

2019 Moon to Mars Ice & Prospecting Challenge Scoring Matrix

Teams must collect at least 50 mL of water to be eligible for the 1st or 2nd overall prize



Team: _____

Total Possible Points = 490 (including 40 potential bonus points – see Prospecting Section)					
Water Extraction (Max 180 points) – 40% of overall score	"x"	Water Volume	Max Points	Actual Points	Comments/Notes
Number of points assigned for hands-on water collection			25		
Number of points assigned for hands-off water collection			125		
Water Clarity			30		
<p>Each team's water volume will be collected (separately for hands-off and hands-on periods) and measured at the end of each day. Silt that has settled to the bottom of the containers will also be measured at the end of the day and subtracted from the water volume measurements to give each team their total water volume for that day's hands-off and hands-on collections. <u>The most total volume collected over the two day period by any one team in the following modes of operation = "x":</u></p> <p>Scoring for hands-on water collection (Max of 25 points): The team with the most water collected during hands-off operations is given a score of 25. Other teams' points are scaled linearly: [(Team volume/x) *25]</p> <p>Scoring for hand-off water collection (Max of 125 points): The team with the most water collected is given a score of 125. Other teams' points are scaled linearly: [(Team volume/x) *125]</p> <p>Scoring for water clarity (Max of 30 points): Teams will be awarded up to 30 points based on the clarity of the water extracted. Turbidity tests will be conducted at the end of each day, with points being awarded to each team's sample with the best clarity over the 2-day period. See Page 2</p>					
Prospecting: Drilling Telemetry (Max 90 pts) – 20% of overall score (+40 add'l bonus points available!)			Max	Actual	Comments/Notes
Identify the correct number of overburden layers			10		
Sequence the layers in order from softest to hardest			40		
Identify the thickness of each layer within an established margin of error (MOE)			40		
BONUS POINTS: Up to 40 bonus points will be awarded if teams can accurately determine the true hardness of individual layers in terms of MPa (within a 10% MOE)			40		
Technical Paper (Max 135 points) – 30% of overall score			Max	Actual	Comments/Notes
Quality of Path-to-Flight description, including rationale behind various trades and critical modifications made to the system for extracting water from sub-surface ice on Mars and prospecting on the moon.			45		
Technical quality, feasibility, and innovation of design for use off-Earth			35		
Quality of integration video and summary description			30		
Quality of summary of production and testing approach			15		
Adherence to Technical Paper guidelines			10		
Poster Presentation (Max 45 points) – 10% of overall score			Max	Actual	Comments/Notes
Discussion of the Earth system (How team got from here to the off-Earth system). Note: The Poster should be a summary of the technical paper with emphasis on modifications made for extracting water from sub-surface ice on Mars and prospecting on the moon.			25		
Technical Content, Style, Coherence			10		
Engagement with judges (all team members should participate) and quality of response to questions			10		

Water Extraction (max 180 pts) _____
 Prospecting (max 90 pts) _____
 Technical Paper (max 135 pts) _____
 Poster Presentation (max 45 pts) _____
Bonus Points (max 40 pts) _____
Sub-Total Score _____

Note: In the event of a tie, total water volume collected may become the deciding factor.
(The team who collected the most water will emerge as the winner)

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Penalties			
Penalty Points are deducted from a team's total score	Max Points	Points Deducted	Comments/Notes
Exceeding the Volume Limit (10 points off total score for every 1 cm over the size limit of 1m x 1m x 2m)	-		
Exceeding the Mass Limit (20 points off total score for every 1 kg of extra weight over the weight limit of 60 kg)	-		
Exceeding 9A Current/Amperage limit by blowing a fuse (80 points off total score and disqualification for the top prize)	80		
Failure to provide a WOB data logger that can provide real-time data (60 points off total score and disqualification for the top prize)	60		
Misalignment between what was proposed in the Mid-Project Review and/or Technical Paper and the system brought to the competition (up to 200 points off total score at the discretion of the judges)	200		
Solid debris in collection bag (1 point per 10 grams)	-		# of grams: Day 1 _____ # of grams: Day 2 _____
Excessive dirt outside of the 12' x 12' tarp under team test station (up to 20 points off the total score at the discretion of the judges)	20		

Sub-Total Score (1st page) _____

Subtract Total Penalty Points _____

Total Score _____

Scoring for Water Clarity

Scoring for water clarity (Max of 30 points): Teams will be awarded up to 30 points based on the clarity of the water extracted. Turbidity tests will be conducted at the end of each day, with points being awarded to each team's sample with the best clarity over the 2-day period.

NTU (Nephelometric Turbidity Unit): Measurement of Reflected Light from a Sample

Note: All samples with an NTU above 1,000 will be calculated using a dilution

Turbidity (NTU)	Points
Less than 5 NTU (Minimum Standard for Waste Water)	30 points
5.1 – 50 NTU	25 – 29 Points
51 – 1,000 NTU	20 – 24 Points
1,001 – 5,000 NTU	15 – 19 Points
5,001 – 25,000 NTU	10 – 14 Points
25,001 – 50,000	1 – 9 Points
Greater than 50,000	0 Points