



Lunar Exploration Initiative

Briefing Topic:

Lunar EVA Sample Mass

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Lunar EVA Sample Mass

Objective

Determine the mission sample mass returned to Earth as a function of EVA time

Boundary condition

This is a mission-level assessment to provide a baseline for ascent vehicle requirements

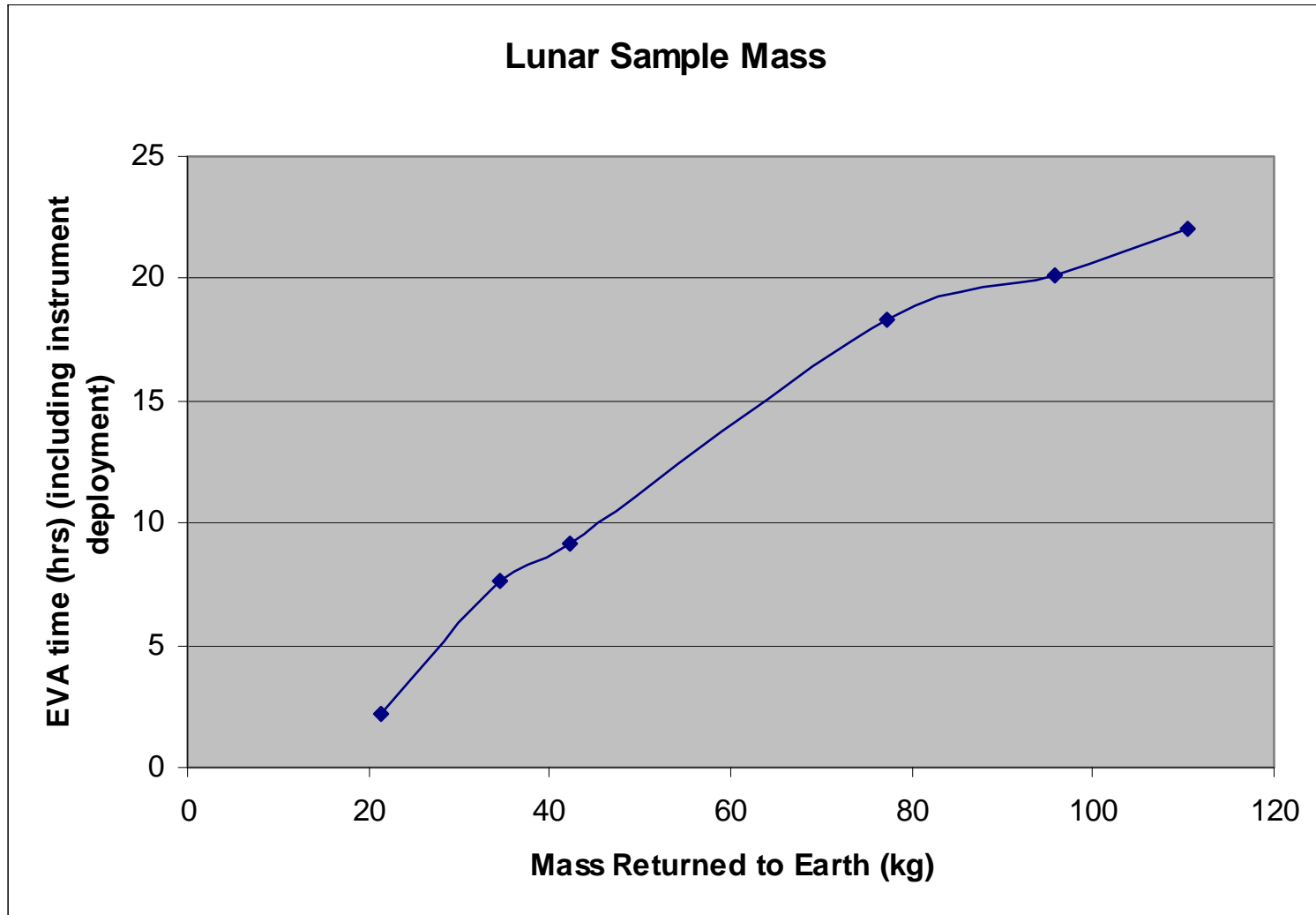
Station-level and traverse-level assessments should also be made to provide baselines for crew and surface vehicle requirements and the development of suitable operational protocols

