The Mars 2020 Three Forks Sample Depot.

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Introduction: The *Perseverance* rover continues to make progress on the task of collecting and documenting a set of Martian samples for possible future return to Earth by the Mars Sample Return program [1]. Near the end of 2022 the rover had acquired, sealed, and stored onboard a total of 15 rock cores, 2 regolith samples, 1 ambient atmosphere sample, and 3 witness tubes [2]. Of these 21 sealed tubes, 10 have been selected for inclusion in a first depot located in the Three Forks region on the floor of Jezero crater near an outflow basin [3]. In December of 2022 the rover began the construction of this depot (Figure 1 and Table 1).

Three Forks Sample Depot: The Three Forks region was chosen for the depot location because it is an area with flat terrain, no large rocks, and enough area for the *Perseverance* rover and potential future robotic vehicles to maneuver around the depot without disturbing the sample tubes [4].

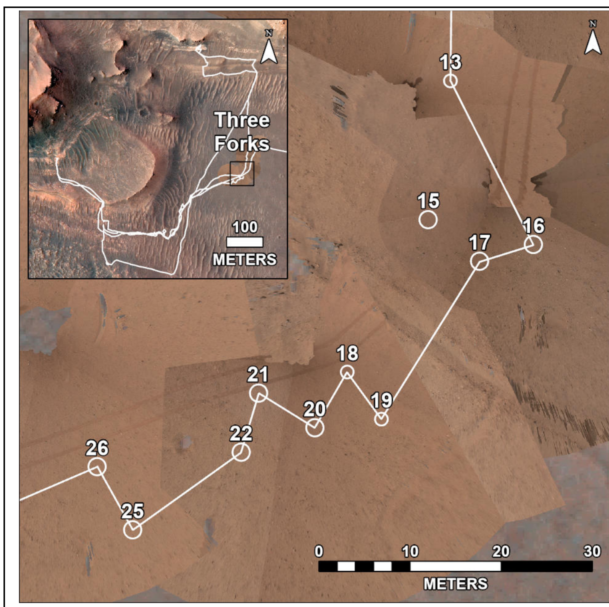

Figure 1. Location of the Three Forks Sample Depot within Jezero Crater, Mars (upper left), and the 10 sample tube drop zone locations (numbered circles). Drop zone 15 is a backup location.

Table 1. Inventory List, Three Forks Sample Depot

Sample Name	Drop Zone ID	Tube ID
Malay	26	TUBE_01
Mageik	25	TUBE_28
Crosswind Lake	22	TUBE_17
Roubion	21	TUBE_29
Coulettes	20	TUBE_34
Montdenier	18	TUBE_13
Hazeltop	19	TUBE_11
Skyland	17	TUBE_24
Atsah	16	TUBE_36
Amalik Witness Tube	13	TUBE_40

Sample Documentation Images: The individual sample core tips are imaged by the Mastcam-Z [5] and Cachecam [6] cameras prior to tube sealing and subsequent storage. These images document the texture and color of the samples and form an important component of the overall sample documentation data set. For details on the image acquisition process and documentation images see [7]. Figures 3 and 4 show typical examples of a sample documentation image, and Figure 5 shows a tube seal confirmation image.

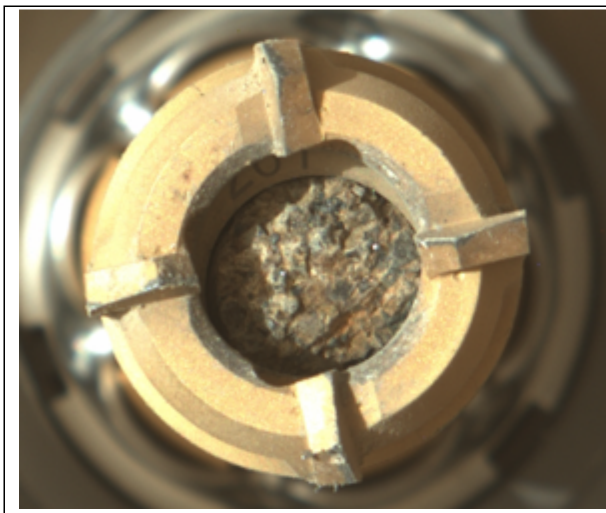

Figure 3. Mastcam-Z image (110 mm) of the Malay core tip (Sol 337). The core is ~ 13 mm in diameter.

Tube Placement Documentation Images: After the sample tubes are dropped onto the depot at the pre-designated zones in Figure 2, images of the tubes are acquired with the Front Hazcam, and Navcam cameras, and the WATSON camera [8]. These images serve two purposes: a) to provide confirmation of the tube state to the operations team during sample depot construction and b) to formally record the location of the tubes within the Three Forks region for the potential retrieval of the tubes by later missions.

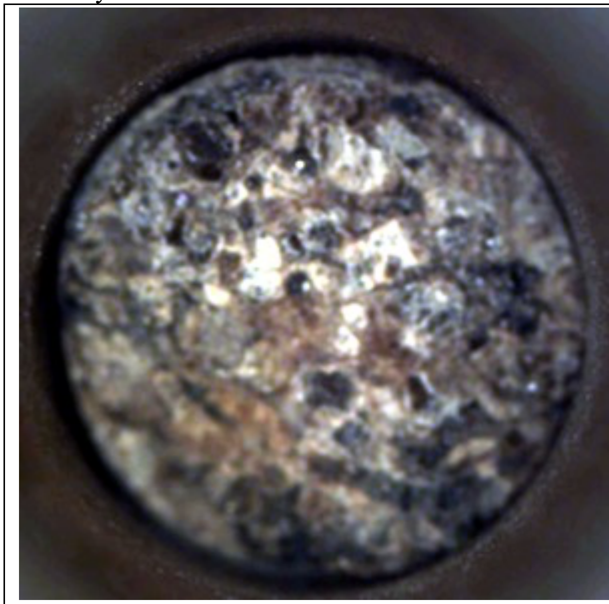

Figure 4. Cachecam image of the Malay core tip (Sol 337). The sample core is ~ 13 mm in diameter.

Figure 5. Cachecam image of a sealed sample tube containing the *Malay* sample (Sol 337).

Figure 6. Sol 653 WATSON mosaic of the Malay sample tube. The tube is ~ 18 cm in length.

Figure 7. Sol 653 Malay sample tube, Front Hazcam image.

Figure 8. Sol 653 Navcam Image of the Malay sample (center) and surrounding terrain.

Current Status: At the time of this writing, construction of the Three Forks sample depot by the rover operations team was underway, with depot completion expected by February 2023.

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References: [1] Farley, K.A., et al.. Space Sci Rev 216, 142 (2020). [2] Herd, C.D.K, et al., LPSC 2023, [3] September 2022 - MSR/M2020 Sample Depot Science Community Workshop, [4] N. Williams, et al., LPSC 2023, [5] Bell, J.F. III, Maki, et al.. Space Sci Rev 217, 24 (2021), [6] Maki, J.N.. et al.. Space Sci Rev 216, 137 (2020). [7] Maki et al., LPSC 2022, [8] Bhartia, R., et al., Space Sci Rev 217, 58 (2021).