IceCube Project Monthly Report
December 2004

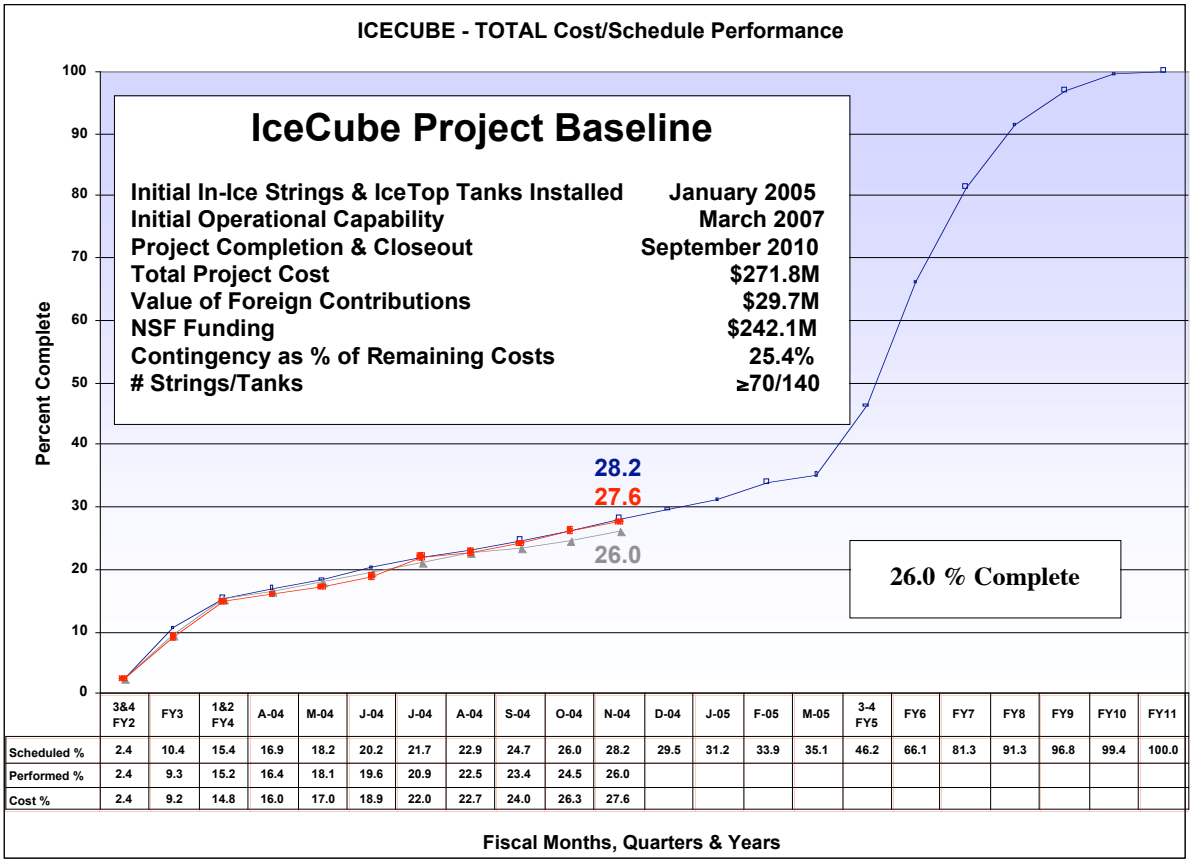
Accomplishments

Production of the Digital Optical Modules (DOMs) and cables required for the first season of installation is complete and the instrumentation was successfully shipped to the South Pole.

System testing at the University of Wisconsin-Madison with a representative configuration of production DOMs, connectors, and cables has thus far confirmed expectations regarding system performance.

Drill camp assembly, surface tank installation, and DOM acceptance tests at the South Pole are complete and full system testing of the IceCube Enhanced Hot Water Drill is underway.

Drilling of the first hole and the installation of the first string will begin after the waiting period for public comments on the IceCube Comprehensive Environmental Evaluation is closed. The public comment period ends on January 15th.