Lunar Sample Inventory

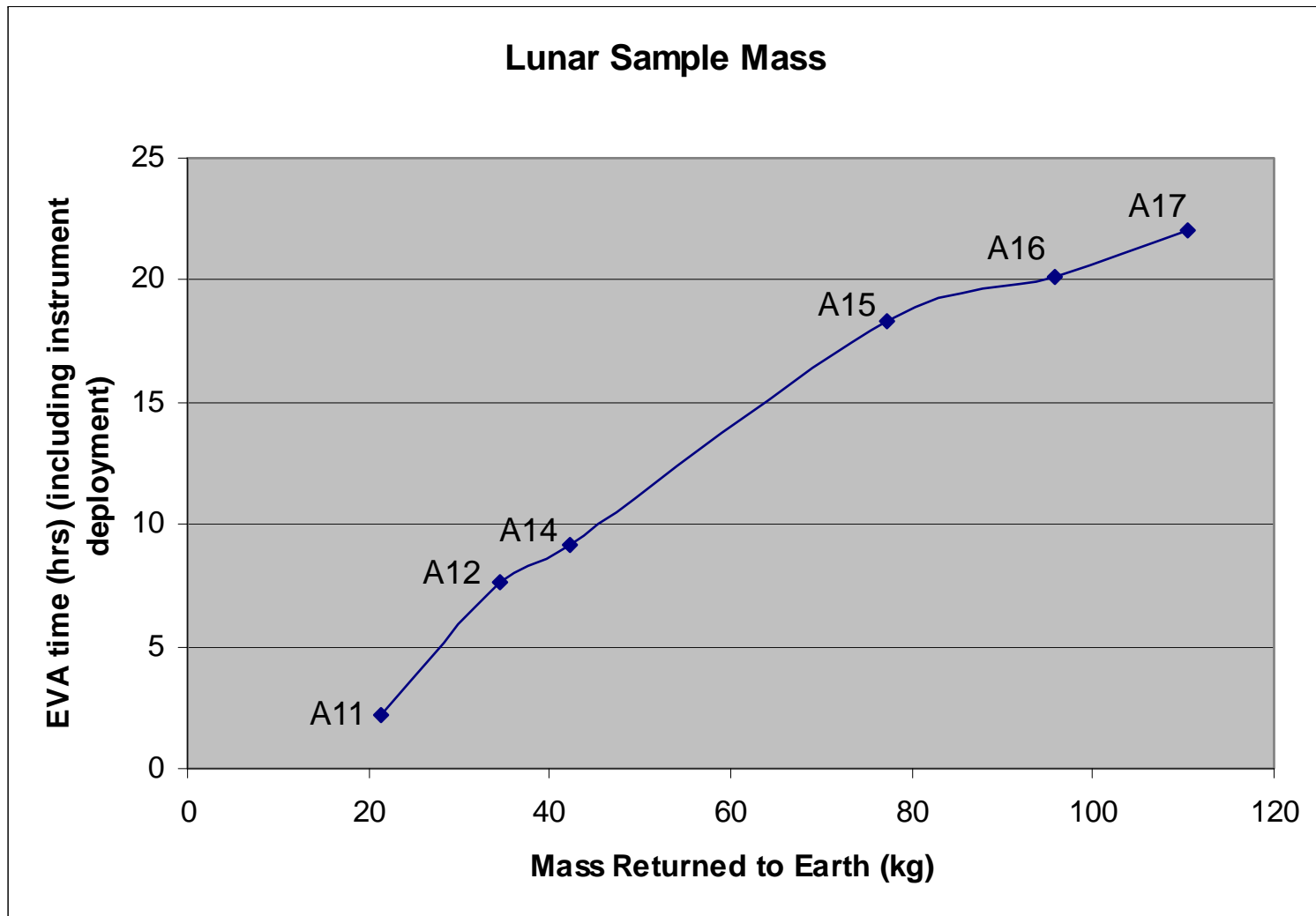
Mission	Mass (kg)	Number	EVA Length (hr)	Distance (km)
Apollo 11	21.5	58	2.2	0.5
Apollo 12	34.4	69	7.6	2.0
Apollo 14	42.3	227	9.2	3.4
Apollo 15	77.3	370	18.3	23.0
Apollo 16	95.7	731	20.1	20.7
Apollo 17	110.5	741	22.0	31.6
Total Apollo	382.0	2196	89.0	81.0
Soils	80	167		
Breccias	133	79 over 300 g each		
Basalts	80	134 over 40 g each		
Cores	20	24 holes (total length is 15 m with 52 segments)		
Other	69	Mostly small breccias		
Luna 16	0.101	35 cm core		
Luna 20	0.050	27 cm core		
Luna 24	0.170	160 cm core		
Total Luna	0.321			



