

## IceCube Project Monthly Report September 2005

### Accomplishments

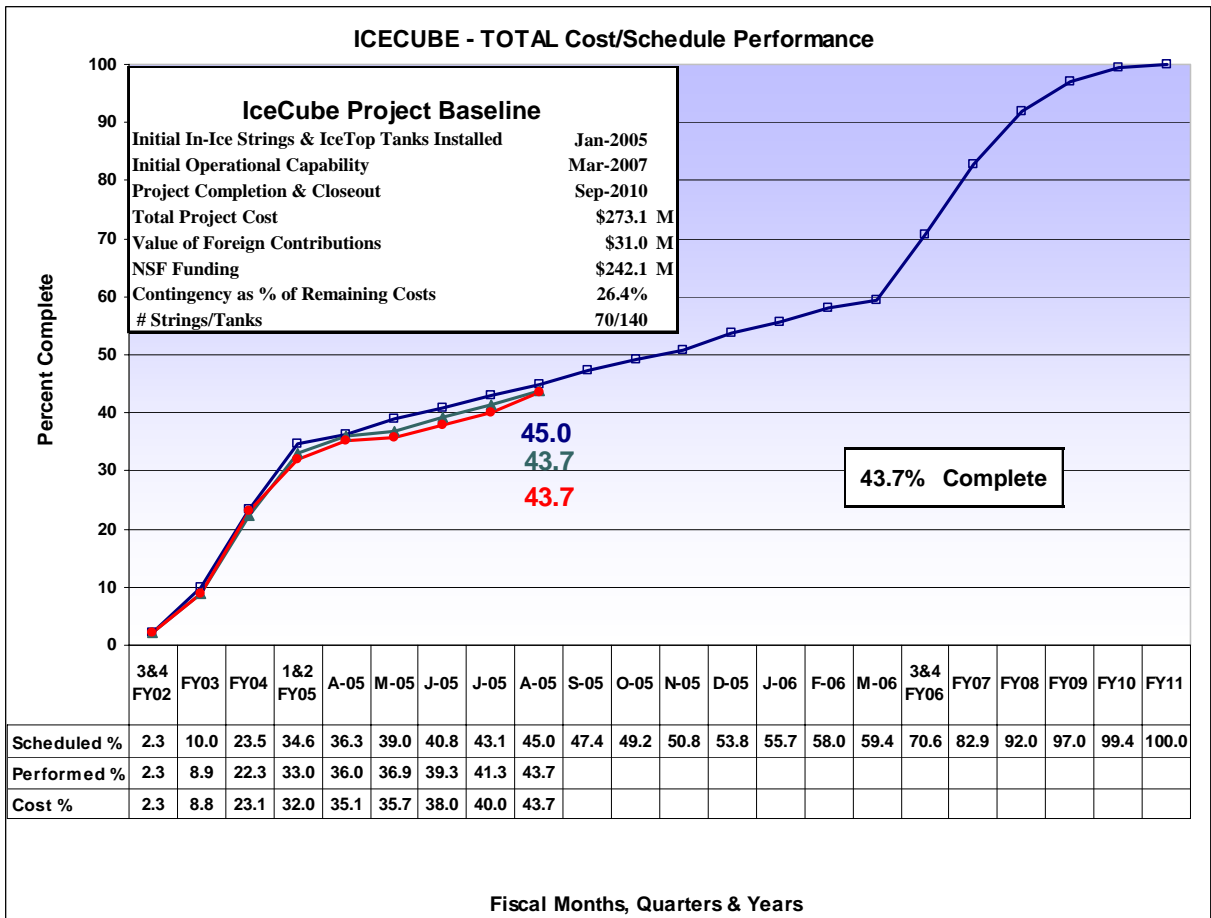
All of the IceCube Digital Optical Modules (DOMs) installed at the South Pole continue to produce physics quality data (60 DOMs on the in-ice string and 16 DOMs in surface tanks).

DOM production is complete at all three production sites (Sweden, Germany, and UW–Madison). The percentage of DOMs passing final acceptance testing cycles confirms the long-term project goals of 90% first pass yield and 95% ultimate yield.

The additional data handling equipment required for the next season of instrumentation installation was built-up and tested in UW-Madison and shipped to the South Pole.

All surface-to-DOM and surface cables that will be shipped to McMurdo station this season were shipped (8 surface-to-DOM and 12 surface). There are three surface-to-DOM cables already at the Pole and one at McMurdo.

The drilling procedures are nearing completion. A final review and sign-off on the majority of the procedures is scheduled for October 11-12th.



