

APOLLO 16
EVA PLANNING ASSUMPTIONS
LRV TRAVERSE ASSESSMENT

DECEMBER 1971

WITH TRAVERSE MAP

APOLLO 16

APOLLO 16
ACTUAL VALUES

- BATTERY
- FEEDWATER
- OXYGEN
- LIOH

APOLLO 16
ACTUAL VALUES

- * SEE TABULAR INPUT DATA FOR SPECIFIC VALUE.

ASSUMPTIONS (CONT)

● METABOLIC RATES

● LM OVERHEAD	-	1050 BTU/HR
● ALSEP	-	1050 BTU/HR
● STATION	-	950 BTU/HR
● RIDING	-	550 BTU/HR

ACTIVITY METABOLIC COMPARISON 15 ACTUAL VERSUS 16 PLANNING

ACTIVITY	AVERAGE METABOLIC RATE (BTU/HR)		
	15 ACTUAL		16 PLANNING
	CDR	LMP	
LM OVERHEAD	1246	1060	1050
ALSEP	1035	1138	1050
STATION	1091	727	950
RIDING	580	405	550

ASSUMPTIONS (CONT)

TRAVERSE CONSTRAINTS

- PLSS FAIL
 - BSLSS/OPS RIDEBACK
- LRV FAIL
 - PLSS WALKBACK

ASSUMPTIONS (CONT)

- PLSS FAIL

- BSLSS/OPS RIDEBACK - ALLOWANCES

- 10 MINUTES - RETURN TO LRV
 - 5 MINUTES - BSLSS HOOKUP
 - 52.5 MINUTES - RIDEBACK
 - 13 MINUTES - INGRESS

ASSUMPTIONS (CONT)

- LRV FAIL

- PLSS WALKBACK - ALLOWANCES

- 10 MINUTES AT LRV
 - WALKBACK - +20-PERCENT UNCERTAINTY INCLUDED IN CONTINGENCY WALK METABOLIC RATES
 - 13 MINUTES FOR INGRESS
 - 30-MINUTE RESERVE MAINTAINED ON ALL PLSS CONSUMABLES

APOLLO 16 EVA SUMMARY

ACTIVITY, (HOURS/MINUTES)	EVA I	EVA II	EVA III	TOTAL
LM OVERHEAD	2:17	1:30	1:35	5:22
ALSEP	2:24	-	-	2:24
STATION	1:51	4:06	3:47	9:44
RIDING	0:28	1:24	1:38	3:30

EVA	TRAVERSE DISTANCE, KM
I	3.4
II	10.3
III	11.95
TOTAL	25.65

EVA METABOLIC COMPARISON

15 ACTUAL VS 16 PLANNING

EVA	AVERAGE METABOLIC RATE (BTU/HR)		
	15 ACTUAL		16 PLANNING
	CDR	LMP	
I	1097	976	990
II	1002	808	891
III	1031	810	879
$\frac{I + II + III}{3}$	1043	868	920

EVA I

APOLLO 16-DESCARTES TRAVERSES CALCULATED DATA

Dec. 14, 1971

DATE

STATION NO.	SEG. DIST. (KM)	LRV MOBILITY RATE (KM/HR)	RIDE TIME (MIN)	TOTAL TRAVEL DIST. (KM)	ARRIVE STATION EVA TIME (H+MIN)	STATION STOP TIME (H+MIN)	DEPART STATION EVA TIME (H+MIN)
LM				0.00	0+ 0	1+37	1+37
ALSEP				0.00	1+37	2+24	4+ 1
RIDE 1	1.70	7.30	14	1.70	4+15	0+30	4+45
RIDE 2	0.75	7.30	6	2.45	4+51	0+31	5+22
RIDE 3	0.95	7.30	8	3.40	5+30	0+50	6+20
LM				3.40	6+20	0+40	7+ 0
TOTALS			28			6+32	7+ 0