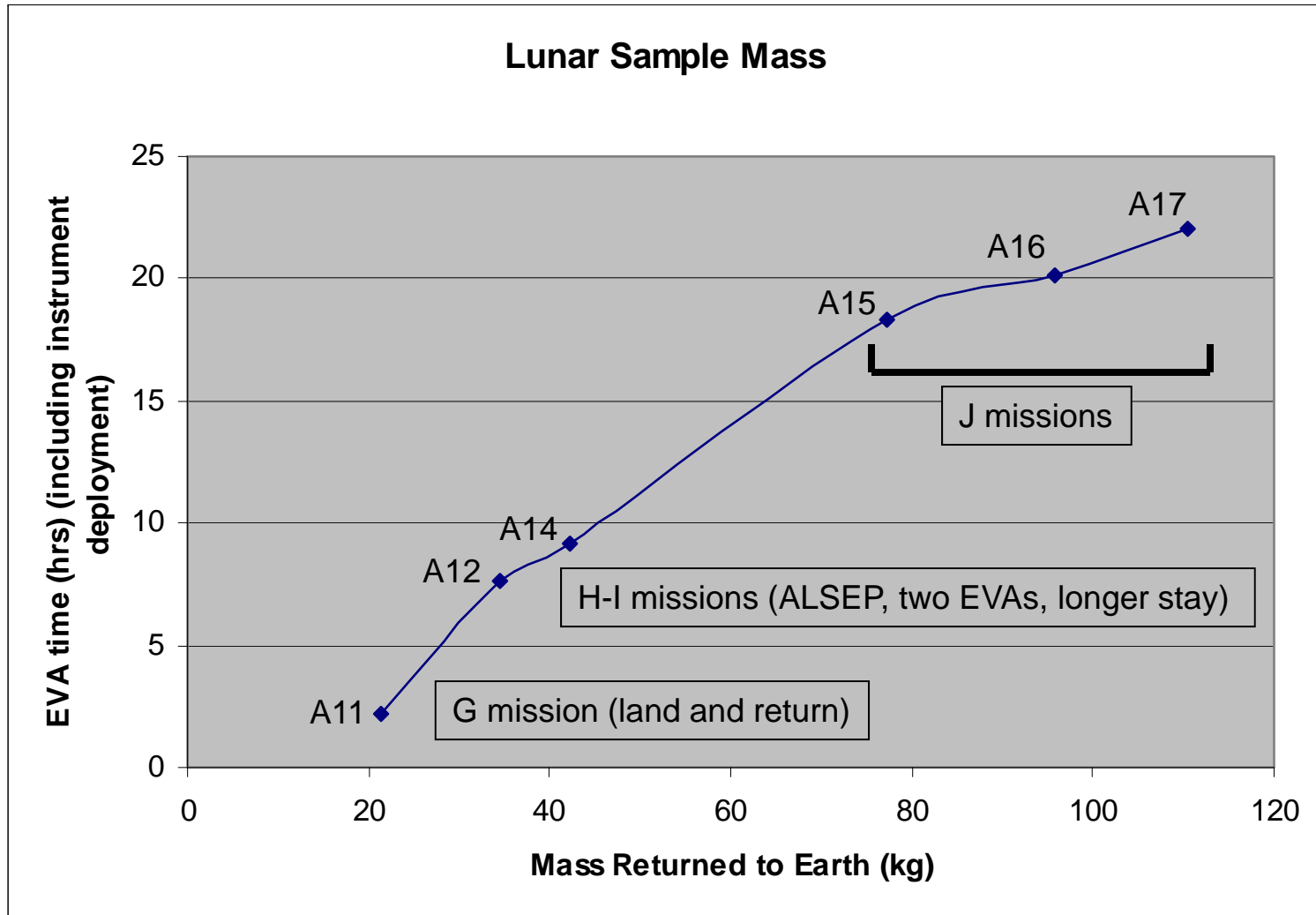
Lunar Sample Mass



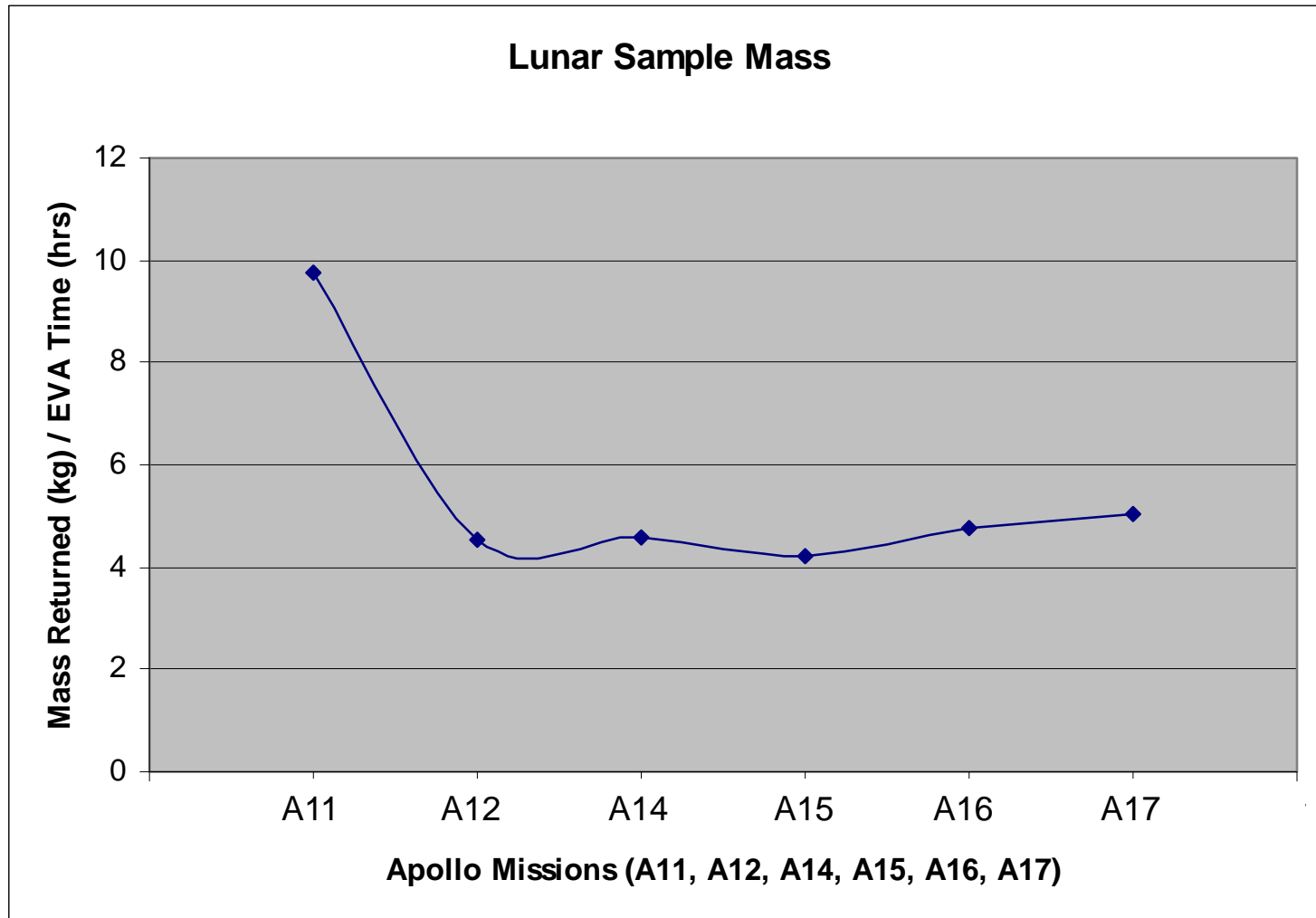
Lunar Sample Mass



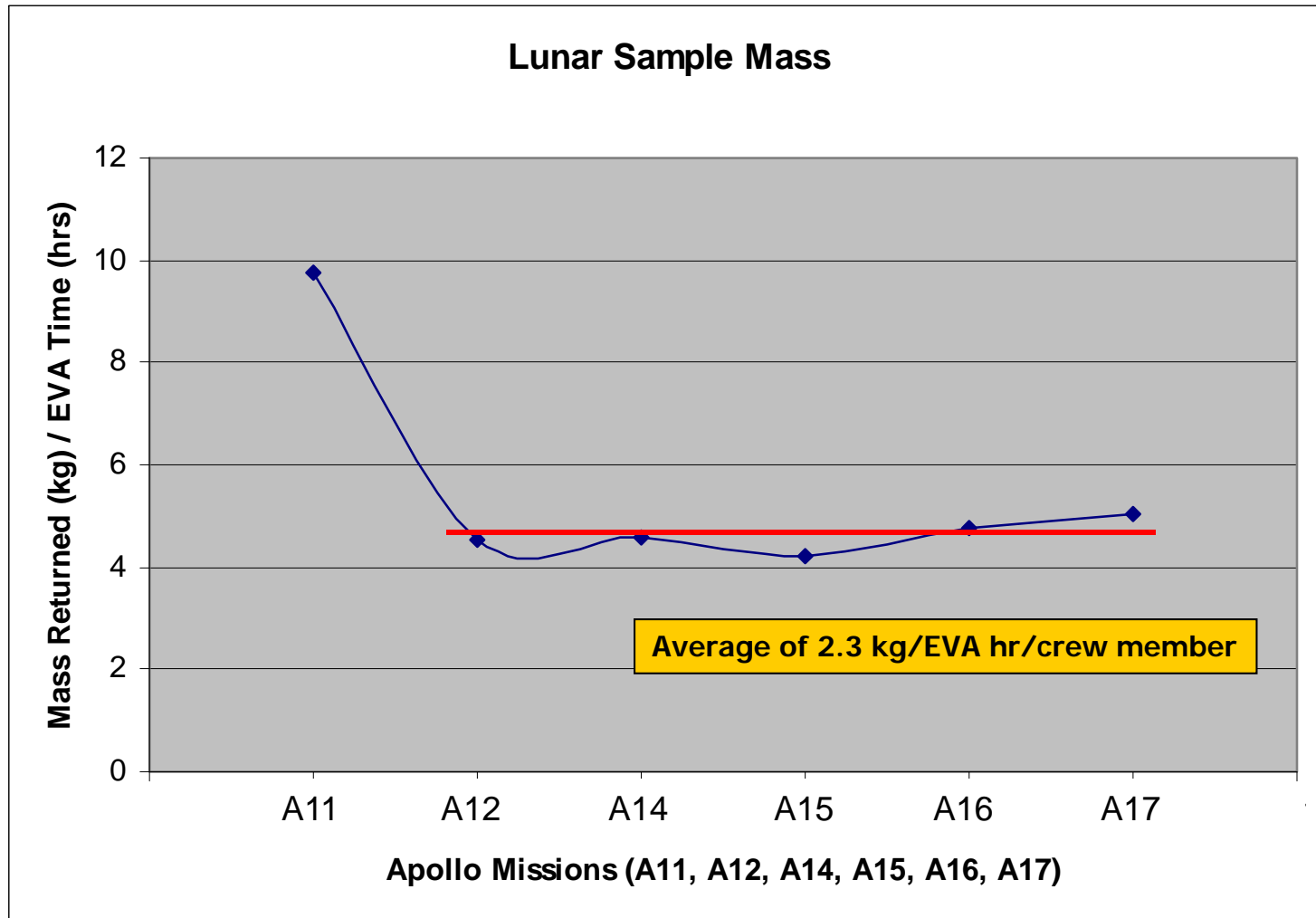
