ID# 407736

OS001

THE WHITE HOUSE
CORRESPONDENCE TRACKING WORKSHEET

INCOMING

DATE RECEIVED: JUNE 18, 1986

NAME OF CORRESPONDENT: THE HONORABLE ROBERT J. LAGOMARSINO

SUBJECT: URGES CONTINUED SUPPORT FOR CONSTRUCTION OF A FOURTH SPACE SHUTTLE ORBITER TO REPLACE THE CHALLENGER, AND FOR THE DEDICATION OF AN ORBITER TO USE AT VANDENBERG AIR FORCE BASE

ROUTE TO: OFFICE/AGENCY (STAFF NAME)	ACTION ACT CODE	ACTION DATE YY/MM/DD	DISPOSITION TYPE RESP	DISPOSITION C D	DISPOSITION COMPLETED YY/MM/DD
WILLIAM BALL	ORG	86/06/18	NB A	86/06/23	
REFERRAL NOTE:					
		__/__/__			__/__/__
REFERRAL NOTE:					
		__/__/__			__/__/__
REFERRAL NOTE:					
		__/__/__			__/__/__
REFERRAL NOTE:					
		__/__/__			__/__/__
REFERRAL NOTE:					

COMMENTS: _____

ADDITIONAL CORRESPONDENTS: MEDIA:L INDIVIDUAL CODES: 1240 ____ ____

__ MAIL USER CODES: (A)_____ (B)_____ (C)_____

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*I-INFO COPY/NO ACT NEC		
*R-DIRECT REPLY W/COPY		
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REFER QUESTIONS AND ROUTING UPDATES TO CENTRAL REFERENCE (ROOM 75,OEOB) EXT-2590
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June 27, 1986

Dear Bob:

On the President's behalf, I would like to thank you for your June 17 letter regarding our space program.

We agree with the view expressed in your letter that the United States depends upon our ability to operate in space for our security and for commercial and scientific purposes. We also agree that the Nation needs a vigorous space program and a robust space launch capacity. These are key elements of the President's program for continued U.S. leadership in space.

The Challenger accident and the subsequent failures of the Titan and Delta class expendable launch vehicles have raised many serious program and funding issues. Recognizing the importance of restoring a safe and adequate space launch capability and the severe fiscal environment, the Administration has given priority, high-level attention to thoroughly examining the many serious issues involved.

The Administration is now in the final stages of reviewing the programmatic and funding requirements for space launch recovery. Thus, we expect that the agencies involved will shortly be able to forward to the Congress their detailed program and funding plans for space launch recovery.

Thank you for your support of the President's space program.

With best wishes,

Sincerely,

William L. Ball, III
Assistant to the President

The Honorable Robert J. Lagomarsino
House of Representatives
Washington, D.C. 20515

WLB:OMB:KRJ:hlb

cc: w/copy of inc to Beth Strauss - FYI
cc: w/copy of inc to Jerry May, NSC - FYI

ROBERT J. LAGOMARSINO
19TH DISTRICT, CALIFORNIA

2332 RAYBURN BUILDING
WASHINGTON, DC 20515
202-225-3601

CONFERENCE SECRETARY

CONGRESSIONAL OBSERVER
GENEVA ARMS CONTROL TALKS

Congress of the United States
House of Representatives
Washington, DC 20515

COMMITTEE ON
FOREIGN AFFAIRS
SUBCOMMITTEES:
WESTERN HEMISPHERE AFFAIRS
RANKING MINORITY MEMBER
INTERNATIONAL ECONOMIC POLICY
AND TRADE

COMMITTEE ON
INTERIOR AND INSULAR
AFFAIRS
SUBCOMMITTEES:
NATIONAL PARKS AND RECREATION
RANKING MINORITY MEMBER
PUBLIC LANDS
MINORITY REPRESENTATIVE FOR
TERRITORIAL AFFAIRS

ND

407736

June 17, 1986

President Ronald Reagan
The White House

Dear President Reagan:

I am writing to urge your continued support for construction of a fourth space shuttle orbiter to replace the Challenger, and for the dedication of an orbiter to use at Vandenberg Air Force Base.

As the latest edition of Jane's Space Flight Directory points out, the Soviet Union has taken an "almost frightening" 10-year lead over the United States in its space program.

We need the capabilities provided by a manned space program, both for national security reasons and for the scientific, technological and economic benefits it provides. And, we need manned access to polar orbits, a capability available only through the shuttle launch complex at Vandenberg. It would be fool-hardy to abandon either the space shuttle program or the Vandenberg shuttle launch complex; and efficient utilization of both requires an adequate fleet of orbiters.