STATION	RETURN DIST (KM)	TRAVERSE CONTINGENCIES						EVA AV MET RATE (BTU/HR)
		LRV FAILURE				PLSS FAILURE		
		WALK-BACK TIME TO LM (H+MIN)	STATION MARGIN ABOVE WALKBACK REQ 1, 4			MIN LRV RIDE BACK SPEED REQ 3		
			F/W (H+MIN)	O ₂ (H+MIN)	AMP HR (H+MIN)	0 MIN (KM/HR)	10 MIN (KM/HR)	
LM	0.00	0+ 0	****	****	****	0.00	0.00	1050.00
ALSEP	0.00	0+ 0	4+40	3+34	3+58	0.00	0.00	1050.00
1	1.70	0+28	3+ 6	2+ 1	2+36	1.63	1.94	1014.96
2	0.95	0+16	2+51	1+45	2+11	0.91	1.09	999.81
3	0.00	0+ 0	2+32	1+25	1+39	0.00	0.00	984.01
LM	0.00	0+ 0	2+ 1	0+55	1+12	0.00	0.00	990.30

EVA I

APOLLO 16-DESCARTES TRAVERSES INPUT DATA

Dec. 14, 1971

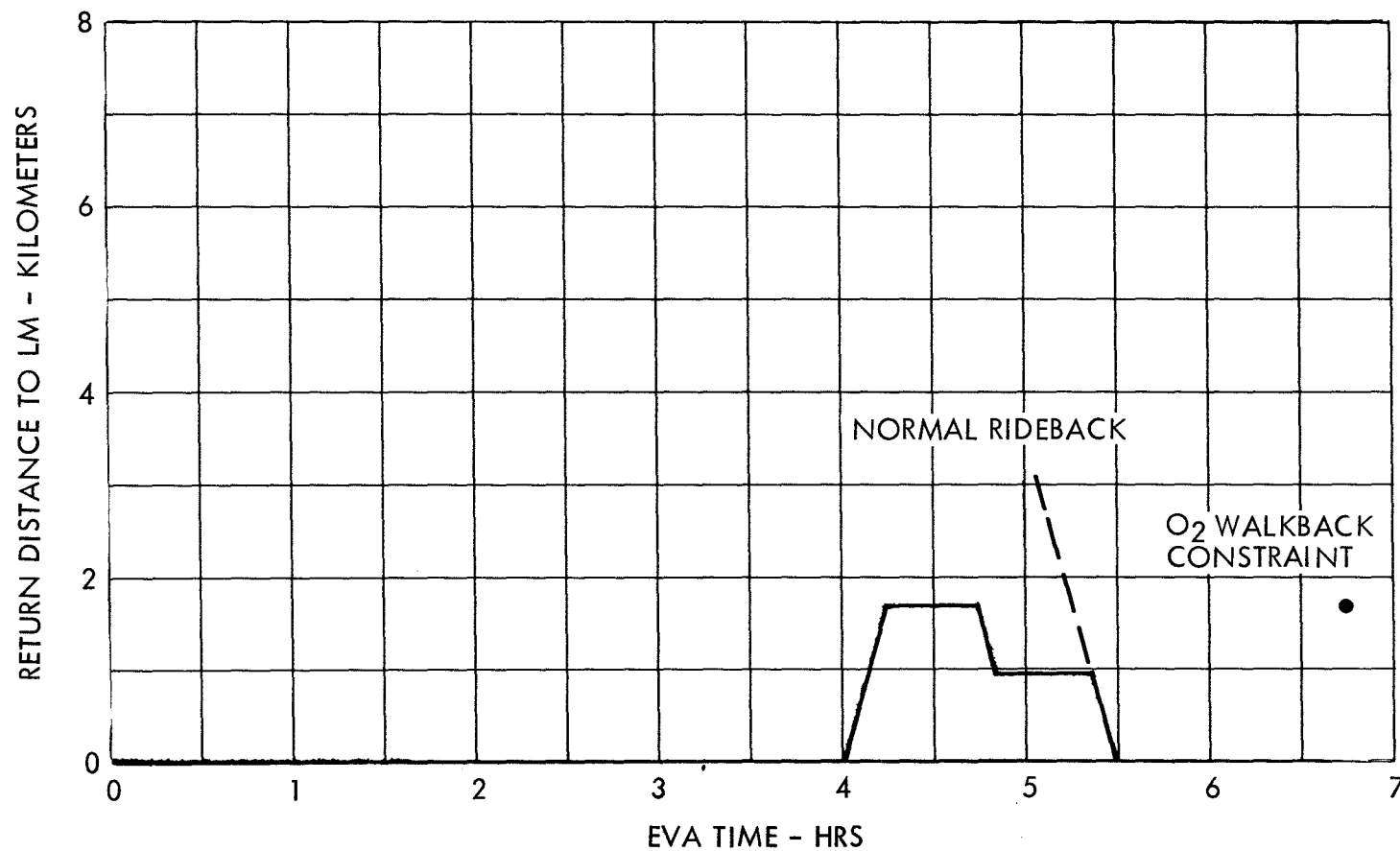
DATE

STATION NO.	STATION STOP TIME (H + MIN)	SEG. DIST (KM)	RET. DIST (KM)	HEAT LEAK (BTU/ HR)	MOBILITY RATE		MET WALK (BTU/HR)
					WALK (KM/HR)	RIDE (KM/HR)	
LM	1+37	0.00	0.00	-99.	3.60	7.30	1560.0
ALSEP	2+24	0.00	0.00	-99.	3.60	7.30	1560.0
1	0+30	1.70	1.70	-99.	3.60	7.30	1560.0
2	0+31	0.75	.95	-99.	3.60	7.30	1560.0
3	0+50	0.95	0.00	-99.	3.60	7.30	1560.0
LM	0+40	0.00	0.00	-99.	3.60	7.30	1560.0

MET ALSEP (BTU/HR)	MET RIDING (BTU/HR)	MET STATION (BTU/HR)	MET LM O/H (BTU/HR)	LEAK RATE O ₂ (LB/HR)	EVA START (F/W LB)	EVA START (O ₂ LB)
1050.00	550.00	950.00	1050.00	.020	11.21	1.426

DATE NOV. 9, 1971

APOLLO 16
RIDING TRAVERSE - DISTANCE
EVA 1