Lunar Sample Mass



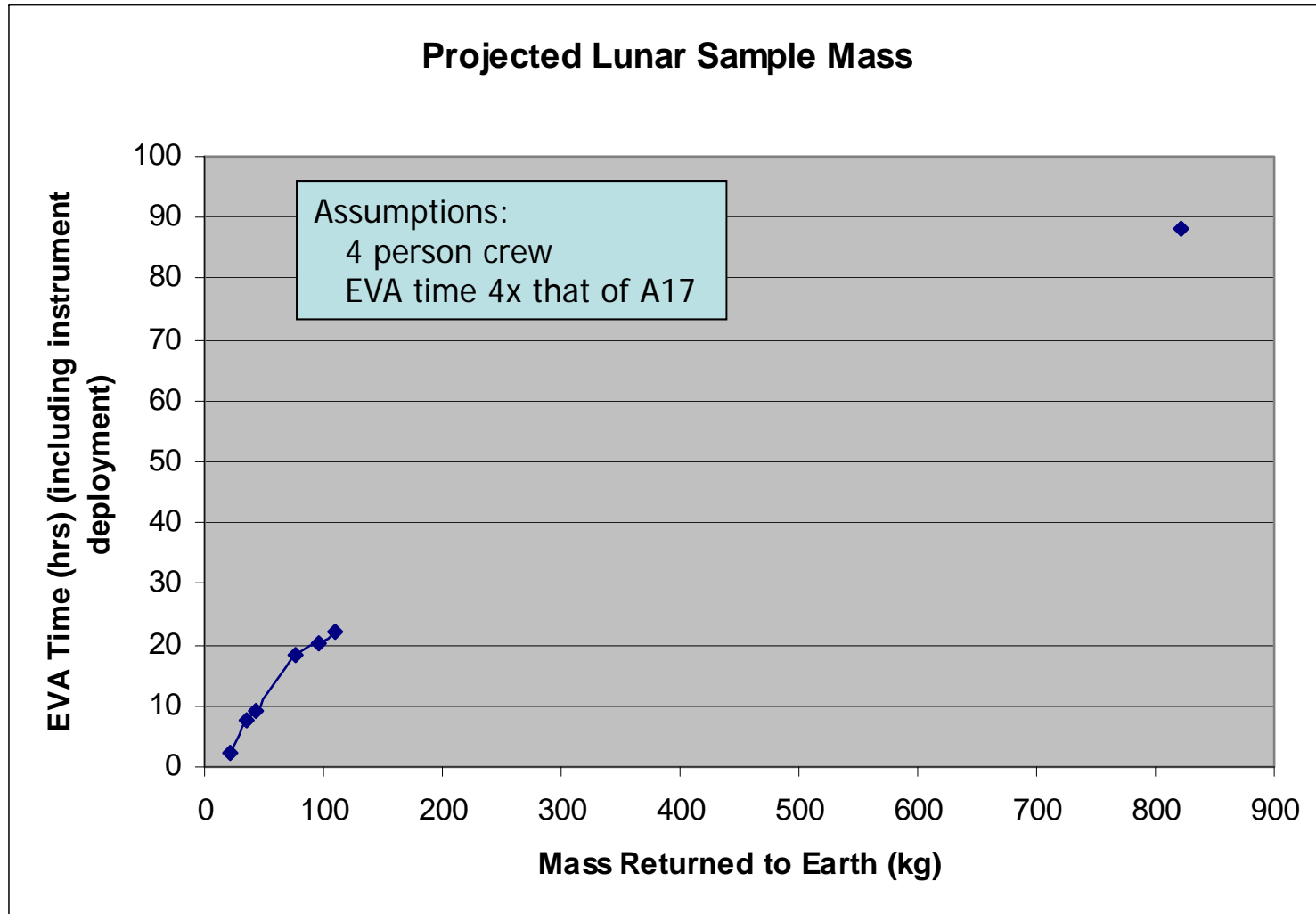
Lunar Sample Mass



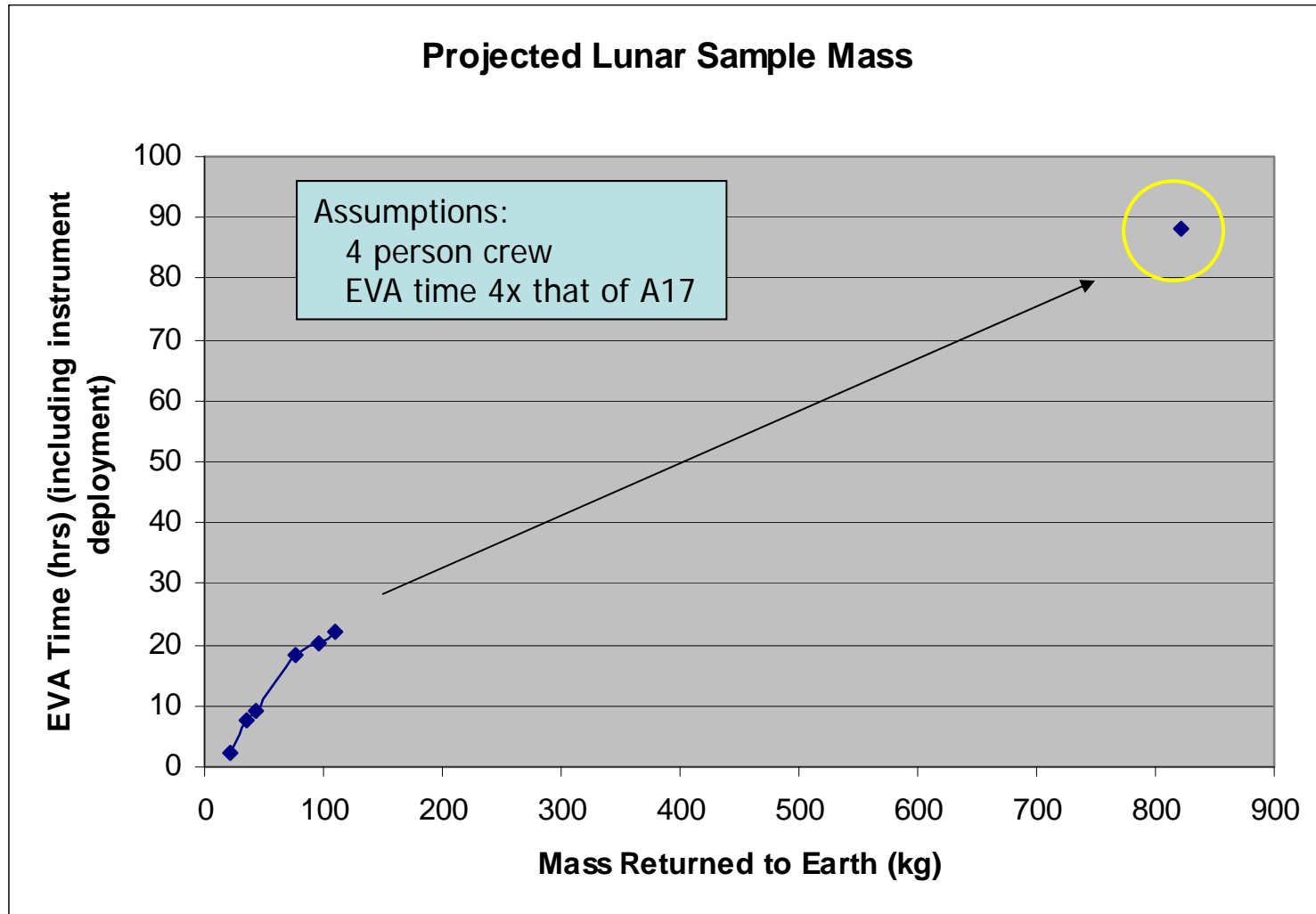
Lunar Sample Mass



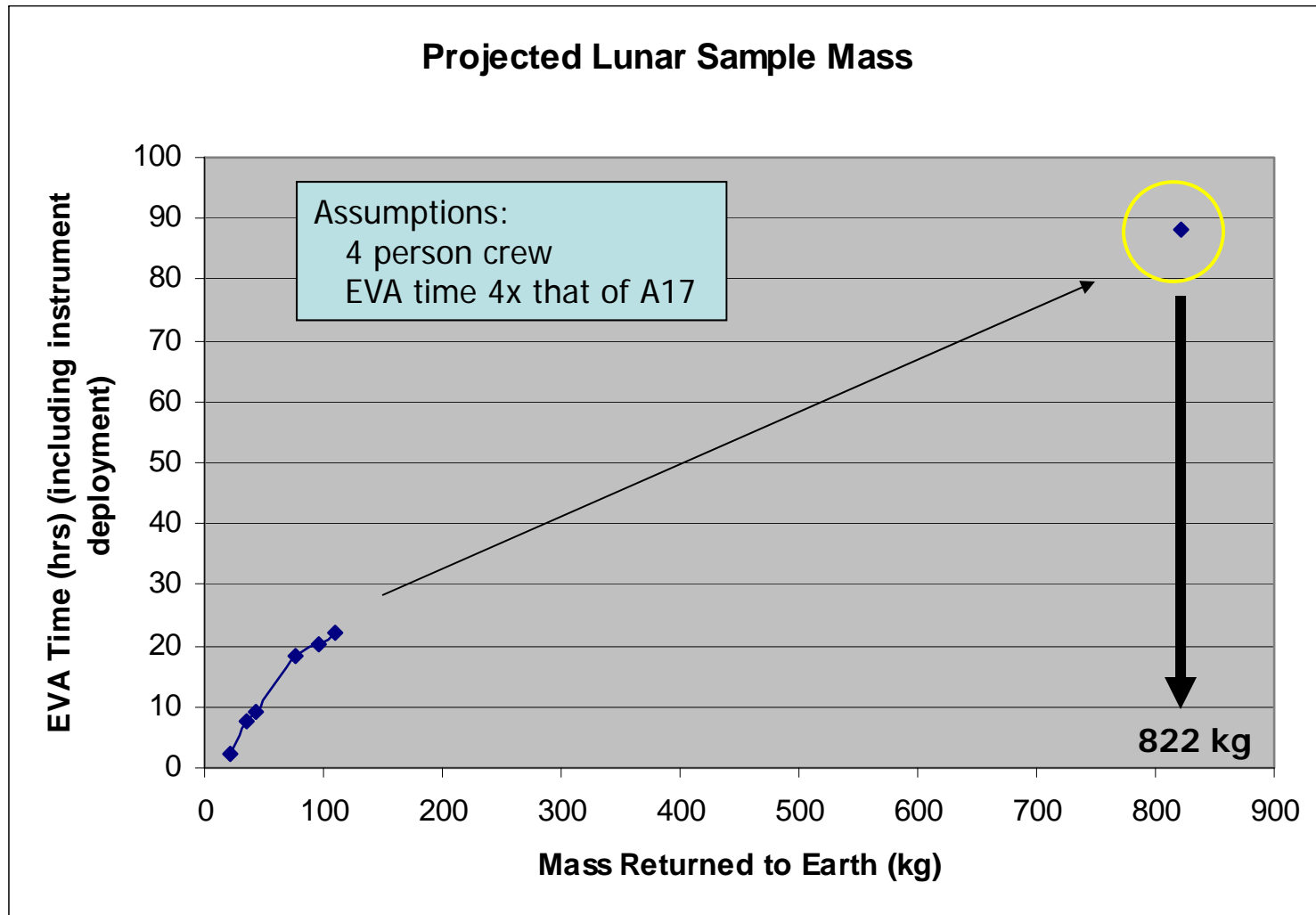