I hope you will continue to support both these national assets and their full, safe utlization for the benefit of our Nation and mankind.

Sincerely yours,

ROBERT J. LAGOMARSINO
Member of Congress

RJL:jd

SUITE 101
5740 RALSTON
VENTURA, 93003
642-2200/656-4344

STUDIO 121 EL PASEO
814 STATE STREET
SANTA BARBARA, 93101
963-1708

104 E. BOONE ST. #E
SANTA MARIA, 93454
922-2131

ID# 408068

THE WHITE HOUSE
CORRESPONDENCE TRACKING WORKSHEET

OS 001

INCOMING

DATE RECEIVED: JUNE 23, 1986

NAME OF CORRESPONDENT: THE HONORABLE CARROLL HUBBARD

SUBJECT: ENCLOSES LETTER FROM JOHN L. DAVIS OF MURRAY, KENTUCKY WHO IS CONCERNED ON THE RISKS TAKEN WITH EVERY SPACE MISSION

ROUTE TO: OFFICE/AGENCY (STAFF NAME)	ACTION ACT CODE	ACTION DATE YY/MM/DD	DISPOSITION TYPE RESP	DISPOSITION C D	DISPOSITION COMPLETED YY/MM/DD
WILLIAM BALL	ORG	86/06/23	WB	A	86/06/27
REFERRAL NOTE: Co Hig	19	86/07/01			/ /
REFERRAL NOTE:		/ /			/ /
REFERRAL NOTE:		/ /			/ /
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COMMENTS:

ADDITIONAL CORRESPONDENTS: MEDIA:L INDIVIDUAL CODES: 1230 ____ ____

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June 27, 1986

Dear Mr. Hubbard:

Thank you for your June 17 letter forwarding to the President a letter from John L. Davis.

In an effort to be of assistance, I have forwarded John's letter to the appropriate White House officials to see if a response may be sent to him in the President's behalf. Your interest in writing is appreciated.

With best wishes,

Sincerely,

William L. Ball, III
Assistant to the President

The Honorable Carroll Hubbard
House of Representatives
Washington, D.C. 20515

WLB/KRJ/HLB/hlb

cc: w/copy of inc, Anne Higgins -- for DIRECT action

WH RECORDS MANAGEMENT WILL RETAIN ORIGINAL INCOMING

6/6/86

Dear Mr. President,

With all due respect, I am totally disgusted. Last night I watched 20/20 and learned the truth about the 1/28/86 51L shuttle disaster and I couldn't believe my eyes & ears.

With every space mission there comes great risk. You ignore that risk. You think it's as safe as eating jelly beans. Now I think you should stop ignoring the risks and start reducing them

Sincerely
John L Davis
Age 12
RT 5 BOX 510
Murray, Ky
42071

CARROLL HUBBARD
CONGRESSMAN
1ST DISTRICT, KENTUCKY

2182 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515
(202) 225-3115

408068

DEPUTY MAJORITY WHIP

COMMITTEES:
BANKING, FINANCE AND URBAN AFFAIRS
MERCHANT MARINE AND FISHERIES
CHAIRMAN, SUBCOMMITTEE ON GENERAL OVERSIGHT AND INVESTIGATIONS OF THE BANKING COMMITTEE

Congress of the United States
House of Representatives
Washington, DC 20515

June 17, 1986

Honorable William L. Ball III
Assistant to the President
for Legislative Affairs
The White House
Washington, D.C. 20500

Dear Will:

I am enclosing a letter from one of my constituents, John L. Davis of Murray, Kentucky. He requested that I forward the enclosed letter to President Reagan.

If possible, please send the President's response to:

John L. Davis
Route 5, Box 510
Murray, KY 42071.

Thank you for your kind attention to this matter.