EVA II

APOLLO 16-DISCARTES TRAVERSES CALCULATED DATA

Dec. 14, 1971

DATE

STATION NO.	SEG. DIST. (KM)	LRV MOBILITY RATE (KM/HR)	RIDE TIME (MIN)	TOTAL TRAVEL DIST. (KM)	ARRIVE STATION EVA TIME (H+MIN)	STATION STOP TIME (H+MIN)	DEPART STATION EVA TIME (H+MIN)
LM				0.00	0+ 0	0+50	0+50
RIDE 4	1.20	7.30	10	1.20	1+ 0	0+15	1+15
RIDE 5	2.30	7.30	19	3.50	1+34	0+30	2+ 4
RIDE 6	1.10	7.30	9	4.60	2+13	1+ 0	3+13
RIDE 7	0.30	7.30	2	4.90	3+15	0+45	4+ 0
RIDE 8	1.50	7.30	12	6.40	4+13	0+20	4+33
RIDE 9	0.90	7.30	7	7.30	4+40	0+55	5+35
RIDE 10	1.60	7.30	13	8.90	5+48	0+20	6+ 8
RIDE LM	1.40	7.30	12	10.30	6+20	0+40	7+ 0
TOTALS			84			5+35	7+ 0

STATION	RETURN DIST (KM)	TRAVERSE CONTINGENCIES						EVA AV MET RATE (BTU/HR)
		LRV FAILURE				PLSS FAILURE		
		WALK-BACK TIME TO LM (H+MIN)	STATION MARGIN ABOVE WALKBACK REQ 1, 4			MIN LRV RIDE BACK SPEED REQ 3		
			F/W (H+MIN)	O ₂ (H+MIN)	AMP HR (H+MIN)	0 MIN (KM/HR)	10 MIN (KM/HR)	
LM	0.00	0+ 0	****	****	****	0.00	0.00	1050.00
4	1.20	0+20	6+19	5+13	6+14	1.15	1.37	964.09
5	3.50	0+58	4+38	3+31	4+47	3.36	4.00	897.43
6	4.60	1+42	2+49	1+42	2+54	4.42	5.26	897.50
7	4.30	1+36	2+11	1+ 4	2+13	4.13	4.91	903.76
8	3.70	1+22	2+ 0	0+54	1+54	3.55	4.23	891.16
9	3.00	0+50	1+31	0+24	1+24	2.88	3.43	893.28
10	1.40	0+23	1+43	0+37	1+18	1.34	1.60	884.10
LM	0.00	0+ 0	1+51	0+45	1+12	0.00	0.00	890.75