IceCube Neutrino Observatory Cost Schedule Status Report Reporting Period Ending: 8/31/2005 <sup>1</sup>											
WBS Element	Cumulative To Date (AY K\$)					At Completion (AY K\$)			Complete (%)		
	Budgeted Cost <sup>2</sup>		Actual Cost of Work Performed	Variance		Budgeted AY \$s	Latest Revised Estimate	Variance	Scheduled	Performed	Actual
	Work Scheduled	Work Performed		Schedule	Cost						
1.1 Project Support <sup>3</sup>	14,813.1	14,741.0	14,736.5	-72.1	4.5	30,232.2	30,227.7	4.5	49.0%	48.8%	48.7%
1.2 Implementation	18,297.8	18,282.3	17,685.8	-15.6	596.5	32,295.5	31,699.0	596.5	56.7%	56.6%	54.8%
1.3 Instrumentation	46,262.3	45,879.9	45,607.7	-382.4	272.3	98,174.3	97,902.0	272.3	47.1%	46.7%	46.5%
1.4 Data Systems	9,136.8	8,093.7	9,845.7	-1,043.1	-1,752.0	24,874.3	26,626.3	-1,752.0	36.7%	32.5%	39.6%
1.5 Detector Commissioning & Verification	6,274.1	6,480.1	6,346.3	205.9	133.8	18,773.7	18,639.9	133.8	33.4%	34.5%	33.8%
1.6 Polar Support Services	11,687.7	9,915.2	9,190.6	-1,772.5	724.7	32,054.5	31,329.8	724.7	36.5%	30.9%	28.7%
NSF <sup>3</sup>	480.5	480.5	437.3	0.0	43.2	1,263.0	1,219.8	43.2	38.0%	38.0%	34.6%
Sub Total	106,952.4	103,872.752	103,849.8	-3,079.7	22.9	237,667.5	237,644.6	22.9	45.0%	43.7%	43.7%
Management Reserve											
Total Contingency						35,385.8	35,408.7	22.9			
Items Outside of Approved Baseline											
IceCube Neutrino Observatory <sup>2</sup>	106,952.4	103,872.8	103,849.8	-3,079.7	22.9	273,053.3	273,053.3	0.0	45.0%	43.7%	43.7%

Notes: 1 Incorporates approved and currently pending baseline changes.

2 Total Budget at Completion includes non-US contributions \$1,283K over the amount in the post Hartill III baseline.

3 The budgeted contingency is: 26.4% of the Budgeted cost of work remaining.

**Cost and Schedule Performance** – The project is roughly 43.7% complete versus the planned performance of 45% complete when measured using earned value measurement techniques. The earned value measurement includes all tasks completed to date including design and development, procured materials, and the construction of the infrastructure that supports the current seasonal installation plan, e.g., the hot water drill, cargo shipments, etc.

**Drill Construction and Operation** – The hot water drill was operated for the first time at the South Pole in January 2005, drilling one hole to a depth of 1,500 meters and another to 2,500 meters that was used for the first IceCube string. The experience gained during the very short drilling period generated a long list of desired improvements to the drill that should enhance the reliability of drill operations. The design and fabrication work for these improvements was completed this summer and the equipment was shipped.