With best wishes for you, I am

Sincerely yours,

Carroll Hubbard

Carroll Hubbard
Member of Congress

CH:sc

Enclosure

ID# 408068

OS 001

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REFERRAL NOTE:					
Cortligan	A	86/07/01		C	87/04/14
REFERRAL NOTE:					
NASA	R	86/07/03		A	86/07/18
REFERRAL NOTE:					
NASA	R	86/07/09		A	86/07/09
REFERRAL NOTE: letter to Mr. John L. Davis					
		/ /			/ /
REFERRAL NOTE:					

TR

COMMENTS:

ADDITIONAL CORRESPONDENTS: MEDIA:L INDIVIDUAL CODES: 1230

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National Aeronautics and
Space Administration

Washington, D.C.
20546

Reply to Attn of: C:PLG

April 13, 1987

Honorable William L. Ball, III
Assistant to the President
for Legislative Affairs
The White House
Washington, DC 20500

Dear Will:

This letter responds to your inquiry of April 7 concerning two cases assigned to NASA. The first (408068) from Rep. Hubbard on behalf of John L. Davis was answered/closed out on July 9, 1986 (copy enclosed). The second (460739) from Rep. Livingston on behalf of Wilson A. Miramon was answered/closed out on April 1, 1987 (copy enclosed). Copies of both actions were forwarded to you as requested at the time of their disposition.

Sincerely,

John F. Murphy
Assistant Administrator
for Legislative Affairs

Enclosures

NASA
National Aeronautics and Space Administration

National Aeronautics and Space Administration
Office of Legislative Affairs
Washington, DC 20546

7/18/86
C19666f

TO: Honorable Carroll Hubbard
House of Representatives
Washington DC 20515

~~In response to your request, we are sending you the following:~~

Enclosed, for your information, is a copy of the letter sent to John L. David in response to your inquiry to the White House.

Patricia S. Newcomer
Legislative Affairs Specialist
453-1071

LFF July 9, 1986

Mr. John L. Davis
Rt 5, Box 510
Murry, KY 42071

Dear Mr. Davis:

Thank you for your letter to the President which the White House forwarded here for acknowledgement.

We believe the many recommendations of the Presidential Commission, which investigated the Space Shuttle Challenger disaster, go along way in reducing the risk of flying in space.

NASA is now in the process of preparing a report to the President which explains in great detail how NASA intends to carry out the recommendations of the Rogers Commission. There will always be a certain amount of risk associated with space flight. However, we believe that we can make space flight as safe as possible, and we will not fly again in space until we are absolutely sure that it is safe.

We thank you for your letter and your concern, and we hope that you will enjoy the enclosed copy of the abbreviated version of the Rogers Commission report.

Sincerely,

Original Signed By
Eugene A. Marianetti

Gene Marianetti
Chief, Special Events Branch
Public Affairs Division

Enclosure:
1. Rogers Report

T H E W H I T E H O U S E O F F I C E

REFERRAL

JULY 3, 1986

TO: NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

ACTION REQUESTED:
DIRECT REPLY, FURNISH INFO COPY

DESCRIPTION OF INCOMING:

ID: 408068

MEDIA: LETTER, DATED JUNE 17, 1986

TO: WILLIAM BALL

FROM: THE HONORABLE CARROLL HUBBARD
U.S. HOUSE OF REPRESENTATIVES

WASHINGTON DC 20515

SUBJECT: ENCLOSES LETTER FROM JOHN L. DAVIS OF MURRAY, KENTUCKY WHO IS CONCERNED ON THE RISKS TAKEN WITH EVERY SPACE MISSION

PROMPT ACTION IS ESSENTIAL -- IF REQUIRED ACTION HAS NOT BEEN TAKEN WITHIN 9 WORKING DAYS OF RECEIPT, PLEASE TELEPHONE THE UNDERSIGNED AT 456-7486.

RETURN CORRESPONDENCE, WORKSHEET AND COPY OF RESPONSE (OR DRAFT) TO:
AGENCY LIAISON, ROOM 91, THE WHITE HOUSE, 20500

SALLY KELLEY
DIRECTOR OF AGENCY LIAISON
PRESIDENTIAL CORRESPONDENCE

7/8

A62197

June 27, 1986

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With best wishes,

Sincerely,

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Assistant to the President

The Honorable Carroll Hubbard
House of Representatives
Washington, D.C. 20515

WLB/KRJ/HLB/hlb

cc: w/copy of inc, Anne Higgins -- for DIRECT action

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CONGRESSMAN
1ST DISTRICT, KENTUCKY

2182 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON DC 20515
(202) 225-3115

Congress of the United States
House of Representatives
Washington, DC 20515

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CHAIRMAN, SUBCOMMITTEE ON GENERAL OVERSIGHT AND INVESTIGATIONS OF THE BANKING COMMITTEE

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The White House
Washington, D.C. 20500

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Sincerly
John A Davis
Age 12
Rt 5 Box 510
Murray, Ky
42071

By The
PRESIDENTIAL COMMISSION
on the Space Shuttle Challenger Accident

REPORT AT A GLANCE

EMBARGOED FOR WIRE TRANSMISSION UNTIL 10:00 A.M. EDT, MONDAY, JUNE 9, AND FROM PUBLICATION/BROADCAST UNTIL 2:00 P.M. EDT, JUNE 9.

