

# Basis of Estimate

1. **WBS ID** 1.1 Total cost for this BOE: \$3,889,990.98

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2. **WBS Name** Project Office

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3. **Estimated by** Farshid Feyzi (University of Wisconsin)

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## 4. WBS Dictionary Description

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Provide oversight and direction in managing and facilitating the IceCube Upgrade Project. Provide ongoing support for daily activities required and review processes to ensure accuracy of reporting data while providing leadership in developing tools, preparing for purchases and manufacturing equipment required for IceCube Upgrade completion. Staffing, Acquisitions, Organization, Project Definition, and technical coordination are also the responsibility of the Project Management team. Technical Coordination includes the resources required to provide overall technical leadership of the project. Tech Coordination supports the definition of requirements including scientific, logistical, environmental, contractual, reliability, quality and safety, interface control; provides solutions to meet these requirements; and documents and provides configuration management of these solutions. Technical oversight includes preliminary, final, production readiness, and deployment readiness reviewing of systems and subsystems. Production Coordination provides design for manufacturability guidance for engineering work. In production, manages the relationships between the project, the vendors, and the quality assurance process. Oversees the quotation process on serially produced parts.

## 5. Assumptions and Related Documents

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The estimates described in this document rely on the following assumptions, which are consistent with the Project's "Key Assumptions" document" (1) and the "Cost Estimating Plan" (2).

- The cost estimate technique classifications (A-L) follow the US Government Accountability Office (GAO) best practices. These are summarized in the Project's Key Assumptions document (1). The techniques are: A=Analogy; C=Engineering build-up; D=Expert opinion; E=Extrapolation from actuals; F=Parametric; L=Learning Curves.
- Contingency codes are assigned to each item: C1—C8. These reflect the estimated uncertainty in the estimate. The meanings of the contingency codes and the percentage of contingency in each case are described in the Key Assumptions document (1).

## 6. Scope

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The scope of this BOE covers the following L3 areas:

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1.1.1	Project Management	Creation and maintenance of Project Execution Plan and Project Management Plans; annual reporting to NSF and stakeholders. Liaison to advisory groups and stakeholders.
1.1.2	Project Controls	Project Controls develops, maintains and uses a consistent set of cost and schedule baselines for the development, implementation and commissioning of the IceCube Upgrade.
1.1.3	Quality and Safety Management	Quality and Safety Management encompasses non-conforming materials, incoming inspections, document control, audits, and corrective and preventive actions.
1.1.4	Polar Operations	This element includes the planning and execution of all of the activities needed at South Pole to successfully install sensor instrumentation into 7 deep drilled holes.
1.1.5	Project Engineering	Determine appropriate standards for purchased or fabricated elements of instrumentation systems. Responsible for standardizing appropriate system definitions, requirements, and interfaces. Provide design engineering support to instrument developers and project management.

## 7. Equipment, Materials, Supplies and Travel

### 7.1. Equipment

No equipment is included.

### 7.2. Materials & Supplies

The project office Materials and Supplies is given in the table below.

The M&S estimates are developed as follows:

- For project level software licenses needed for the project office (e.g. SmartSheet, Zoom, design software) contracted costs are entered.
- For computing hardware, peripherals, service agreements and office software the yearly cost is estimated as the average from project years one, two and three.
- For incidental expenses such as shipping, review meeting expenses, safety supplies yearly cost is also estimated as the average from project years one, two and three.
- For prequalification expenses for deployment of project manager for field seasons one two and three, standard cost per key assumption document is entered.

WBS	M&S/Equipment Activity	FY23	FY24	FY25	FY26	GAO Estimation Technique	Contingency Code
1.1.1.1	Project Office M&S	\$15,500	\$15,500	\$15,500	\$7,800	E – Extrapolation from Actuals	C1

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## 7.3. Travel

Travel in the project office covers travel for project personnel and travel and support for internal reviews. All South Pole deployment costs are covered in WBS 1.2 (Implementation) for essential personnel – for example the Quality and Safety Manager, and others in the project office who may act as either drillers or instrumentation deployers. Total trips/year for the project office and reviewers are summarized in Table 1. For the reviewers, this is to support an annual “Vice Chancellors” review in advance of the annual NSF review. The VC review has 6 reviewers, all assumed domestic, and some additional compensation for some of the reviewers, as necessary. The number of trips/year and review travel/compensation are summarized in the table below. Using the average domestic and international cost per trip gives the final travel table of direct costs.

	FY23	FY24	FY25	FY26
PO-Domestic	8	8	8	1
PO-International	3	3	3	0
Reviews				
Reviewers – Domestic	6	6	6	0
Reviewer – Compensation	3,000	3,000	3,000	0

WBS	Travel Activity		FY23	FY24	FY25	FY26	GAO Estimation Technique	Contingency Code
1.1.1.1	Project Advisory Panel Reviews - Panel Members Compensation	Domestic	\$13,800.00	\$13,800.00	\$13,800.00	\$0.00	E - Extrapolation from Actuals	C1
1.1.1.1	PO-Travel	Domestic	\$14,400.00	\$14,400.00	\$14,400.00	\$1,800.00	E - Extrapolation from Actuals	C1
1.1.1.1	PO-Travel	Foreign	\$9,600.00	\$9,600.00	\$9,600.00	\$0.00	E - Extrapolation from Actuals	C1

## 8. Labor

### 8.1. Labor Estimate

Labor covers the project office effort, including the project manager, project controls, safety management, systems engineering and technical coordination, and logistics planning. Additionally, a small amount of support for the co-PIs is included in the project office.

### 8.2. Summary of Labor Resources

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WBS	Labor Activity	Resource ID	FY23	FY24	FY25	FY26	GAO Estimation Technique	Contingency Code
1.1.1.1	Project admin - principal investigator	KE	144	144	144	96	A - Analogy	C1
1.1.1.1	Project admin - Doug Cowen	KE	60	60	60	40	A - Analogy	C1
1.1.1.1	Project admin - Greg Sullivan	KE	60	60	60	40	A - Analogy	C1
1.1.1.1	Project Director-ODell	KE	720	600	530	240	A - Analogy	C1
1.1.1.1	Project manager-Feyzi	KE	1800	950	725	425	A - Analogy	C1
1.1.2.1	Finance -	MA	720	720	720	480	A - Analogy	C1
1.1.2.1	Project Controls -	MA	1800	900	900	600	A - Analogy	C1
1.1.3.1	Q&A / Safety - Zernick	MA	1356	1067	1067	226	A - Analogy	C1
1.1.4.1	Logistics-Tosi	SC	360	180	139	27	A - Analogy	C1
1.1.5.1	System Engineering-Sandstrom	SE	900	900	600	0	A - Analogy	C1
1.1.5.1	Technical Coordination-DuVernois	SS	900	900	900	150	A - Analogy	C1

## 9. References

- [Ref-1] 1. **IceCube Upgrade Project. Key Assumptions for the IceCube Upgrade Project.**
- [Ref-2] 2. —. *Cost Estimating Plan.*

## Revision History

Date	Revised by	Summary of changes
2021-12-28	Farshid Feyzi	First version created
2021-12-30	Marek Rogal	Added Tables
2022-01-07	V. O'Dell	Did some cleanup
2022-02-17	V. O'Dell	Synced with latest schedule
2022-03-23	V. O'Dell	Synced with latest schedule
2022-04-29	V. O'Dell	Corrected errors in tables, synced with the NSF reviewed rebaseline schedule
2022-05-06	V. O'Dell	Added Project Director

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