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ANALYSIS OF AIRCRAFT COLLISION NEAR VERA, SPAIN BY SANDIA CORP TEAMS (MESSAGE 7)

TO: 16AF ADVON SPAIN ATTN: R. C. MAYDEW AND R. E. REED, SANDIA CORP.

AT THE REQUEST OF DMA WE SUBMITTED OUR BEST GUESS OF NEW WATER SEARCH AREAS. THESE WERE BASED ON TRAJECTORIES RUN USING THE MOST RECENT INFORMATION AND THEORIES. WE FINALLY COMPLETED THE PARACHUTE TRAJECTORIES THIS WEEKEND, AND THE RESULTS ARE AS FOLLOWS:

<u>RELEASE VELOCITY</u>	<u>RELEASE ALTITUDE</u>	<u>REMARKS</u>	<u>X</u>	<u>Y</u>
400 FPS	28,000	1 STAGE, C <sub>D</sub> S=107 SQ FT	-4400	+8630
615 FPS	28,000	1 STAGE, C <sub>D</sub> S = 107	-4606	+8183
615 FPS	30,500	2 STAGE C <sub>D</sub> S = 22 @25K FT. C <sub>D</sub> S = 107	-5779	+2639
615 FPS	30,500	1 STAGE, C <sub>D</sub> S = 107	-5624	+8832
415 FPS	30,500	2 STAGE, FREE FALL @5 SEC. C <sub>D</sub> S = 107	-5623	+7239
415 FPS	30,500	2 STAGE, FREE FALL @10 SEC. C <sub>D</sub> S = 107	-5617	+4940
415 FPS	30,500	2 STAGE; FREE FALL @15 SEC. C <sub>D</sub> S = 107	-5465	+2437
615 FPS	30,500	2 STAGE, FREE FALL @5 SEC. C <sub>D</sub> S = 107	-6080	+5869
615 FPS	30,500	2 STAGE, FREE FALL @10 SEC. C <sub>D</sub> S = 107	-6295	+2686
615 FPS	30,500	2 STAGE, FREE FALL @15 SEC. C <sub>D</sub> S = 107	-6344	-600
515 FPS	30,500	1 STAGE, C <sub>D</sub> S = 107	-5528	+9038
415 FPS	30,500	1 STAGE, C <sub>D</sub> S = 107	-5414	+9279

NOTE: ALL OF THE ABOVE TRAJECTORIES WERE RUN ASSUMING 256° TRUE TRACK, TOTAL WEIGHT OF 2320 POUNDS AND AN OPEN UNDAMAGED 16 FT. PARACHUTE FOR FINAL DESCENT.

FORMERLY RESTRICTED DATA  
Unauthorized Disclosure Subject to Administrative and Criminal Sanctions. Handle as Restricted Data in Foreign Dissemination, Section 144.b, Atomic Energy Act of 1954.

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Att. 37

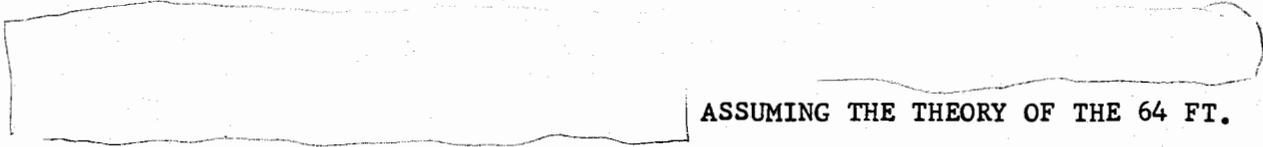
DEPARTMENT OF ENERGY DECLASSIFICATION REVIEW	
1ST REVIEW DATE: 12/97	DETERMINATION (CIRCLE NUMBER(S))
AUTHORITY: <input type="checkbox"/> DC 5000	1. CLASSIFICATION RETAINED
NAME: <i>Billow/Renc</i>	2. CLASSIFICATION CHANGED TO: <i>SECRET</i>
2ND REVIEW DATE: 1/13/99	3. CONTAINS NO DOE CLASSIFIED INFO
AUTHORITY: <i>DC</i>	4. COORDINATE WITH:
NAME: <i>Billow/Renc</i>	5. CLASSIFICATION CANCELED
	6. CLASSIFIED INFO BRACKETED
	7. OTHER (SPECIFY):

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PLOTTING THESE DATA INDICATES A PRIME SEARCH AREA CENTERED AT 1°46.1'W AND 37°14.6'N OR ON AN AZ = 122° RANGE 9700 FT. FROM LATEST RELEASE POINT WITH A RADIUS OF 3000 FEET. FROM OUR PLOT THIS IS AN AREA INCLUDING HALF LAND AND HALF WATER. ACCORDING TO ASSELIN THIS AREA HAS BEEN FAIRLY WELL SEARCHED.



