IceCube Closeout

1. The performance of the IceCube Project Team this past season was outstanding. With a goal of installing 16 strings and a stretch goal of 18, they installed 19 after a slow start due to weather and finished a week early. This brings the total to 59 strings or ~ 75% of the original proposal.

2. In addition to the installation of an extra 3 strings, the fuel usage per hole was reduced to 4800 gallons by the end of the season compared to the originally projected fuel use of 7200 gallons per string. The Panel congratulates IceCube on this very significant improvement.

3. The Panel was pleased to see the initial data analysis from the IC22 run which indicates that all the steps needed for taking the raw waveforms generated by the DOM electronics to fully analyzed events are working well. The Panel looks forward to seeing the buildup of statistics with the full analysis of IC40 in the near future. Neutrino astronomy is now a reality.

4. The proposal for the installation of the additional 5 strings of the deep core array is a very attractive one and should be supported. This six string array extends the low energy reach of the detector into a region where it will be possible to do high statistics neutrino physics using atmospheric neutrinos. This will compliment accelerator based neutrino studies for both oscillation parameters and perhaps matter effects.

5. The disposition of the EHWD at the end of the drilling campaign in 010/011 needs to be decided soon so that there is a clear understanding of the impact on contingency. The cost of removing the drill from Antarctica is included in the contingency.

6. The argument for extending the IceCube array by an expanded hole pattern for the last nine strings planned for the last drilling season is based on improving the sensitivity for very high energy neutrinos (gain ~ 20%). There is a loss of sensitivity for few TeV neutrinos (~ 8%) by the removal of strings from the regular array but the IceCube collaboration argues that this energy region is dominated by atmospheric neutrino background. Provided that there are not technical problems, the Panel agrees that this makes sense.

7. The detection of the radar interference during the testing of the newly installed strings this past season is strong confirmation of the IceCube collaboration's ability to rapidly understand a noise problem. It does not affect their data quality. IceCube is now able to tell the radar group when their phased array antenna has stopped moving the beam.

8. The resiliency of the IceCube data processing system was illustrated when they reprocessed three months of data without significant impact on their normal data processing. The reprocessing was necessary due to calibration errors in the original analysis.

9. The management structure for the data analysis stream is making good progress and seems to be working well.

10. The tracking on the scientific effort is very good and the IceCube collaboration has a clear understanding of their needs.

11. The MOU's for the M&O tasks are in place and they seem to be working well. Having these in place before there is an issue makes resolving that issue much easier.

12. On the implementation front, the hose problem is finally solved, the drill software is in good shape, and the fern drill improvements include a method for getting through debris and it is working well. There are 37 water heaters with only 27 needed so this is in good shape, the problems with the pumps are solved and there will be 70 DOMs left over from the 86 strings. All cables are ordered and available, and the power consumption is 400 watts per string.

13. The Panel is concerned that there currently is only one copy of the raw data tapes. IceCube should move rapidly to providing two copies and have them stored and shipped separately.

14. The new electrical/mechanical cables have experienced mechanical slippage. IceCube added an external clamp to support the weight and they are looking into what happened with the cable end. There was no loss of electrical signals.

15. If for some reason IceCube is not successful in installing the planned 18 strings during the coming season there is sufficient contingency to complete the installation the following season.

16. Fuel usage for the remaining installation of IceCube in the current economic environment was cited last year as the largest uncertainty for the timely completion of the detector, to be reassessed at next years' annual review and adjusted accordingly at that time. A combination of improved efficiencies of fuel use and favorable price experience has turned this around.

17. The Panel reviewed the current risk assessment and potential contingency assignments. Approximately $7.0M of contingency is uncommitted with potential assignment of $6.9M. The Panel appreciates the careful management of the project that the funding appears sufficient to complete up to an 86-string installation.

18. The DOM and cable production for up to 86 strings will be completed by Nov. 09. This includes more than 60 extra DOMs (in two design versions). Given past experience, this should provide sufficient field spares for the installation of up to 86 strings.