EVA II

APOLLO 16-DESCARTES TRAVERSES INPUT DATA

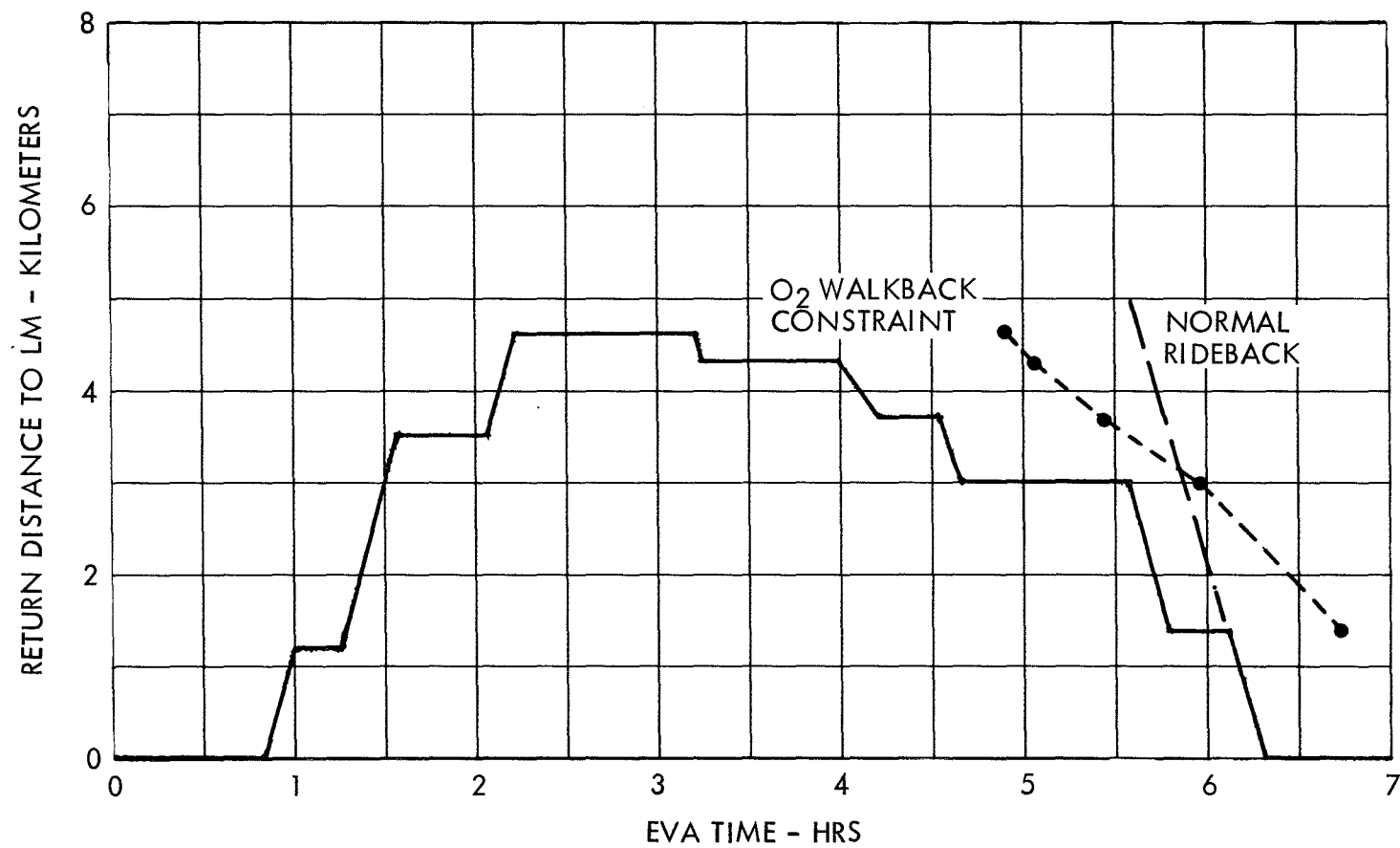
Dec. 14, 1971
DATE

STATION NO.	STATION STOP TIME (H + MIN)	SEG. DIST (KM)	RET. DIST (KM)	HEAT LEAK (BTU/ HR)	MOBILITY RATE		MET WALK (BTU/HR)
					WALK (KM/HR)	RIDE (KM/HR)	
LM	0+50	0.00	0.00	75.	3.60	7.30	1560.0
4	0+15	1.20	1.20	75.	3.60	7.30	1560.0
5	0+30	2.30	3.50	75.	3.60	7.30	1560.0
6	1+00	1.10	4.60	75.	2.70	7.30	1290.0
7	0+45	0.30	4.30	75.	2.70	7.30	1290.0
8	0+20	1.50	3.70	75.	2.70	7.30	1290.0
9	0+55	0.90	3.00	75.	3.60	7.30	1560.0
10	0+20	1.60	1.40	75.	3.60	7.30	1560.0
LM	0+40	1.40	0.00	75.	3.60	7.30	1560.0