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b(3)

ASSUMING THE THEORY OF THE 64 FT.

CHUTE BEING OUT, THESE RESULTS WERE NOT GIVEN STRONG WEIGHT IN DEFINING SEARCH AREAS. THE RESULTS ARE AS FOLLOWS:

<u>RELEASE VELOCITY</u>	<u>RELEASE ALTITUDE</u>	<u>REMARKS</u>	<u>X</u>	<u>Y</u>
515	30,500		-10,473	+20,868
515	30,500		-10,299	+17,464
515	30,500		-9759	+13,529

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USING THE 64 FOOT CHUTE THEORY AND NEW WEIGHTS, THE FOLLOWING RESULTS WERE OBTAINED AND USED IN DETERMINING SECOND SEARCH AREA.

<u>RELEASE VELOCITY</u>	<u>RELEASE ALTITUDE</u>	<u>REMARKS</u>	<u>X</u>	<u>Y</u>
400 FPS	30,500	2 STAGE, C <sub>D</sub> S = 18 @25 K FT. C <sub>D</sub> S = 1600 WT. TO 1500	-15,349	+39,780
400 FPS	30,500	2 STAGE, C <sub>D</sub> S = 18 @20 K FT., C <sub>D</sub> S = 1600 WT. TO 1500	-11,424	+29,493
400 FPS	30,500	2 STAGE, C <sub>D</sub> S = 18 @15 K FT., C <sub>D</sub> S = 1600 WT. TO 1500	-6805	+5957
400 FPS	30,500	2 STAGE, C <sub>D</sub> S = 18 @25 K FT., C <sub>D</sub> S = 1600 WT. TO 500	-25,326	+72,543

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<u>RELEASE VELOCITY</u>	<u>RELEASE ALTITUDE</u>	<u>REMARKS</u>	<u>X</u>	<u>Y</u>
615 FPS	30,500	2 STAGE, $C_D S = 13.8$ @15 K FT., $C_D S = 1600$ WT. TO 500	-15,480	+32,053
400 FPS	30,500	2 STAGE, $C_D S = 18$ @15 K FT., $C_D S = 2400$ WT. TO 1500	-9348	+25,044

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NOTE: THE NEW WINDS FOR S.L. AND 5,000 FT. HAVE BEEN INCLUDED. ASSELIN'S DESCRIPTION OF 64 FT. CHUTE INDICATES TO US EITHER THE CHUTE HAS A LINE OVER OR A SPLIT GORE IN WHICH CASE A  $C_D S$  OF 1200 TO 1600 IS POSSIBLE.

THESE IMPACT POINTS FALL ALONG A NOMINAL AZIMUTH OF  $111^\circ$  TRUE FROM THE RELEASE POINT. THE SECOND AREA TO SEARCH WOULD START AT A POINT 4 N.M. FROM RELEASE POINT ( $1^\circ 43'W$ ,  $37^\circ 14'N$ ) TO 8 N.M. ( $1^\circ 38'W$ ,  $37^\circ 12.5'N$ ). ASSUME AT THE 4 N.M. POINT A  $\pm 0.5$  N.M. DISPERSION, INCREASING TO  $\pm 1.0$  N.M. AT THE 8 N.M. POINT. THE THIRD AREA WOULD EXTEND FROM THE 8 N.M. POINT TO ONE 12 N.M. ( $1^\circ 33'W$ ,  $37^\circ 11'N$ ) ALONG  $111^\circ$  TRUE. ASSUME A  $\pm 1.0$  N.M. DISPERSION. IT IS DOUBTFUL, BASED ON LATEST ASSUMPTIONS, THAT THE UNIT OR PARTS COULD BE BEYOND 12 MILES FROM THE RELEASE POINT.

THE AREA BETWEEN THE FIRST AND SECOND SEARCH AREAS COULD BE CONSIDERED EQUALLY WITH THE THIRD SEARCH AREA IN PRIORITY OF LOOKING.

THE BEST MATCH OF UNITS 1, 2, AND 3 WITH NEW RELEASE POINT WAS OBTAINED WITH THE FOLLOWING.