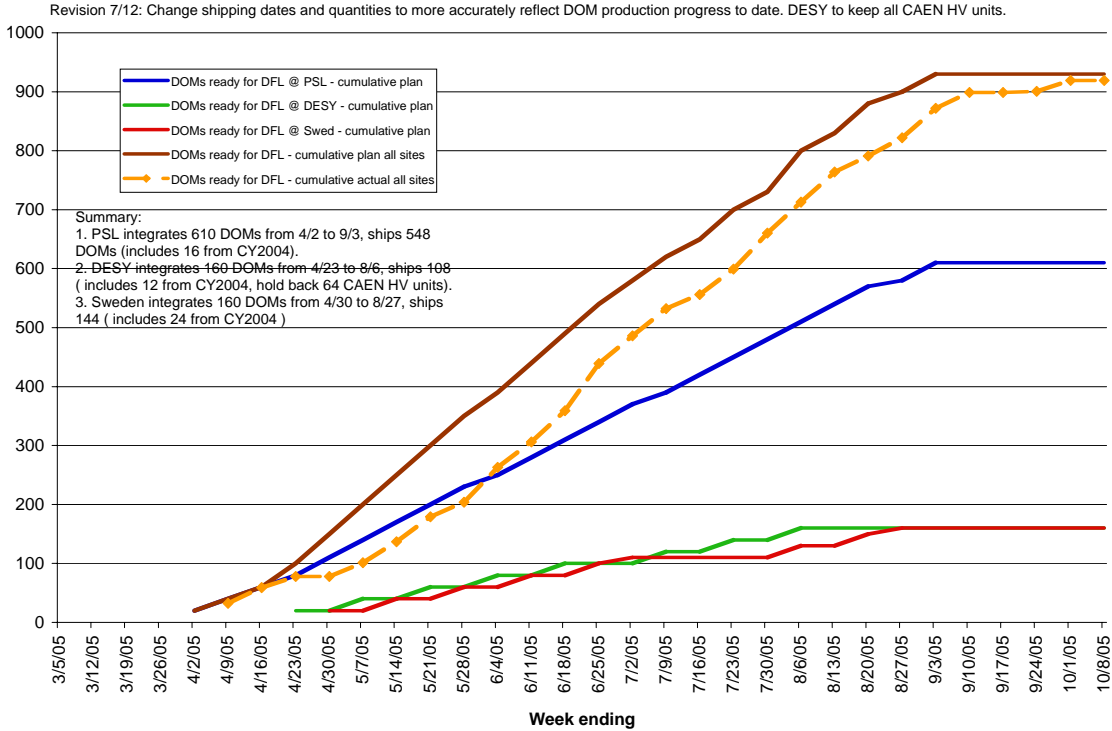
The experience gained last season was used to develop a comprehensive set of standard operating procedures for the drill. The writing of these procedures is well underway and will be complete before the start of the drilling season. A major review of each procedure is planned for October 11-12, 2005, when most of the procedures will be formally approved. The general drilling and string installation plan for 2005/2006 includes:

- Set up the drill camp and prepare for the start of drilling by December 10<sup>th</sup>.
- Drill and install strings over seven weeks (December 11<sup>th</sup> – January 28<sup>th</sup>).
- Improve the drilling speed to the original design goals.
- Install 2 strings per week (a total of 12 strings would be possible at this rate).

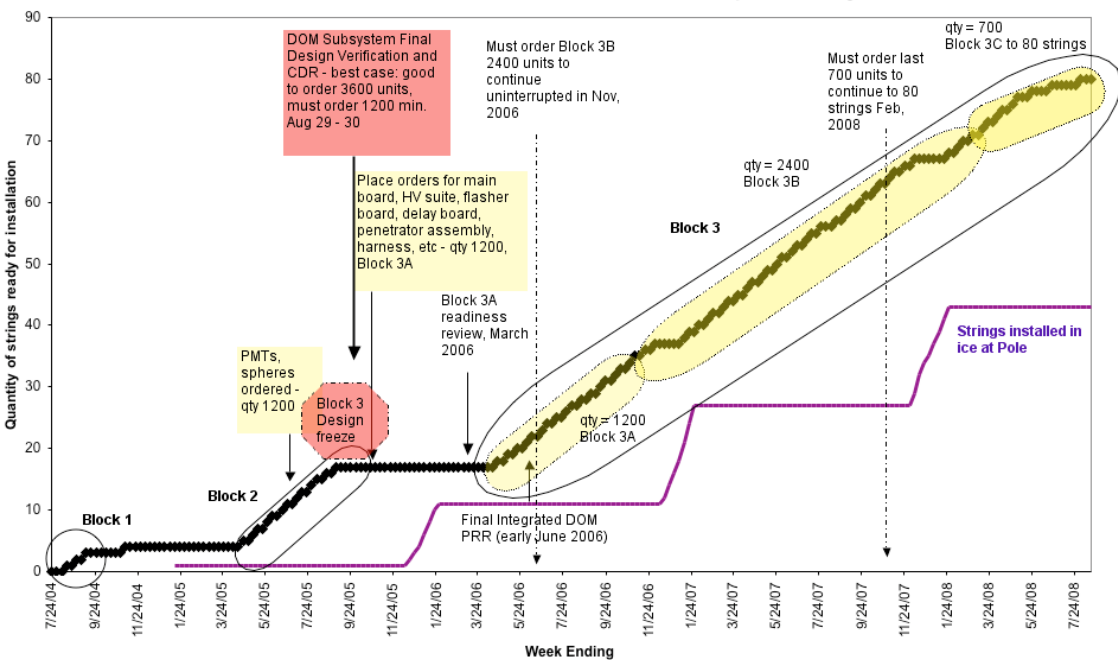
A draft operational plan for the 2005/2006 drilling season was completed in September and was circulated for review and comment. The general plan is to establish stable drilling operations and then to increase the drilling speed at an incremental rate. A number of improvements will be incorporated into the drill systems prior to the start of drilling and additional minor modifications can be introduced on-ice, e.g., modifications to the drill nozzle diameter, taper, and weight stack.