MET ALSEP (BTU/HR)	MET RIDING (BTU/HR)	MET STATION (BTU/HR)	MET LM O/H (BTU/HR)	LEAK RATE O ₂ (LB/HR)	EVA START (F/W LB)	EVA START (O ₂ LB)
1050.00	550.00	950.00	1050.00	.028	11.64	1.345

DATE NOV. 18, 1971

APOLLO 16
RIDING TRAVERSE - DISTANCE
EVA 11



EVA III

APOLLO 16-DESCARTES TRAVERSES CALCULATED DATA

Dec. 14, 1971
DATE

STATION NO.	SEG. DIST. (KM)	LRV MOBILITY RATE (KM/HR)	RIDE TIME (MIN)	TOTAL TRAVEL DIST. (KM)	ARRIVE STATION EVA TIME (H+MIN)	STATION STOP TIME (H+MIN)	DEPART STATION EVA TIME (H+MIN)
LM				0.00	0+ 0	0+45	0+45
RIDE	2.70	7.30	22				
11				2.70	1+ 7	0+10	1+17
RIDE	1.85	7.30	15				
12				4.55	1+32	0+10	1+42
RIDE	0.40	7.30	3				
13				4.95	1+46	0+56	2+42
RIDE	0.65	7.30	5				
14				5.60	2+47	1+ 5	3+52
RIDE	1.70	7.30	14				
15				7.30	4+ 6	0+40	4+46
RIDE	2.50	7.30	21				
16				9.80	5+ 7	0+36	5+43
RIDE	0.60	7.30	5				
17				10.40	5+47	0+10	5+57
RIDE	1.55	7.30	13				
LM				11.95	6+10	0+50	7+ 0
TOTALS			98			5+22	7+ 0

STATION	RETURN DIST (KM)	TRAVERSE CONTINGENCIES						EVA AV MET RATE (BTU/HR)
		LRV FAILURE				PLSS FAILURE		
		WALK-BACK TIME TO LM (H+MIN)	STATION MARGIN ABOVE WALKBACK REQ T, 4			MIN LRV RIDE BACK SPEED REQ 3		
			F/W (H+MIN)	O ₂ (H+MIN)	AMP HR (H+MIN)	0 MIN (KM/HR)	10 MIN (KM/HR)	
LM	0.00	0+ 0	****	****	****	0.00	0.00	1050.00
11	2.70	0+45	5+16	4+21	5+47	2.59	3.09	893.30
12	4.60	1+42	3+52	2+57	4+24	4.42	5.26	847.86
13	5.00	1+51	2+43	1+48	3+16	4.80	5.71	877.18
14	5.50	2+ 2	1+20	0+25	1+55	5.28	6.29	890.05
15	4.65	1+43	0+55	0+ 0	1+20	4.46	5.31	881.82
16	2.15	0+36	1+24	0+30	1+31	2.06	2.46	869.08
17	1.55	0+26	1+25	0+32	1+26	1.49	1.77	866.94
LM	0.00	0+ 0	1+25	0+31	1+12	0.00	0.00	879.11