IN MEMORIAM

"The future is not free: the story of all human progress is one of a struggle against all odds. We learned again that this America, which Abraham Lincoln called the last, best hope of man on Earth, was built on heroism and noble sacrifice. It was built by men and women like our seven star voyagers, who answered a call beyond duty, who gave more than was expected or required and who gave it little thought of worldly reward."

—President Ronald Reagan *January 31, 1986*

Francis R. (Dick) Scobee
Commander

Michael John Smith
Pilot

Ellison S. Onizuka
Mission Specialist One

Judith Arlene Resnik
Mission Specialist Two

Ronald Erwin McNair
Mission Specialist Three

S. Christa McAuliffe
Payload Specialist One

Gregory Bruce Jarvis
Payload Specialist Two

Presidential Commission
on the
Space Shuttle Challenger Accident

June 6, 1986

Dear Mr. President:

On behalf of the Commission, it is my privilege to present the report of the Presidential Commission on the Space Shuttle Challenger Accident.

Since being sworn in on February 6, 1986, the Commission has been able to conduct a comprehensive investigation of the Challenger accident. This report documents our findings and makes recommendations for your consideration.

Our objective has been not only to prevent any recurrence of the failure related to this accident, but to the extent possible to reduce other risks in future flights. However, the Commission did not construe its mandate to require a detailed evaluation of the entire Shuttle system. It fully recognizes that the risk associated with space flight cannot be totally eliminated.

Each member of the Commission shared the pain and anguish the nation felt at the loss of seven brave Americans in the Challenger accident on January 28, 1986.

The nation's task now is to move ahead to return to safe space flight and to its recognized position of leadership in space. There could be no more fitting tribute to the Challenger crew than to do so.

Sincerely,

William P. Rogers
Chairman

The President of the United States
The White House
Washington, D. C. 20500

600 Maryland Avenue, S.W. Washington, D.C. 20024 (202)453-1405

In compliance with the Executive Order 12546 of February 3, 1986, the undersigned present the report of the Presidential Commission on the Space Shuttle Challenger Accident.

William P. Rogers
Chairman, Maryland

Neil A. Armstrong
Vice Chairman, Ohio

David C. Acheson
District of Columbia

Eugene E. Covert
Massachusetts

Richard P. Feynman
California

Robert B. Hotz
Maryland

Donald J. Kutyna
Illinois

Sally K. Ride
California

Robert W. Rummel
Arizona

Joseph F. Sutter
Washington

Arthur B. C. Walker, Jr.
California

Albert D. Wheelon
California

Charles E. Yeager
California

Volume I

Report of the Presidential Commission on the Space Shuttle Challenger Accident

with

Appendix A	Commission Activities
Appendix B	Commission Documentation System
Appendix C	Observations Concerning the Processing and Assembly of Flight 51-L
Appendix D	Supporting Charts and Documents

Volume II

Appendix E	Independent Test Team Report to the Commission
Appendix F	Personal Observations on Reliability of Shuttle
Appendix G	Human Factors Analysis
Appendix H	Flight Readiness Review Treatment of O-ring Problems
Appendix I	NASA Pre-Launch Activities Team Report
Appendix J	NASA Mission Planning and Operations Team Report
Appendix K	NASA Development and Production Team Report
Appendix L	NASA Accident Analysis Team Report
Appendix M	Comments by Morton Thiokol on NASA Report

Volume III

Appendix N	NASA Photo and TV Support Team Report
Appendix O	NASA Search, Recovery and Reconstruction Task Force Team Report

Volume IV

Hearings of the Presidential Commission on the Space Shuttle Challenger Accident: February 6, 1986 to February 25, 1986

Volume V

Hearings of the Presidential Commission on the Space Shuttle Challenger Accident: February 26, 1986 to May 2, 1986

Volume I

Table of Contents

Preface

The accident of Space Shuttle Challenger, mission 51-L, interrupting for a time one of the most productive engineering, scientific and exploratory programs in history, evoked a wide range of deeply felt public responses. There was grief and sadness for the loss of seven brave members of the crew; firm national resolve that those men and women be forever enshrined in the annals of American heroes, and a determination, based on that resolve and in their memory, to strengthen the Space Shuttle program so that this tragic event will become a milestone on the way to achieving the full potential that space offers to mankind.

