THE RECOVERY OF THE STARDUST SAMPLE RETURN CAPSULE. S. A. Sandford[1], K. McNamara[2], and M. Zolensky[2] - [1]NASA Ames Research Center, [2]NASA Johnson Space Center

Introduction: The primary objective of STARDUST is to collect coma samples from comet 81P/Wild 2. These samples were collected by impact onto an array of aerogel tiles on January 2, 2004 when the spacecraft flew through the coma of the comet at a relative velocity of ~6.1 km/sec [1]. Measurements of dust impacts on the front of the spacecraft suggest that the aerogel particle collector was impacted by approximately 2800 ± 500 particles larger than 15 μm in diameter [2].

Stardust's Sample Return Capsule (SRC) reenters the Earth's atmosphere in the early morning of January 15, 2006. A heat shield protects the SRC during its initial ablative deceleration. Subsequent deployments of a drogue chute and parachute further slow the SRC. The descent of the SRC is monitored using radar and IR camera assets at the Utah Test and Training Range (UTTR), and its ultimate landing point is expected to be established with a high degree of accuracy.

Once it has touched down, a Recovery Team is sent to find and collect the SRC. Depending on ground and weather conditions, the Recovery Team may travel to the SRC landing point by helicopter or by 'MATTRACK' (a pickup with wheels replaced by treads). The recovered SRC is then transported to a cleanroom at the Avery Complex where the sample return canister is separated from the heatshield and backshell. These components will then be transported to the Johnson Space Center were the sample canister will be opened in a dedicated cleanroom and initial documentation and examination of the returned comet samples will begin. A discussion of the preliminary examination of the samples can be found in other abstracts in this volume.

Preparations for Return of the SRC: In order to be prepared for successful recovery of the SRC under a wide variety of circumstances, the Stardust mission has carried out numerous rehearsals of the procedures associated with SRC return and recovery. These efforts have included rehearsals of ground recoveries under both nominal conditions and multiple off-nominal scenarios. These training activities culminated in an Operational Readiness Test (ORT), including dropping an SRC test article from 10,000 ft, on the night of December 12/13. The end-to-end sequence of spacecraft release, SRC tracking, and recovery operations were tested. This test exercise went extremely well and the Stardust Project is now certified as ready for Earth Return and Recovery of the SRC.

The Recovery Team: The SRC Recovery Team is lead by Michael McGee of Lockheed Martin Space Systems, and includes Lockheed Martin technical personnel along with members of the Stardust Science Team and the NASA JSC Curatorial Office. Each member of the Recovery Team has a designated alternate to take their place in the event the principal team member is unable to perform his or her duties on the day of recovery. All members of the Recovery Team (principals and alternates) were required to attend appropriate recovery rehearsals.

A partial list of personnel who have played key roles in the Recovery Operation preparations is provided at the end of this abstract.

Safety: The safety of all recovery personnel is the primary requirement during the course of conducting the SRC recovery operation. Recovery Team members are equipped with appropriate cold weather gear and personnel safety equipment. The Recovery Team contains members who are knowledgeable in the areas of all feasible hazards (toxic gasses, unexploded ordinance, etc.). Each Team member has been trained for and has practiced the recovery operation procedure that includes steps to deal with all potential personnel hazards.

Contamination Control and Assessment*:* A primary concern for the study of the returned samples will be the issue of possible contamination by non-cometary materials. This issue is addressed by a two pronged approach - minimizing exposure and monitoring potential contaminants. The first effort is to carefully minimize all possible exposures to potential contaminants. This includes plugging the backside shell vents into the SRC shortly after landing, double bagging the SRC during transport, and establishing a positive pressure N_2 purge on the sample canister once it is returned to the cleanroom at Avery. In addition, a concerted effort is made to obtain samples that will allow the Science Team to assess possible contaminants the SRC may be exposed to during reentry and recovery. This will be done by (1) searching for contaminants on various monitoring 'coupons' that were placed with the SRC prior to launch but not exposed to the cometary flux, (2) identifying the organics in air, soil, and water samples taken from the landing site, (3) identifying any organics associated with the SRC ablative heat shields or captured in the return canister's air filter,

and (4) characterizing any organics or other contaminants in the original aerogel tiles.

Summary: Since the Stardust SRC has not yet returned to Earth, it is not possible to discuss the results of the recovery operation at the time of the writing of this abstract. However, by the time of the 2006 Lunar and Planetary Science Conference, the SRC reentry and recovery will have occurred. We anticipate at that time to provide details, including field images, of the recovery operation. In addition, we plan to provide an initial assessment of the possible scientific implications of the SRC recovery operation.

References: [1] Brownlee, D. E., et al. (2004) *Science* **304**, 764-769. [2] Tuzzolino, A. J. et al. (2004) *Science* **304**, 1776-1780.

Key Personnel Associated with the Stardust Recovery Operations Preparation

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