UNIT 1 FREE FALL FOR 5 SEC. THEN 16 FOOT CHUTE ( $C_D S = 107$ ) TO IMPACT. REL. VEL. 615 FPS, ALTITUDE 30,500, X = -6080, Y = +5869, TOF 186 SEC., IMPACT VELOCITY 135 FPS.

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COLLISION NEAR

R. E. REED,

-4-

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UNIT 2 TUMBLING ( $C_D S = 18.0$ ), RELEASE ALT. = 615 FPS, ALTITUDE 28,000 FT.,  
X = -4144, Y = -4809, TOF 79.5 SEC., IMPACT VELOCITY 341 FPS.

UNIT 3 DAMAGED 16 FOOT CHUTE ( $C_D S = 40$ ), RELEASE ALT. = 28,000 FT., X = -3963  
Y = 1246, TOF 110 SEC., IMPACT VEL. 226 FPS.

THERE IS A LOT OF EXTRA TRAJECTORY RESULTS INCLUDED; HOWEVER, THEY SHOULD  
HELP GIVE YOU AN IDEA AS TO HOW DIFFERENT PARAMETER VARIATIONS AFFECT THE  
IMPACT POINTS.

NEW SUBJECT: IF UNIT 4 HAS NOT BEEN POSITIVELY LOCATED BY FRIDAY, 11 FEB 1966  
I WILL LEAVE HERE TO REPLACE YOU. ARRIVAL TIME WILL BE FORWARDED LATER.

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$2.2760 \times 10^{-1}$

$5.2 \times 10^{-3}$

$250 \times 10^{-4}$

$\frac{42.2}{5.2} \times 10^{-3}$

47.7

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69,000 ft.

1055 sec.

	Dir.	Vel. kts	Alt. (ft)
30K	305	60	300° / 60-DS.
25K	300	55	
20K	290	50	
15K	290	45	
10K	285	30	
5K	270	25	
S.L.	270	20	

$\frac{65 \text{ ft}}{\text{sec}} \times 1055 = 71,700 \text{ ft.}$

① 54-11  
② 185300

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25000 FT

64 FT

ROUTE

W/

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TOP

X

Y

765

-26460

89716

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64 FT ROUTE

W/ 1500 lb

25000

-12100

50010

475

20000

-11240

36970

769

15000

-7200

74650

614

387 lb

MAN-10127

144

0.552 IN 1.

TOP

X

Y

VAR

VAR

2.4

453

-3260

22340

43.7

22.7

264 lb

MAN

FF

+5000

TOP

X

Y

VAR

VAR

Z/Vel

1655

-22700

85050

40.7

22.6

405

1655

-22950

64470

42.7

22.6

615

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P. Amt.	1/24 to 1/29	X	Y
0,000	355	-9456	3050
1,000	337	-7157	29951
4,000	322	-7300	23640
5,000	302	-1805	15420

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~~1/24 to 1/29~~

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RELEASE ALTITUDE 25000 REL VEL 400fps Az = 256°

WINDS AS OF 19 FEB TUMBLING BOMB C<sub>D</sub>S = 18.0

CONDITIONS AT STAGING ALTITUDES UNCLASSIFIED

	Vel.	TOF	X	Y	θ	
25000	378	15	-1276	-3779	-66	STAGE 1
20000	436	28	-2056	-4683	-83	STAGE 2
15000	430	~ 41	-2570	-4542	-83	STAGE 3

TAIL COVER

STAGE	Imp VEL	TOF	X	Y	θ
1	128	181	-4375	5600	-74.5
2	128	165	-3967	2890	-74.5
3	128	145	-3583	919	-74.5

OBJECT C<sub>D</sub>S = 0.847

STAGE	Imp VEL	TOF	X	Y	θ
1	882	50	-3419	-6861	-87
2	853	56	-3343	-4701	-88
3	802	62	-339	-3624	-87

OBJECT C<sub>D</sub>S = 0.346

STAGE	Imp VEL	TOF	X	Y	θ
1	1106	47	-3432	-7469	-85
2	1041	54	-3339	-4964	-88
3	890	57	-3231	-3865	-87

UNDERWATER DRIFT (ASSUME 2000 FT DEEP)

Doc  
63

DRIFT RANGE 2489 FT. IN A SOUTH WEST DIRECTION (22.

64 FOOT CHUTE WITH 1500 POUNDS (IMPACT VEL 0.79 fps)

DRIFT RANGE 1436.7 IN A SOUTH WEST DIRECTION

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WRB

- Body weight	175	lbs
- clothing + equipment	59	lbs
- ejection seat	130	lbs
- parachute	33	lbs
TOTAL	397	lbs

Shepan

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