**Instrumentation Production, Testing, and Shipping** – The production goals for this calendar year were to produce 16 surface-DOM cables, 16 surface cables, and 930 DOMs. These goals will be met. Cable shipments this season to McMurdo via ChristChurch include 12 surface cables, eight surface-to-DOM cables. An additional five surface cables and six surface-to-DOM cables will be sent directly to McMurdo on the annual supply vessel and stored at McMurdo.

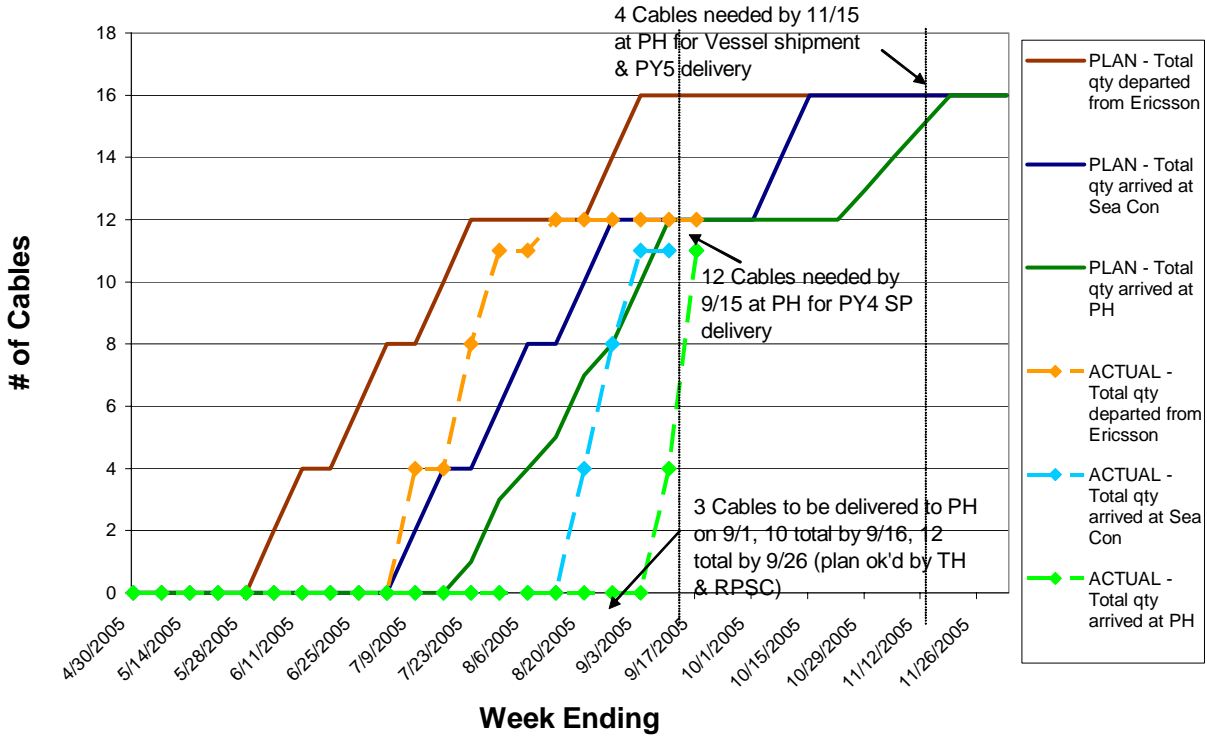
**IceCube DOM Production PY4 - Summary ( revised 7/12/05 )**



