STARDUST Sample Collection at Wild 2 and its Preliminary Examination. P. Tsou[1], D.E. Brownlee[2], F. Hörz[4], R. L. Newburn[1], S. A. Sandford[3], Z. Sekanina[1], and M. E. Zolensky[4], [1]Jet Propulsion Laboratory, California Institute of Technology (peter.tsou@jpl.nasa.gov), [2]Astronomy Department, University of Washington, [3]NASA Ames Research Center, [4]NASA Johnson Space Center

Introduction: The primary objective of STARDUST is to collect coma samples from 81P/Wild 2 [1]. This was made on January 2, 2004. Before the encounter three significant model predictions existed for the number and size of samples to be captured. Three investigations during the Wild 2 encounter (Dust Flux Monitor, Comet and Interstellar Dust Analyzer and Dynamic Science) made in situ measurements of the dust. Spectacular images were captured of the Wild 2 nucleus and dust jets. This abstract compares the model predictions with the in situ measurements and Wild 2 images and assesses the likely samples to be returned for analysis on January 15, 2006. To give some lead time for sample analysts to prepare for the analyses of the returned samples, the organization of the Preliminary Examination is presented.

Model Predictions: Newburn maintained a dust model for the STARDUST Project to guide the design of the mission since Phase A in 1995 [2] and was updated during Phase E [3]. Based upon extensive experience with cosmic dust, the MPI Dust Group at Heidelberg published a prediction of the STARDUST in situ dust measurements [4]. With the latest 5th apparition perihelion Wild 2 observations, Sekanina provided an alternative prediction [5].

At the 1999 launch, STARDUST had targeted toward a 150km closest encounter with Wild 2. Due to concerns about the flux of centimeter particles, the encounter target distance was moved outward in August 2003. On December 30, 2003, due to ground observations showing reduced Wild 2 brightness, the encounter distance was reduced to 250km. The actual encounter distance was 236.4km.

The STARDUST Sample Collector has 132 continuous gradient silica aerogel cells with a total surface area of 1039 cm^2 [6]. The final Wild 2 sample objective was set to 500 analyzable particles >15 m in diameter for a 300km encounter.

Newburn Dust Model Predictions are interpolated for the selected sizes and adjusted to the actual targeted closest encounter distance of 236.4km.

Diameter	Phase A Model	Phase E Model
1 m	8840000	758000
15 m	6810	786
m	24	8

MPI Prediction The predictions are interpolated for the selected sizes and adjusted to the 236.4km encounter distance.

Diameter	Radial-Sym. Model	Axial Sym. Model
1 m	273,000	440,000
15 m	5,020	10,477
100 m	10	17

Sekanina Prediction The prediction is adjusted to the 236.4 km closest encounter distance.

m	15 m	m
3.8M- 10M	127 -318	1.3-3.8

Halley's continuous dust size distribution heavily influences all current cometary dust flux modeling, since it is the only cometary in situ dust flux measurement. Alternative cometary dust size distribution may be noncontiguous clusters and varying instantaneously for specific locations.

Extrapolations from In Situ Data: The Comet and Interstellar Dust Analyzer measured the time of dust impacts on its target plate as well as their mass spectra during the Wild 2 encounter [7]. The Dust Flux Monitor Instrument provided four sensors: two PVDFs and two acoustic piezoelectric sensors [8]. Shifts in the two-way Doppler telemetry and spacecraft attitude control sensors will provide an estimate of the integrated and individual large dust impacts [9]. Imaging showed a very active Wild 2 with many jets covering many locations during the encounter [10], indicating a good Wild 2 dust environment during the encounter. Due to the amount of telemetry and shortage of time, processing of the in situ telemetry has not been completed but will be ready for the conference. The real ground truth, however, will be in the returned samples.

Preliminary Examination: After landing of the Sample Return Capsule at the Utah Test & Training Range on January 15, 2006, the flight hardware will be transported to JSC for processing. Preliminary Examination of the Wild 2 samples will be completed by September 2006 and will encompass three tasks: retrieval, document and analysis [1]. After the aerogel cells are retrieved and deintegrated (retrieval task), a full inventory of the captured samples are generated with an evaluation of the efficacy of capture in silica aerogel (documentation task). The analysis task is the core of the sample science and will be organized into seven subteams: gases,

isotopes, bulk composition, mineralogy/petrology, visual (UV/vis, IR & Raman), organics and cratering.

In addition to the silica aerogel cells there will also be a total of 153 cm^2 of 100 m thick aluminum foil available for crater analyses.

Acknowledgment: This research was carried out at the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

References: [1] Brownlee D. E. et al. (2003) *JGR 108 E12,* pp. 14. [2] Newburn R. (1995), STARDUST SRD App. D. [3] Newburn R. (2001), STARDUST Operation Workshop. [4] Landgraf M. et al. (1999) *Planetary & Space Sci., 47,* 1029-1050. [5] Sekanina, Z. (2003) Private communication. [6] Tsou P, et al. (2003) *JGR 108 E12,* pp. 21. [7] Kissel J., et al. (2004) *LPSC.* [8] Tuzzolino A., et al. (2004) *LPSC.* [9] Anderson J. et al. (2004) *LPSC.* [10] Newburn et al. (2004) *LPSC.*