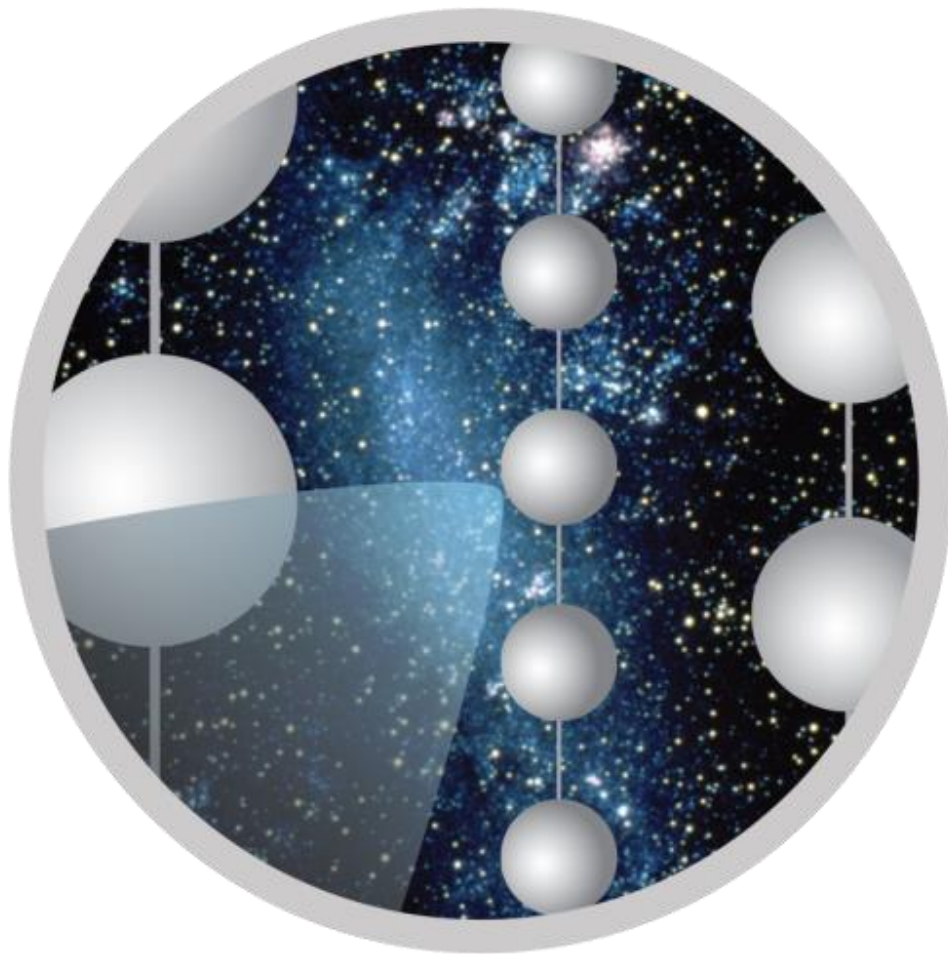


# **Divestment Plan for the IceCube Neutrino Observatory**



**ICECUBE**

## Revision History

Rev	Date	Author(s)	Comments
-	05/2021	JM, KH, AK	Initial DRAFT.

## Purpose

This plan outlines the steps that will be followed after a decision for divestment is made for the closeout of IceCube Neutrino Observatory (ICNO) operations and decommissioning. A transition to a new model of operation under a funding mechanism other than NSF is not foreseeable given the South Pole location of the ICNO. The IceCube Divestment Plan focuses on the scenario where the science return no longer warrants the continued operation of the ICNO. When that decision is reached, the Wisconsin IceCube Particle Astrophysics Center (WIPAC) management team that oversees ICNO management and operations will consult stakeholders and the NSF program office. A management team with personnel familiar with Antarctic operations will be appointed that will be responsible for managing the decommissioning and divestment activities. The transition team will develop a final transition plan as described below and will submit it to the NSF program office for approval. The WIPAC operations and management team will help ensure a smooth and successful process.

## Scope

The following elements will be included in the plan:

**Target date for completing the decommission:** April 1 in the year after the third and final South Pole season deployment to decommission and retrograde equipment.