	3&4 FY2	FY3	1&2 FY4	A-04	M-04	J-04	J-04	A-04	S-04	O-04	N-04	D-04	J-05	F-05	M-05	3-4 FY5	FY6	FY7	FY8	FY9	FY10	FY11
Scheduled %	2.4	10.4	15.4	16.9	18.2	20.2	21.7	22.9	24.7	26.0	28.2	29.5	31.2	33.9	35.1	46.2	66.1	81.3	91.3	96.8	99.4	100.0
Performed %	2.4	9.3	15.2	16.4	18.1	19.6	20.9	22.5	23.4	24.5	26.0											
Cost %	2.4	9.2	14.8	16.0	17.0	18.9	22.0	22.7	24.0	26.3	27.6											

Cost and Schedule Performance – The total cumulative schedule and cost variances at the end of November were less than a few percent. The earned value measurements are consistent with the measurements of progress using detailed schedule milestones.

Drill Construction and Operation – The IceCube drill team completed construction of the seasonal equipment site and drill camp and has initiated full system testing. If all goes well the first hole will be drilled and the first string deployed after the CEE public comment period ends on January 15th. The last of the maximum of four strings planned will be deployed no later than January 30th, to allow adequate time for winterizing the drill equipment including moving all equipment to the winter storage area nearer to the South Pole Station. The schedule is extremely tight relative to the original plan.

IceTop Installation – IceTop installation is complete. All eight of the IceTop surface tanks are in place, the DOMs are installed, the tanks are filled with water and the degassing systems are in operation. Freezing continues to go smoothly on all tanks.

Instrumentation Production & Testing – The project produced 400 DOMs by the end of December 2004. Current production and testing status is summarized in the table below:

Instrumentation Status

DOMs Produced	400
DOMs Accepted for Shipment	280
DOMs at the South Pole (256 required for deployment)	280
DOMs Tested at the South Pole	280
Surface-to-DOM Main Cables Shipped	4
Surface Cables Shipped	4
Surface-to-DOM Cable at PSL for System Testing	1
Surface-to-DOM Cable Ready for Next Year (vessel)	1

Of the 280 DOMs tested at the South Pole fourteen did not pass on-site acceptance tests. Some of these DOMs may eventually pass local tests and the others will be shipped back for further testing and analysis. Fifty of the DOMs that were not shipped will go through Final Acceptance Testing in Germany and Sweden this month.

Instrumentation System Test Status – The South Pole Test System located at the Physical Sciences Laboratory was expanded to support high fidelity demonstrations of communications, data taking, timing, and other critical functions are now possible. Eight In-Ice DOMs are located in chest freezers, connected via a full 2,500 meter surface to DOM cable assembly, surface junction box, 800 meter surface cable assembly, and patch cables to the DOM Hub. A full IceTop station (four DOMs) is in a chest freezer and is connected in a realistic manner through the surface junction box and surface cable assembly. Additionally, the IceTop power and freeze control system electronics are operating over the actual cable set. Instrumentation is in place to allow each DOM to be driven by a simultaneously arriving light pulse.

The engineering and instrumentation team have been able to demonstrate reliable communications to all devices, the ability to load new software to deployed DOMs over the full cable path, basic local coincidence functionality, and normal functionality of the IceTop power and freeze control system. Further, they have demonstrated that all of these devices can operate simultaneously over the common communications cable set with no adverse effects.

Using the DOM in normal data taking mode, the test system can easily detect subtle background rate increases during injection events in the nearby Synchrotron facility, yet the shielding and electromagnetic interference provisions have been effective at keeping normal background noise from interfering with operations.

The next major demonstration to be conducted is to show that timing requirements are met by the overall system, followed by more detailed investigation of local coincidence behavior. This facility is also central to the evaluation of new software and hardware version releases prior to installation at the South Pole, and will be a key resource in understanding and interpreting the results obtained from the first season deployed devices.

Data Systems – The data handling system for the instrumentation that will be installed this season arrived at the South Pole and is being installed in the temporary counting house (future optical module laboratory). The software required for data movement is operational. The permanent counting house (former elevated dormitory) was moved to the center of the IceCube array and Raytheon is now preparing the building for the interior construction work planned for the coming next South Pole winter.