Projected Lunar Sample Mass



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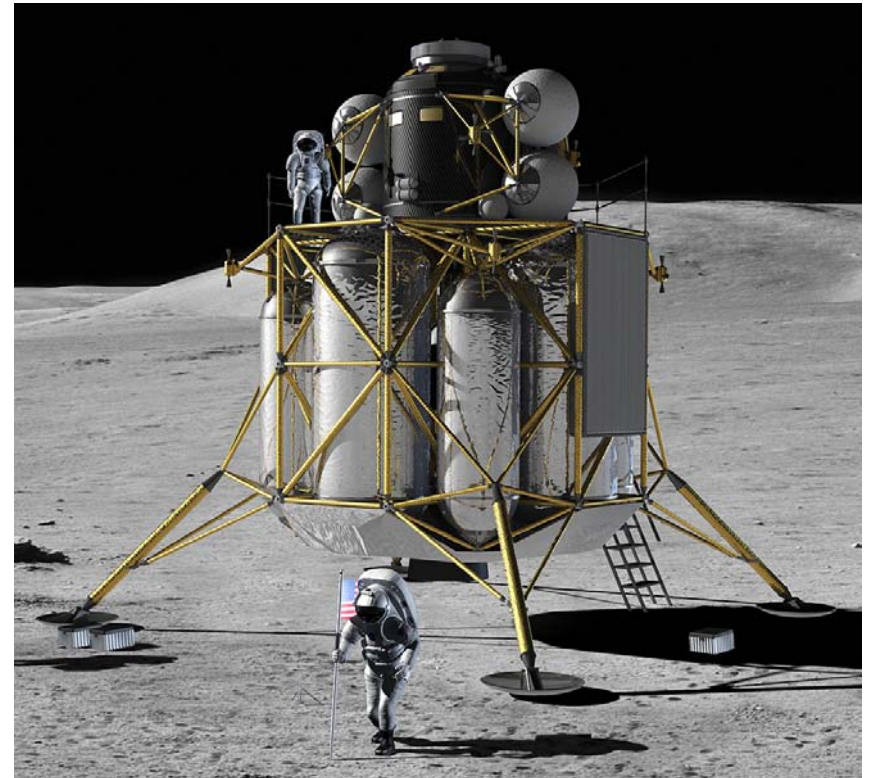


Projected Lunar Sample Mass