EVA III

APOLLO 16-DISCARTES TRAVERSES INPUT DATA

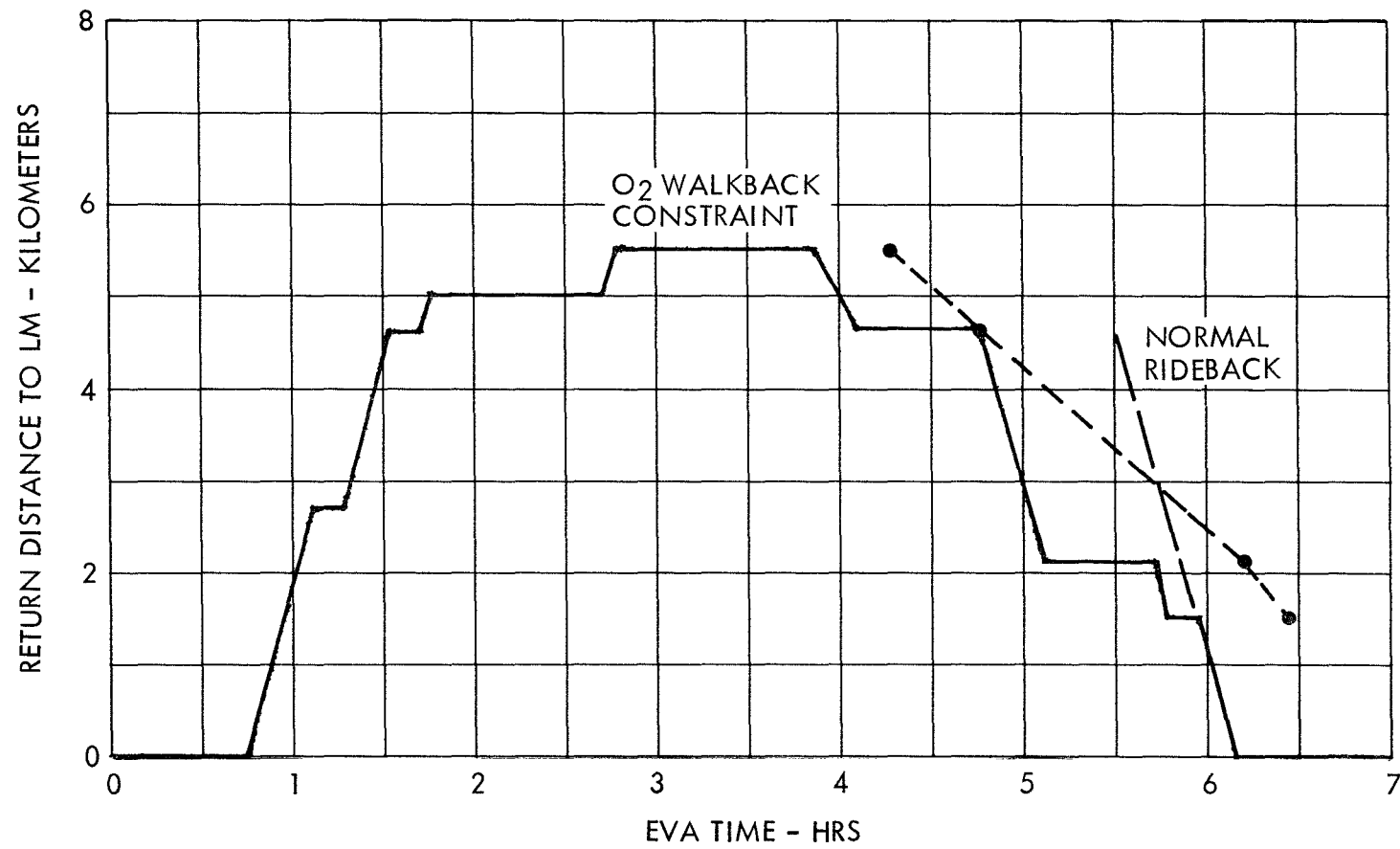
Dec. 14, 1971
DATE

STATION NO.	STATION STOP TIME (H + MIN)	SEG. DIST (KM)	RET. DIST (KM)	HEAT LEAK (BTU/ HR)	MOBILITY RATE		MET WALK (BTU/HR)
					WALK (KM/HR)	RIDE (KM/HR)	
LM	0+45	0.00	0.00	160.	3.60	7.30	1560.0
11	0+10	2.70	2.70	160.	3.60	7.30	1560.0
12	0+10	1.85	4.60	160.	2.70	7.30	1290.0
13	0+56	0.40	5.00	160.	2.70	7.30	1290.0
14	1+05	0.65	5.50	160.	2.70	7.30	1290.0
15	0+40	1.70	4.65	160.	2.70	7.30	1290.0
16	0+36	2.50	2.15	160.	3.60	7.30	1560.0
17	0+10	0.60	1.55	160.	3.60	7.30	1560.0
LM	0+50	1.55	0.00	160.	3.60	7.30	1560.0