The President, who was moved and troubled by this accident in a very personal way, appointed an independent Commission made up of persons not connected with the mission to investigate it. The mandate of the Commission was to:

1. Review the circumstances surrounding the accident to establish the probable cause or causes of the accident; and
2. Develop recommendations for corrective or other action based upon the Commission's findings and determinations.

Immediately after being appointed, the Commission moved forward with its investigation and, with the full support of the White House, held public hearings dealing with the facts leading up to the accident. In a closed society other options are available; in an open society—unless classified matters are involved—other options are not, either as matter of law or as a practical matter.

In this case a vigorous investigation and full disclosure of the facts were necessary. The way to deal with a failure of this magnitude is to disclose all the facts fully and openly; to take immediate steps to correct mistakes that led to the failure; and to continue the program with renewed confidence and determination.

The Commission construed its mandate somewhat broadly to include recommendations on safety matters not necessarily involved in this accident but which require attention to make future flights safer. Careful attention was given to concerns expressed by astronauts because the Space Shuttle program will only succeed if the highly qualified men and women who fly the Shuttle have confidence in the system.

However, the Commission did not construe its mandate to require a detailed investigation of all aspects of the Space Shuttle program; to review budgetary matters; or to interfere with or supersede Congress in any way in the performance of its duties. Rather, the Commission focused its attention on the safety aspects of future flights based on the lessons learned from the investigation with the objective being to return to safe flight.

Congress recognized the desirability, in the first instance, of having a single investigation of this national tragedy. It very responsibly agreed to await the Commission's findings before deciding what further action might be necessary to carry out its responsibilities.

For the first several days after the accident—possibly because of the trauma resulting from the accident—NASA appeared to be withholding information about the accident from the public. After the Commission began its work, and at its suggestion, NASA began releasing a great deal of information that helped to reassure the public that all aspects of the accident were being investigated and that the full story was being told in an orderly and thorough manner.

Following the suggestion of the Commission, NASA established several teams of persons not involved in the mission 51-L launch process to support the Commission and its panels. These NASA teams have cooperated with the Commission in every aspect of its work. The result has been a comprehensive and complete investigation.

The Commission believes that its investigation and report have been responsive to the request of the President and hopes that they will serve the best interests of the nation in restoring the United States space program to its preeminent position in the world. ■

Chapter III

The Accident

Just after liftoff at .678 seconds into the flight, photographic data show a strong puff of gray smoke was spurting from the vicinity of the aft field joint on the right Solid Rocket Booster. The two pad 39B cameras that would have recorded the precise location of the puff were inoperative. Computer graphic analysis of film from other cameras indicated the initial smoke came from the 270 to 310-degree sector of the circumference of the aft field joint of the right Solid Rocket Booster. This area of the solid booster faces the External Tank. The vaporized material streaming from the joint indicated there was not complete sealing action within the joint.

Eight more distinctive puffs of increasingly blacker smoke were recorded between .836 and 2.500 seconds. The smoke appeared to puff upwards from the joint. While each smoke puff was being left behind by the upward flight of the Shuttle, the next fresh puff could be seen near the level of the joint. The multiple smoke puffs in this sequence occurred at about four times per second, approximating the frequency of the structural load dynamics and resultant joint flexing. Computer graphics applied to NASA photos from a variety of cameras in this sequence again placed the smoke puffs' origin in the 270-to 310-degree sector of the original smoke spurt.

As the Shuttle increased its upward velocity, it flew past the emerging and expanding smoke puffs. The last smoke was seen above the field joint at 2.733 seconds.

The black color and dense composition of the smoke puffs suggest that the grease, joint insulation and rubber O-rings in the joint seal were being burned and eroded by the hot propellant gases.

At approximately 37 seconds, Challenger encountered the first of several high-altitude wind shear conditions, which lasted until about 64 seconds. The wind shear created forces on the vehicle with relatively large fluctuations. These were immediately sensed and countered by the guidance, navigation and control system.

The steering system (thrust vector control) of the Solid Rocket Booster responded to all commands and wind shear effects. The wind shear caused the steering system to be more active than on any previous flight.

Both the Shuttle main engines and the solid rockets operated at reduced thrust approaching and passing through the area of maximum dynamic pressure of 720 pounds per square foot. Main engines had been throttled up to 104 percent thrust and the Solid Rocket Boosters were increasing their thrust when the first flickering flame appeared on the right Solid Rocket Booster in the area of the aft field joint. This first very small flame was detected on image enhanced film at 58.788 seconds into the flight. It appeared to originate at about 305 degrees around the booster circumference at or near the aft field joint.

