THE UNIVERSITY OF WISCONSIN

SPACE SCIENCE & ENGINEERING CENTER

MADISON, WISCONSIN

DOCUMENT IDENTIFICATION

Title:	**REPLICATE ICE CORING SYSTEM**
	SCIENCE REQUIREMENTS DOCUMENT

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DOCUMENT APPROVAL

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REVISION HISTORY

(maintain last 3 versions)

REV	ECN	DESCRIPTION	DATE	APPROVAL
-	NA	Original Document	6/23/09	See above
A	1131	Added a requirement that states that a total of four deviations should be possible to a particular depth of interest.		

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1.0 PURPOSE

This document presents science requirements related to the Replicate Ice Coring System. The present document incorporates details from 8505-0006 (DISC Drill system, science requirements document). 8505-0006 previously included science requirements related to replicate coring; however, due to the scope of the replicate coring project, the present document was established to address science requirements for replicate coring separate from 8505-0006.

2.0 SCOPE

The requirements in this document focus on what samples and information need to be collected as part of replicate coring.

3.0 REFERENCES

8505-0006	Deep Ice Sheet Coring Drill DISC Drill System Science Requirements Document

4.0 ACRONYMS & DEFINITIONS

4.1 Acronyms

DISC	Deep Ice Sheet Coring Drill
ICDS	Ice Coring & Drilling Services
ID	Inner Diameter

4.2 Definitions

Parent Borehole	The original borehole wherefrom deviation drilling is performed.

5.0 RESPONSIBILITIES

5.1 ICDS Engineering is responsible for:

5.1.1 The creation and updating of this document.

5.1.2 Ensuring the device design fulfills these science requirements.

5.2 SSEC QA is responsible for ensuring that documents are created, reviewed, approved, maintained and updated per appropriate procedures.

6.0 REPLICATE CORING SCIENCE REQUIREMENTS

6.1 Core Characteristics

6.1.1 A minimum core length of 1m is required, though 2m is desirable.

6.1.2 A target core diameter of 100mm. It is desirable that the diameter does not vary by more than 3mm, i.e. 97mm-103mm core diameter is acceptable.

6.1.3 Total replicate core collection up to 400m.

6.1.4 Ice pieces to fit together snugly without any gaps.

6.1.5 Ability to determine the in situ orientation (azimuth) of core segments to within ±10°.

6.1.6 It is desirable that the replicate core is within 0m to 20m of the parent borehole; however, somewhat larger deviations than 20m are tolerable though not desired.

6.1.7 Core to be collected with an angle of deviation of less than 20° from vertical. 10° or less is desirable.

6.1.8 An amount of rubble during the initial deviation from the parent borehole is permissible. Note: Deviation from the parent borehole will require some amount of drilling or reaming that does not produce science grade core. This is necessary in order to start the deviating borehole.

6.2 Hole Characteristics

6.2.1 The Parent Borehole must remain open and usable after replicate coring has occurred. No reduction in diameter of the parent borehole is allowed (e.g. no permanent rings or whipstock may be used).

6.2.2 Reaming of the parent borehole is permissible but should be kept to a minimum. Reaming should be less than 20 meters in length, and result in a borehole diameter increase less than 100mm. This is allowed for each deviation from the parent borehole.

6.2.3 Replicate coring should be possible at any location of the borehole, starting 100m below casing end.

6.2.4 Damage to the parent borehole wall should be kept to a minimum, outside the reaming interval shown in figure 1.

6.2.5 It is required that deviation is performed on the ‘up hill’ side of the borehole. This is to ease logging of the borehole. This requirement does not apply if more than one deviation to a given depth is performed, see 6.2.9.

6.2.6 The borehole inclination must be measured with an accuracy of ±5°

6.2.7 The Replicate Ice Coring System must be operational at a lowest temperature of -55°C.

6.2.8 If any permanent equipment is to remain in the parent borehole it must have an inner dimension equal to, or larger than, that of the parent borehole and not obstruct borehole continuity.