Detector Verification and Commissioning – The planning documentation is complete and simulation of the first four IceCube strings plus AMANDA is underway.

Project Documentation, Safety and Quality Assurance – The IceCube Safety Manual was approved. IceCube On-Ice personnel participated in an emergency response drill (hypothetical mass casualty scenario) at the South Pole Station. On January 2, 2005, IceCube hosted an open house in the station's dark sector to provide an opportunity for station staff to tour the seasonal equipment site and learn about project activities. Weekly safety meetings are held at the South Pole and chaired by the IceCube On-Ice Safety Officer.

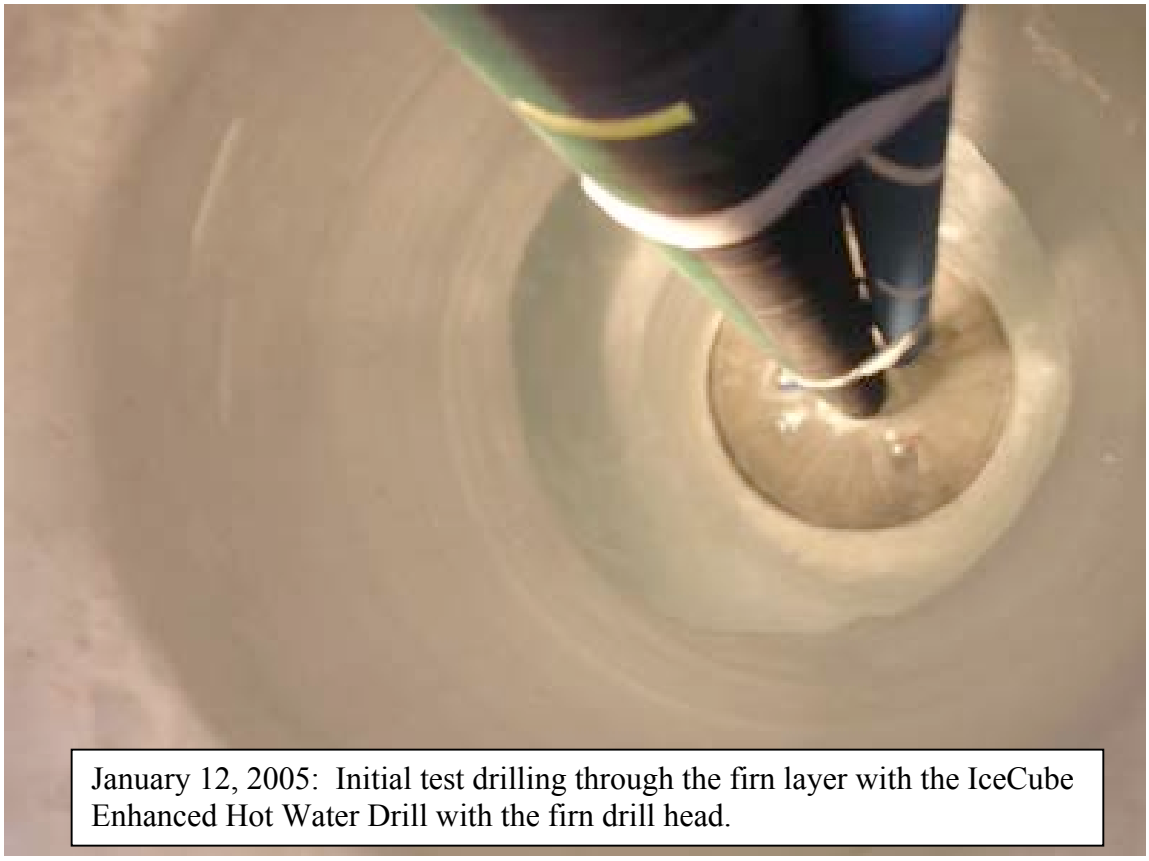
Future Meetings and Events

Monthly Status Meeting	January 19, 2005
UW Internal Status and PY04 (Fiscal Year 2005) Planning Meeting	February 23, 2005
1st Season Assessment/Future Year Planning Meeting @ UW	March 3-4, 2005
2nd Season DOM Pre-Integration Readiness Review @ UW	March 7-8, 2005
Project Advisory Panel/ Science Advisory Committee Meeting @ UW	March 9-10, 2005
Amanda/IceCube Collaboration Meeting @ Berkeley/LBNL	March 19-23, 2005
International Oversight and Finance Group Meeting @ NSF	March 24, 2005
UW/RPSC Detailed Planning Meeting in Support of SIP @ UW	March 28-29, 2005