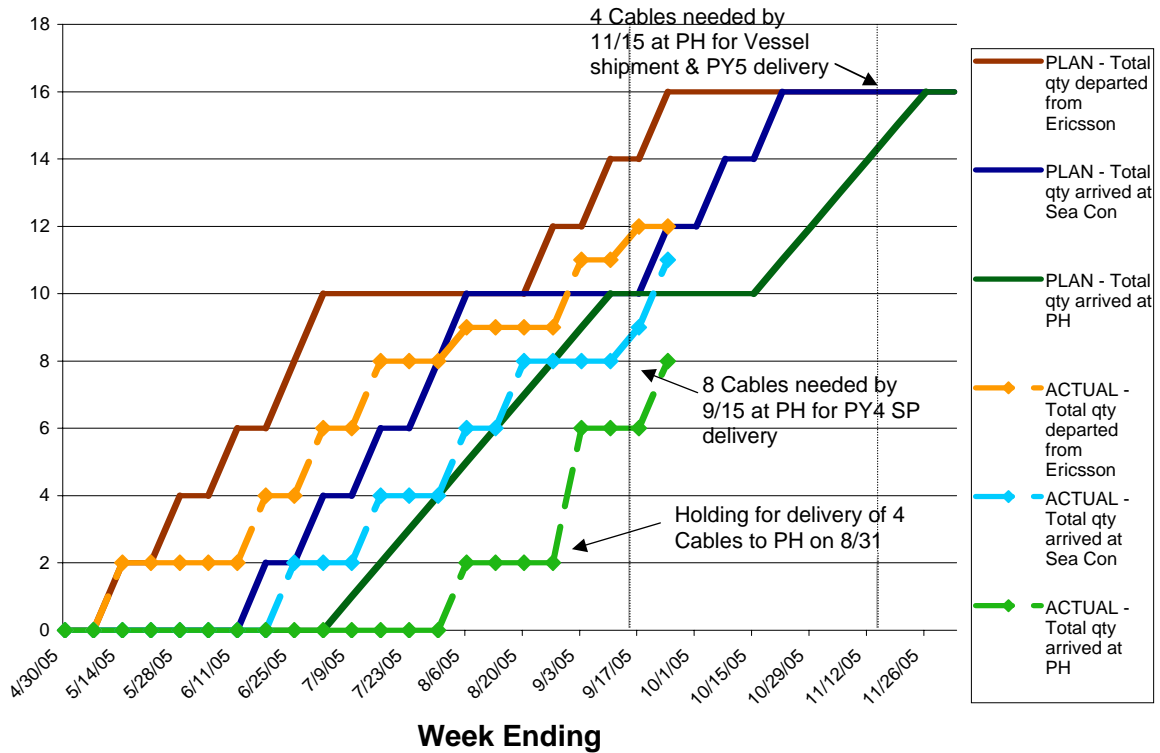
**IceCube DOM Production CY2004 - CY2008 for up to 80 Strings**



## Surface Cable PY4 Production



## Surface to DOM Cable PY4 Production



**Final Acceptance Testing of DOMs** – The first pass yield of DOMs passing final acceptance tests in the dark freezer laboratories is routinely approaching 90% on average, a long-term goal for the project. The second pass yield is 95%.

**String and IceTop Commissioning** – All 76 IceCube DOMs at the South Pole are operating and reading data (60 DOMs on the string and 16 DOMs in 8 surface tanks). Overall, the quality of the data from the first string and the eight IceTop tanks is very good. The IceCube scientific collaboration is evaluating data from AMANDA and the initial IceCube instrumentation. This analysis was presented at the IceCube collaboration meeting in late September. A recent IceCube event is shown at the end of this report. The collaboration meeting was used to develop more detailed plans for string and tank performance verification and commissioning for the 2005/2006 season when an additional ten strings (600 DOMs) will be installed in the deep ice and 48 DOMs will be installed in twenty-four surface tanks. The basic strategy for string commissioning is to conduct detailing performance testing on only a few strings and a minimal set of tests on the rest of the strings.

Data from the existing IceCube string is currently extracted using a test version of the data acquisition software. The “final” data acquisition software will be uploaded onto the first string at the start of the season.

**System Testing** – The South Pole Test System located at the Physical Sciences Laboratory was relocated to the UW main campus. The test system provides a critical test bed for the data acquisition and data handling software. The DOM-Cable test facility at PSL is now located in a new warehouse that provides adequate space for the connection of 60 DOMs on an actual, full-length cable plus IceTop hardware. This system provides a test environment for data acquisition software, general system performance testing, and the ability to troubleshoot problems without impacting the instrumentation installed at the South Pole.

**Data Systems** – The data handling systems required for the 2005/2006 season were procured and tested in UW-Madison and shipped to the South Pole for installation in the temporary counting house (future optical module laboratory).

**Quality Assurance & Safety** – There are no significant quality assurance issues to report. The project is preparing a response to the NSF Safety Review of the IceCube Program that was conducted in early August.

### **Meetings and Events**

Final UW/RPSC Detailed Planning Meeting for the 2005/2006 Season	September 14-15, 2005
IceCube Collaboration Meeting	September 25-29, 2005
International Oversight and Finance Group Meeting @ NSF	October 21, 2005
IceCube Drill Workshop/Project Advisory Panel Meeting	week of March 27, 2006

The monthly reports are posted at [IceCube Monthly Reports](#).

IceCube Event 3356

