

# Basis of Estimate

1. **WBS ID** 1.4.3 \$0 total cost for this WBS

---

2. **WBS Name** FieldHub

---

3. **Estimated by** Tyce DeYoung (Michigan State University)

---

## 4. WBS Dictionary Description

---

This element includes design, production and testing of the FieldHubs, which will control, read out, and supply power and timing signals to the instrumentation and calibration devices connected to the downhole cables. The FieldHub hosts Comms Modules that communicate with the in-device Ice Comms Module over the downhole cable assembly.

## 5. Assumptions and Related Documents

---

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

---

The scope of this BOE covers the following L3 areas:

1.4.3.1	FieldHub Electronics	The labor and materials required to design and produce the FieldHub electronics. The labor and materials required to design and produce the surface readout FieldHub electronics, including the mini-FieldHubs used in DOM development and production testing, the FieldHubs to be deployed at South Pole, and all related prototype and development stages.
---------	----------------------	--

The scope of this L3 area includes design and production of the FieldHub surface readout electronics that interface via the surface and downhole cables to the DOMs in the ice. The “mini-FieldHubs,” a first

# Basis of Estimate

development release which supports DOM development and FAT, are also included. The FieldHubs and related labor are an in-kind contribution from DESY and essentially all related costs are off-project. The communications module (ICM/SCM) inside the FieldHub, and its related firmware, is essentially identical to that embedded in the DOMs and is therefore a WBS 1.3 responsibility. Responsibility for the software and firmware resident on the FieldHubs was transferred to WBS 1.6 via past CRs; this WBS element includes only the hardware.

## 7. Materials, Supplies, Equipment, Travel

---

### 7.1. Procurement of Materials, Supplies, Equipment

All materials, supplies and equipment related to FieldHub and mini-FieldHub are in-kind contributions from DESY.

### 7.2. Summary of Materials, Supplies, and Equipment Resources

There are no on-project materials or equipment costs associated with this WBS element.

### 7.3. Travel

There is no on-project travel associated with this WBS element.

## 8. Labor

---

### 8.1. Labor Estimate

All labor associated with design, procurement, fabrication and delivery of the FieldHubs and mini-FieldHubs is an in-kind contribution from DESY. NSF-funded labor associated with this WBS element are limited to on-site support for installation and testing of FieldHub prototypes at NTS, which is funded under M&O.

### 8.2. Summary of Labor Resources

There is no on-project labor associated with this WBS element.

## 9. References

---

[Ref-1] 1. **IceCube Upgrade Project**. *Key Assumptions for the IceCube Upgrade Project*.

[Ref-2] 2. —. *Cost Estimating Plan*.

# Basis of Estimate

## Revision History

---

<b>Date</b>	<b>Revised by</b>	<b>Summary of changes</b>
2022-02-27	Tyce DeYoung	First version created
2022-03-09	Tyce DeYoung	Corrected NTS support labor (covered under M&O, not on-project)