**Organizations involved in managing the transition activities:** WIPAC, NSF, Antarctic Support Contractor (ASC).

**Estimated cost of transition, which includes labor and material cost, as well as the estimated contingency based on the uncertainties and risks:** By far the major cost of facility divestment will be decommissioning of the physical detector, computing, and infrastructure assets at South Pole. The costing of these activities including retro cargo from South Pole must be developed by NSF in coordination with the Antarctic Support Contractor. Most of the detector infrastructure is entombed under the ice and its final disposition, namely leave in place, has been covered by the IceCube Comprehensive Environmental Evaluation (CEE). An estimate of the remaining items eligible for decommissioning and retro equipment from the South Pole is provided below. The contingency estimate remains to be done.

**Plan for environmental impact analysis:** The environmental impact analysis completed when the MREFC project was proposed will be revisited and updated. Any additional environmental remediation needed will be identified in the first South Pole decommission season deployment.

**Plan for resolving contractual issues and closing of contracts:** Contract issues for services provided by personnel hired by UW-Madison will be handled by UW-System policies and procedures. NSF will be responsible for resolving contractual issues and closing of contracts with ASC.

**Any additional costs and responsibilities (e.g., HR and personnel-related costs, environmental remediation, etc.) associated with divestment/decommissioning should be noted to the extent possible.** Known costs and responsibilities are listed below.

Since the divestment will be accomplished through decommissioning, the cost and procedures for proper disposal of equipment and the cost and plan for environmental and site remediation are described below.

**No pension and health care responsibilities will continue after the divestment.**

The transition plan will also include the risk management during the divestment transition process. This includes a list of risks, risk mitigation and management plan that are under development

## **Actions Required for Decommissioning**

### South Pole Site

<b>Detector Elements</b>	<b>Disposition</b>	<b>FTE-Hours</b>	<b>Retro lbs.</b>
IceCube Deep-Ice Optical Modules	Leave in place. Impossible to retrieve.	N/A	N/A
IceTop Optical Modules	Recommend leave in place. Would require manual excavation of tank and removal of modules.	17,000	5,500
IceTop Tanks	Leave in place. Requires excavation by hand and with bulldozer.	N/A	N/A
Surface Junction Boxes	Recommend leave in place. Manual excavation and bulldozer required.	2,000	30,000
Main cables	Leave in place.	N/A	N/A
Surface cables	Leave in place	N/A	N/A
Scintillator prototypes	Remove.	500	5,000
Cosmic ray antenna prototypes	Remove.	100	2,000
ARA DAQ boxes.	Remove. Manual excavation	1000	5,000
ARA antennas	Leave in place.	N/A	N/A
ICL computing and detector infrastructure	Remove	5,000	25,000
EHWD	Retro	5,000	1,000,000
<b>Total</b>		<b>30,600</b>	<b>1,072,500</b>

### Northern Hemisphere

<b>Elements</b>	<b>Disposition</b>	<b>FTE-Hours</b>
Data Warehouse	Decommission.	1,000
Compute clusters	Decommission.	1,000
SPTS	Decommission	1,500
PCTS	Decommission	2,000
mDFLs	Decommission	500

Misc. infrastructure components	Decommission	1,000
<b>Total</b>		<b>7,000</b>

## **Decommissioning Schedule & Milestones**

Full ICNO decommissioning will require 3 field seasons. The first year will comprise a recon team of approximately 4 for the field season (Nov – Feb) to reconnaissance and inventory ICNO components at the South Pole site. Following this season, a full decommissioning plan will be developed. During the 2<sup>nd</sup> field season, a team of 12 will deploy to dismantle the above-mentioned detector systems and prepare the EHWD equipment for retro. During the 3<sup>rd</sup> field season a team of 3 will deploy to oversee the retro shipping at Pole.

Decommissioning of the Northern Hemisphere ICNO components can take place as soon as the decision is taken to decommission the observatory and will take approximately 1 year. Planning for decommissioning activity is included in the estimates in the table above. Project staff (35-40 FTE) may be ramped down over this period.