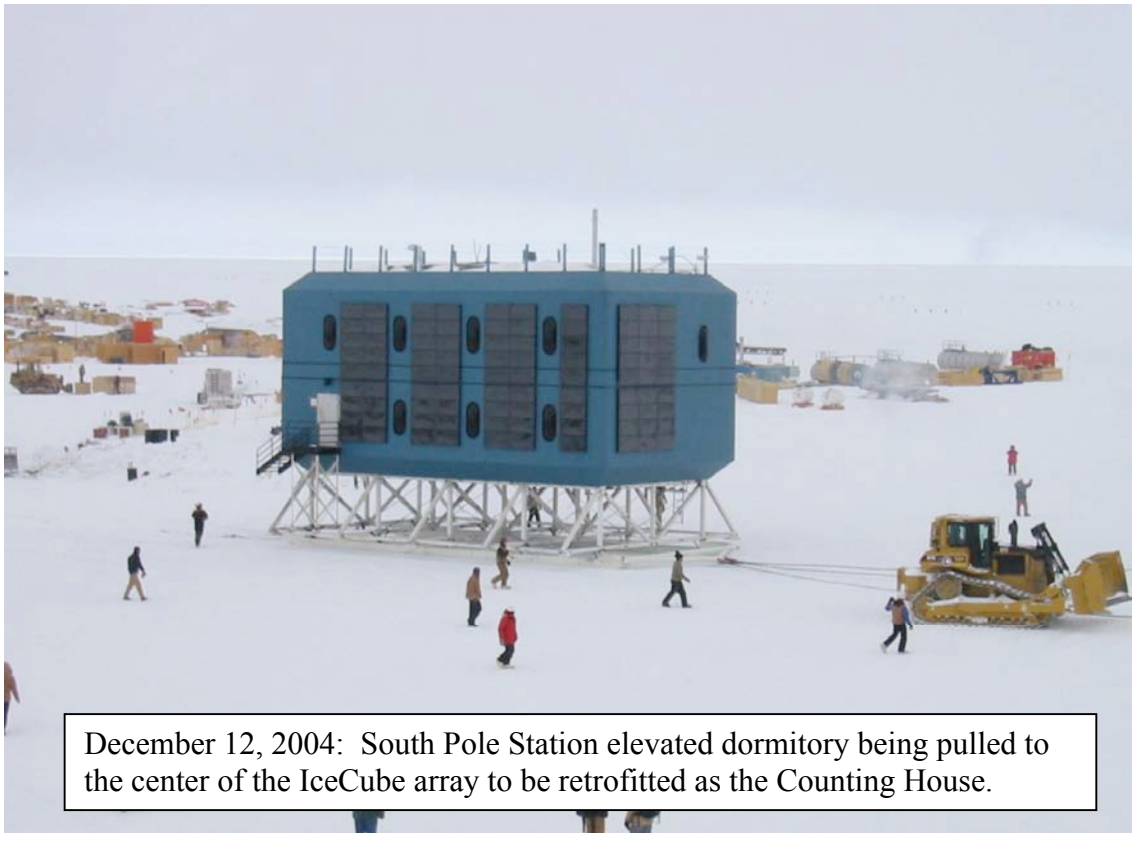
The monthly reports are posted at IceCube Monthly Reports.

January 09, 2005: Tower, drill cable connected, hose end in tower. Second drill shift installing a windbreaker to reduce heat loss.

January 12, 2005: Two IceTop stations (4 tanks) are switched to freeze control from the temporary counting house (Optical Module Lab).



January 12, 2005: Initial test drilling through the firn layer with the IceCube Enhanced Hot Water Drill with the firn drill head.



December 12, 2004: South Pole Station elevated dormitory being pulled to the center of the IceCube array to be retrofitted as the Counting House.