6.2.9 Up to four deviations to a depth of particular interest is desired. If more than one deviation to a given depth is performed, the requirement of 6.2.5 no longer applies.

6.3 Drilling Fluid

6.3.1 The drilling fluid must be the same, or compatible with, that used in the parent borehole.

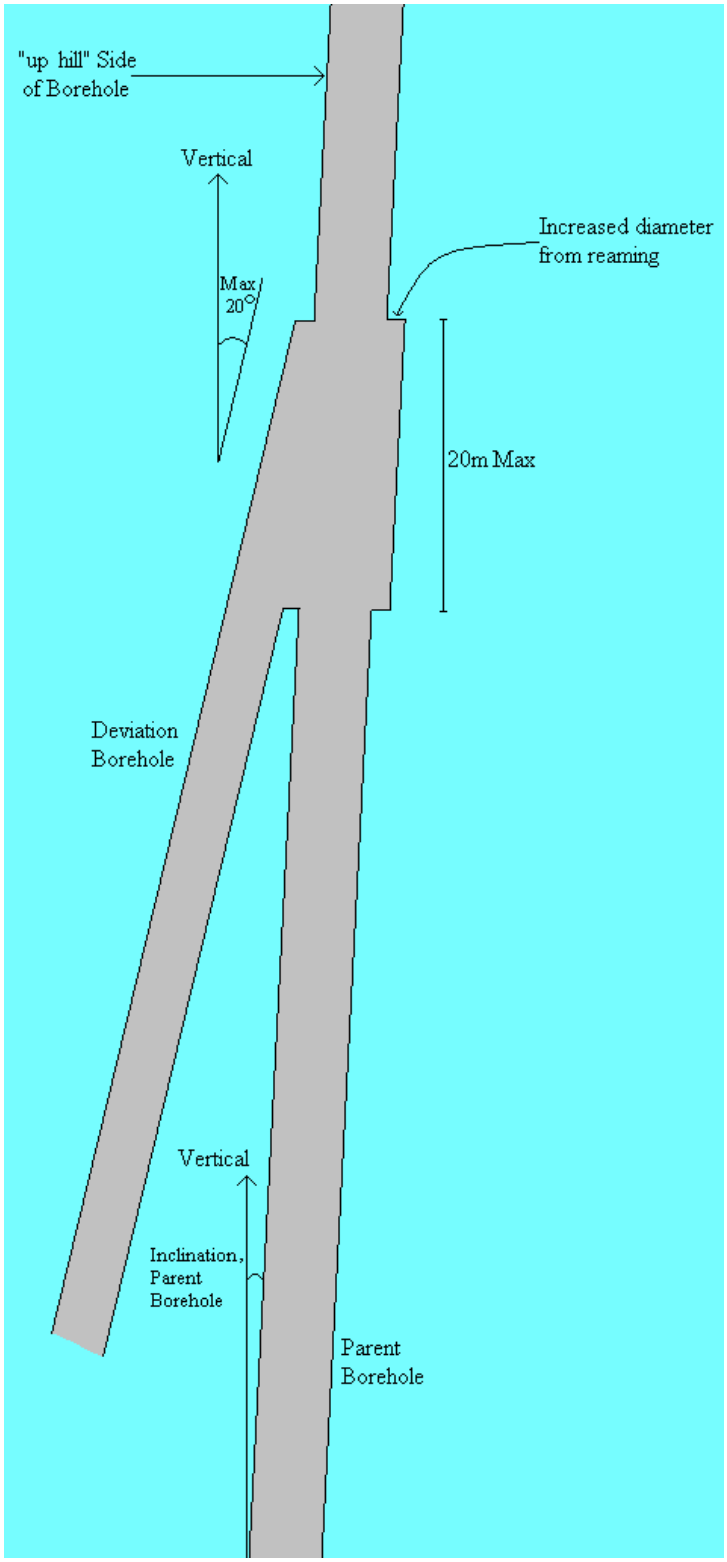

Figure 1. Cross sectional view of parent and deviation boreholes