MET ALSEP (BTU/HR)	MET RIDING (BTU/HR)	MET STATION (BTU/HR)	MET LM O/H (BTU/HR)	LEAK RATE O ₂ (LB/HR)	EVA START (F/W LB)	EVA START (O ₂ LB)
1050.00	550.00	950.00	1050.00	.035	11.64	1.345

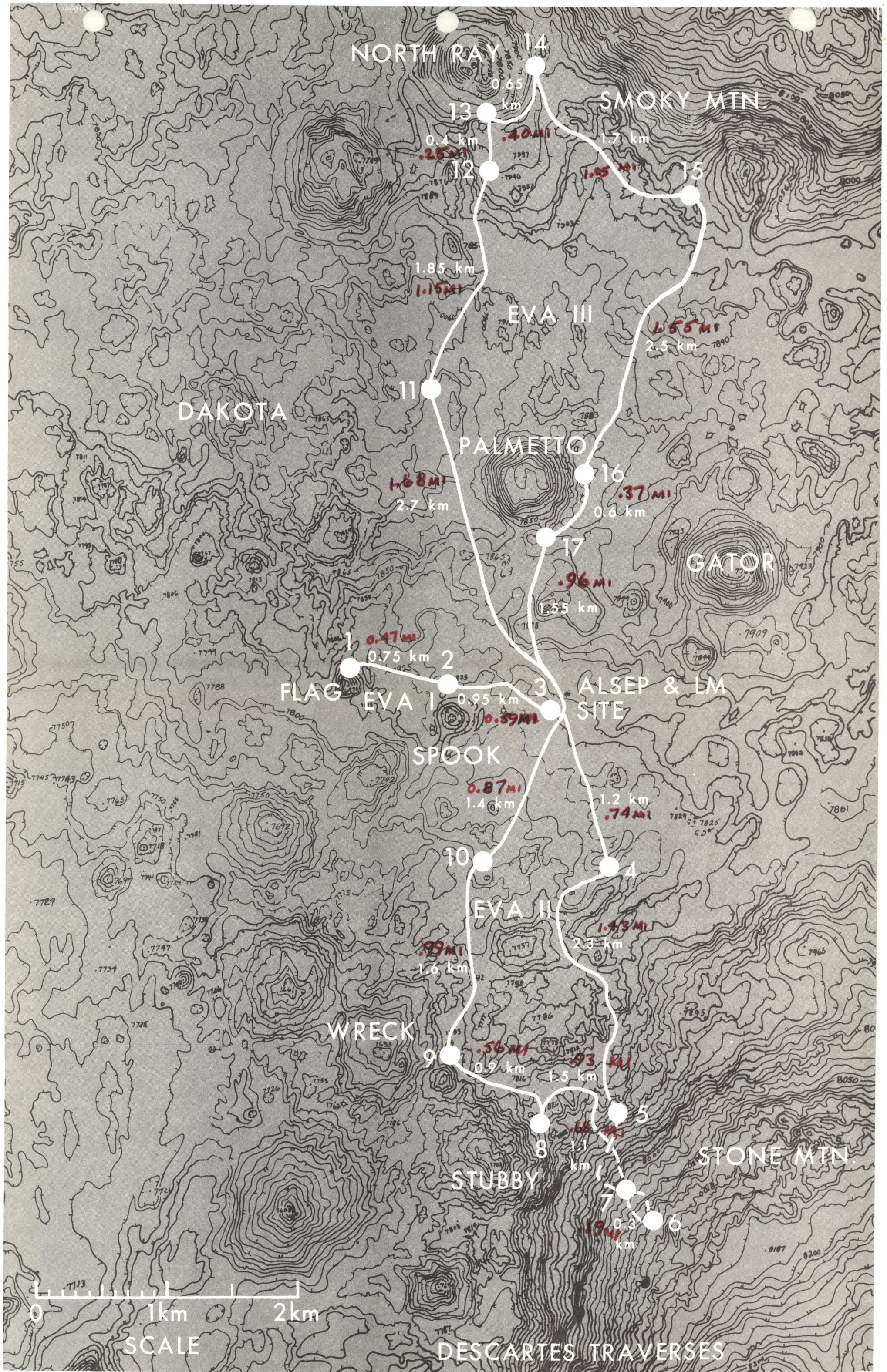
DATE NOV. 18, 1971

APOLLO 16
RIDING TRAVERSE - DISTANCE
EVA III



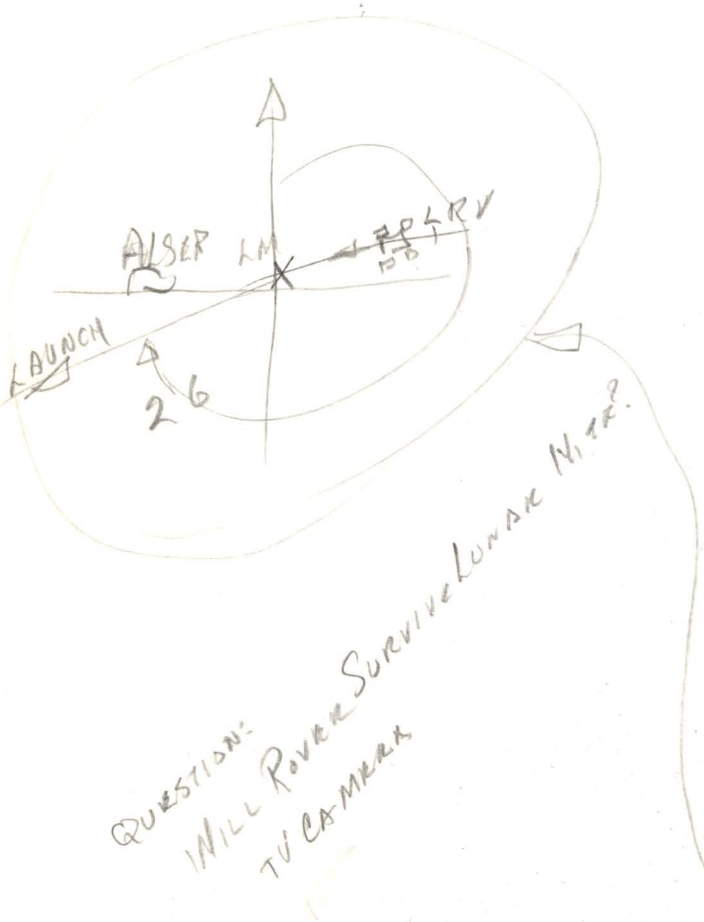
1. 30 MINUTES RESERVES MAINTAINED ON ALL PLSS CONSUMABLES
AT STATION METABOLIC RATE
2. ALL DISTANCES AND SPEEDS ARE MAP DISTANCES AND MAP SPEEDS
(MOBILITY RATES)
3. REQUIRED RATE = RETURN DISTANCE/AVAILABLE OPS TIME
TOTAL OPS TIME 80.5 MINUTES
5 MIN BSLSS HOOKUP
13 MIN LM INGRESS
62.5 MIN AVAILABLE FOR RIDEBACK
52.5 MINUTES REMAINING FOR RIDEBACK (10 MINUTES ALLOWED AT
STATION FOR RETURN TO LRV AND RIDEBACK PREPARATION)
4. TIME MARGIN AT STATION METABOLIC RATE

STATION FINAL LM O/H	}	MARGIN =	TIME REMAINING AFTER ALLOWANCE FOR 10 MINUTES AT LRV, WALKBACK, AND 13 MINUTES INGRESS
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5. RESPIRATORY EXCHANGE QUOTIENT = .90
6. FEED WATER HEAT OF VAPORIZATION 1038 $\frac{\text{BTU}}{\text{LB.}}$



$EPA1 \approx 2.1$, $EPA2 \approx 6.4$, $EPA3 \approx 7.9$ minutes.

Walt
JADKRLUND
PUSHING MSFC
GIVES MSFC THEM SC DATA
GIVES GSTA FORKS THE MSFC DATA



Dust

CTV

TEA

LCRU

LENS

BATT COURTES

BATT MIRROR, — AT McCRAVES

Low Park

A7 ALSED

Go 60 ft SSE from heading of 210 take TV spec of clay
- to be close to drill spec too.

AT Seismic Sites

Push down sum for N & V update

BETWEEN

RV 1212

乙卯

Heading 356 not in shadow

353

POST R V A 3

Bearing 265°

distance 0.1 KM

heading 265°

subject to change
with change in end
of EVA time.