Exhibit 2. Science Traceability Matrix.

SCIENCE GOALS	SCIENCE OBJECTIVES	MEASUREMENT REQUIREMENTS	INSTRUMENT (ANALOGS [TRL])	FUNCTIONAL REQUIREMENT
Goal 1: Investigate the highly chemically reduced, unexpectedly volatile-rich mineralogy and chemistry of Mercury's surface, to understand the earliest evolution of this end-member of rocky planet formation.	**1.1** Determine the major- and minor-elemental composition of the LRM, including its C content and volatile-element abundances (e.g., Na, K, S)	Absolute abundances of: C, O, Na, Mg, Si, S, Cl, K, Ca, Fe, Th, U, Cr, Mn, if present at concentrations of >1 wt%	**GRS: Gamma-Ray Spectrometer** (MESSENGER [TRL 9], Psyche [TRL 7], MMX [TRL 7], Dragonfly [TRL 7])	Continuous operation to avoid instrument degradation; unobstructed FOV of the surface; surface operations ≥72 hrs
	1.2 Determine the mineralogy of the components of the LRM, including any silicate, sulfide, or carbide phases that are present	Identification of silicates, sulfides, carbides, metallic phases, if present at concentrations of >1 wt%	**XRD/XRF**: **X-Ray Diffractometer/X-Ray Fluorescence Spectrometer** (MSL CheMin [TRL 9], CheMin-V [TRL 6])	Surface sample must be delivered into the XRD/XRF instrument
	1.3 Investigate the chemical and mineralogical heterogeneity of the landing site	Measurements of Objective 1.2 from two locations at the landing site and from ≥two distinct surface disturbance events		Ability to collect samples from multiple locations and to produce distinct surface disturbance events
Goal 2: Investigate Mercury's interior structure and magnetic field, to unravel the planet's differentiation and evolutionary history and to understand the magnetic field at the surface.	**2.1** Investigate the distribution of mass in Mercury's interior, determine the size and state of the core to characterize the solid and liquid portions, and search for seismic activity	Longitude libration amplitudes; obliquity	**RS: Radio Science** (InSight RISE [TRL 9])	Ka-band communication to enable the most-sensitive science measurements
		Gravitational acceleration change due to solid-body tides; short-period seismic observations	**MAC: Mercury Accelerometer/Short-Period Seismometer** (InSight SEIS-SP [TRL 9])	Positioned near surface; high data rate from continuous operations needed to detect potential seismic events
	2.2 Measure the magnetic field at the surface to investigate the coupling between the dynamo and external field, the time variation of the field, the strength of the crustal field, and the electrical conductivity structure of the crust and mantle	Measurements of magnetic field at the surface as a function of time, with a precision of 1 nT and at cadence of 20 vector samples per second	**MAG: Magnetometer** (MESSENGER MAG [TRL 9])	Positioned to minimize contributions from spacecraft-generated fields
	2.3 Investigate the mineralogy of the surface to identify potential magnetic carrier minerals	Covered by Objective 1.2 mineralogical measurements above		
Goal 3: Investigate the active processes that produce Mercury's exosphere and alter its regolith, to understand planetary processes on rocky airless bodies, including the Moon.	**3.1** Determine the composition and density of the near-surface neutral exosphere and compare with the surface compositional measurements, to investigate processes releasing materials from the surface	Densities of atomic and molecular species 1–100 amu, M/ΔM ~100, sensitivity ~1 count/sec at density of 10 cm^{-3}	**NMS: Neutral Mass Spectrometer** (BepiColombo STROFIO [TRL 9])	Unobstructed FOV of space environment, angled 45° toward surface
	3.2 Determine and characterize the incoming and outgoing fluxes of charged particles at Mercury's surface	Identification of low-energy charged particles, 1 eV/e to 20 keV/e, M/ΔM 4–40 over M/q 1–50, angular resolution <20°	**IMS: Ion Mass Spectrometer** (MESSENGER FIPS [TRL 9])	Unobstructed FOV of space environment, angled 45° away from surface
		Identification of high-energy charged particles, 20 keV to 1 MeV, angular resolution <20°	**EPS: Energetic Particle Spectrometer** (New Horizons PEPSSI [TRL 9])	Unobstructed FOV of space environment, angled 45° away from surface
	3.3 Determine and characterize the influx of micrometeoroids (dust) at Mercury's surface	Measurements of dust flux with sensitivity to measure 10^{-15} kg m^{-2} s^{-1}	**DD: Dust Detector** (New Horizons SDC [TRL 9])	Unobstructed FOV of space environment, looking toward zenith
	3.4 Investigate the nature of Mercury's regolith, including particle sizes and heterogeneity	Images of regolith in ≥3 visible colors, pixel scales ≤500 µm @ 1-m distance	**FootCam: Regolith Imagers** (Malin Space Science Systems, ECAM [TRL 9])	Mounted to resolve 1-mm grains; LED illumination @ 450, 550, 650, 750 nm
	3.5 Investigate the characteristics of space weathering on Mercury	Measurements for Objective 1.2 and 3.4 repeated for ≥two distinct surface disturbances of the same location		Ability to collect multiple samples from the same location and to produce distinct surface disturbance events
Goal 4: Characterize the landing site, to understand the processes that have shaped its evolution, to place the in situ measurements in context, and to enable ground truth for global interpretations of Mercury.	**4.1** Connect observations from images acquired by orbiting spacecraft to those from the Lander and determine the geological context of the landing site	Images of landing site acquired during descent, pixel scales 1 cm to 1 m	**DescentCam: Descent Imagers** (Malin Space Science Systems, ECAM [TRL 9])	Periodic imaging of the surface during descent; two cameras oriented 90° from one another to enable surface imaging despite changing orientation during descent
	4.2 Characterize the geological setting of the landing site, including heterogeneity and landforms, and search for changes over the mission by surface, horizon, and exosphere imaging	Images of the landing site, pixel scale ≤5 cm within 50 m; ≥180° az, 0°– -45° elev	**StaffCam: Panoramic Imager** (MER Pancam [TRL 9], MSL Mastcam [TRL 9])	Unobstructed access to ≥ 180° of the landing site; articulation to achieve angular coverage
	4.3 Characterize the bulk-element composition of the local landing site and place it into context with the equivalent orbital measurements	Covered by Objective 1.1 elemental measurements above		