements and scope of their subsystem and develop an equally encompassing cost estimate with basis of estimate and contingency analysis for M&S and Labor. Open discussion at these reviews amongst collaborators furthered an understanding of subsystem interface requirements and integration of the project as well as a list of action items.

The ORKA Project has a base cost of $32.8M (FY13 dollars) with a contingency of 51% that results in a Total Project Cost (TPC) of $49.5M. This total cost along with detailed costs for each subsystem by ORKA project WBS is shown in Table 1. This cost estimate assumes that accelerator and beam line scope cost totaling $23.6M will be established as a number of accelerator improvement projects (AIP) rather than part of the TPC (as shown in Table 1). An alternative photon veto system with enhanced Barrel Veto (BV) and End-Cap (EC) detector systems totaling $21.9M is noted in Appendix-3 as a possible INFN contribution that is not included in the TPC. Total detector subsystem deliverables including integration and installation effort accounts for 79% of the TPC with project management at 18% and OPC (R&D) at 3%, all considered a reasonable breakdown of project cost.

ORKA Cost Estimate

WBS	Description	Base Cost	Cont (%)	Total Cost	Funding Source
1.0	**TPC**	**$32,800**	**51%**	**$50,000**	
1.1	**Accelerator & Beams**	**0**	**0%**	**0**	
1.1.1	A0 to B0 transport	0	0%	0	AIP
1.1.2	Target & Dump	0	0%	0	AIP
1.1.3	Kaon Beam				
1.2	**Detector**	**25,370**	**53%**	**38,910**	
1.2.1	Spectrometer Magnet	1,010	50%	1,510	ORKA
1.2.2	Beam and Target	850	45%	1,240	ORKA
1.2.3	Drift Chamber	3,320	40%	4,650	ORKA
1.2.4	Range Stack	4,490	53%	6,860	ORKA
1.2.5	Photon Veto (BV+EC)	5,830	60%	9,330	ORKA
1.2.6	Electronics	6,930	59%	11,020	ORKA
1.2.7	Trigger & DAQ				
1.2.8	Software & Computing	0	0%	0	OPS/Research
1.2.9	Installation	2,940	46%	4,300	ORKA
1.3	**Project Management**	**6,510**	**40%**	**9,110**	**ORKA**
1.4	**OPC**	**950**	**60%**	**1,520**	**ORKA**
1.4.1	R&D	950	60%	1,520	ORKA
AIP#1	Target/Dump Systems	2280	60%	3,650	AIP
AIP#2	Separated Kaon Beam	5400	60%	8,640	AIP
AIP#3	Magnets for IF	2,740	44%	3,960	AIP
AIP#4	High Intensity Beam	4,690	37%	6,410	AIP
Total AIP		**16,000**	**47%**	**23,000**	**AIP**

Table 1: ORKA Total Project Cost

The Committee found that the ORKA project has satisfied requirements for a CD-0 cost estimate and that in many areas, based on the team's previous experience with E787/E949, the cost estimate is at a CD-1 level. Previously unidentified scope was defined and assigned to the appropriate WBS. Additional detector enhancements were reviewed and evaluated for future consideration. The presentations and discussion were based on a possible FY14 start; a delay of 3–4 years in funding would require further review and consideration of the impact on project facility infrastructure and cost.