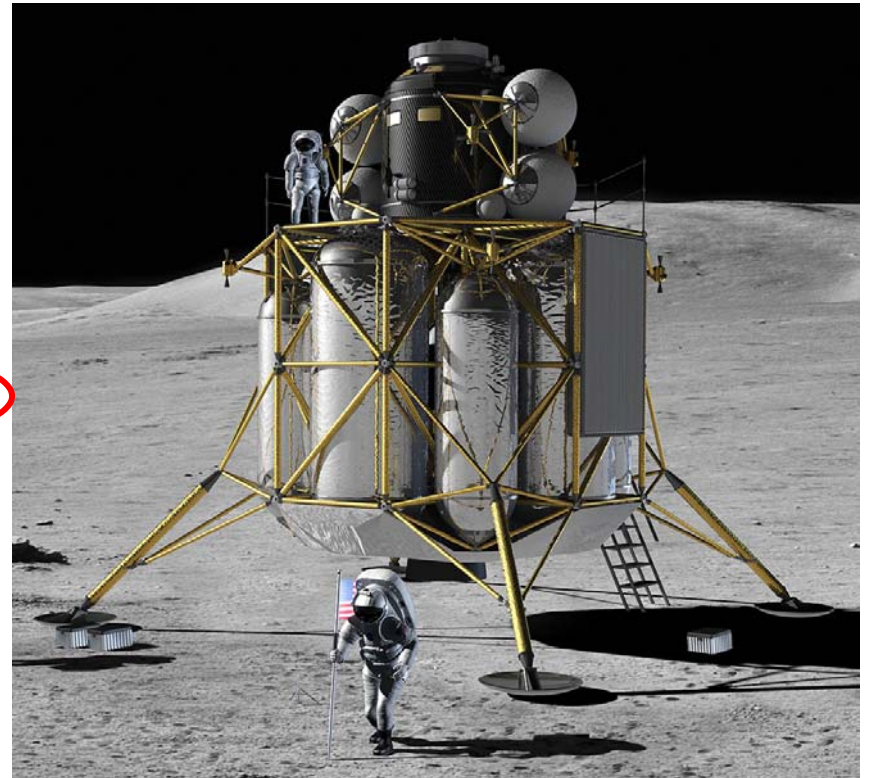
Altair Mission Requirements

- **3 Variants: Sortie, Outpost, Cargo**
- **4 Crew**
- **7 Day Sortie**
- **210 Day Outpost**
- **Deliver 500kg of cargo w/ crew**
- **Return 100 kg (goal of 250kg) from the lunar surface**
- **Airlock or Suitlock on Sortie missions only**
- **Control Mass**
 - Crewed missions control mass: 45,000 kg
 - Cargo missions control mass: 53,600 kg



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Still far below that implied by the Apollo sampling rate