One film frame later from the same camera, the flame was visible without image enhancement. It grew into a continuous, well-defined plume at 59.262 seconds. At about the same time (60 seconds), telemetry showed a pressure differential between the chamber pressures in the right and left boosters. The right booster chamber pressure was lower, confirming the growing leak in the area of the field joint.

As the flame plume increased in size, it was deflected rearward by the aerodynamic slipstream and circumferentially by the protruding structure of the upper ring attaching the booster to the External Tank. These deflections directed the flame plume onto the surface of the External Tank. This sequence of flame spreading is confirmed by analysis of the recovered wreckage. The growing flame also impinged on the strut attaching the Solid Rocket Booster to the External Tank.

The first visual indication that swirling flame from the right Solid Rocket Booster breached the External Tank was at 64.660 seconds when there was an abrupt change in the shape and color of the plume. This indicated that it was mixing with leaking hydrogen from the External Tank. Telemetered changes in the hydrogen tank pressuriza-

tion confirmed the leak. Within 45 milliseconds of the breach of the External Tank, a bright sustained glow developed on the black-tiled underside of the Challenger between it and the External Tank.

Beginning at about 72 seconds, a series of events occurred extremely rapidly that terminated the flight. Telemetered data indicate a wide variety of flight system actions that support the visual evidence of the photos as the Shuttle struggled futilely against the forces that were destroying it.

At about 72.20 seconds the lower strut linking the Solid Rocket Booster and the External Tank was severed or pulled away from the weakened hydrogen tank permitting the right Solid Rocket Booster to rotate around the upper attachment strut. This rotation is indicated by divergent yaw and pitch rates between the left and right Solid Rocket Boosters.

At 73.124 seconds, a circumferential white vapor pattern was observed blooming from the side of the External Tank bottom dome. This was the beginning of the structural failure of the hydrogen tank that culminated in the entire aft dome dropping away. This released massive amounts of liquid hydrogen from the tank and created a sudden forward thrust of about 2.8 million pounds, pushing the hydrogen tank upward into the intertank structure. At about the same time, the rotating right Solid Rocket Booster impacted the intertank structure and the lower part of the liquid oxygen tank. These structures failed at 73.137 seconds as evidenced by the white vapors appearing in the intertank region.

Within milliseconds there was massive, almost explosive, burning of the hydrogen streaming from the failed tank bottom and the liquid oxygen breach in the area of the intertank.

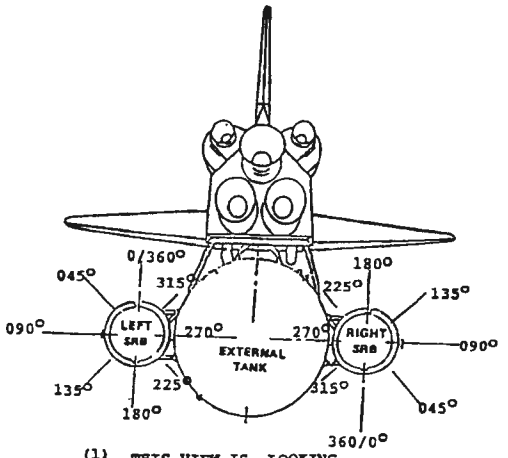
At this point in its trajectory, while traveling at a Mach number of 1.92 at an altitude of 46,000 feet, the Challenger was totally enveloped in the explosive burn. The Challenger's reaction control system ruptured and a hypergolic burn of its propellants occurred as it exited the oxygen-hydrogen flames. The reddish brown colors of the hypergolic fuel burn are visible on the edge of the main fireball. The Orbiter, under severe aerodynamic loads, broke into several large sections which emerged from the fireball. Separate sections that can be identified on film include the main engine/tail section with the engines still burning, one wing of the Orbiter, and the forward fuselage trailing a mass of umbilical lines pulled loose from the payload bay.

STS 51-L Sequence of Major Events

Mission Time (GMT, in hr:min:sec)	Event	Elapsed Time (secs.)	Source
16:37:53.444	ME-3 Ignition Command	-6.566	GPC
37:53.564	ME-2 Ignition Command	-6.446	GPC
37:53.684	ME-1 Ignition Command	-6.326	GPC
38:00.010	SRM Ignition Command (T=0)	0.000	GPC
38:00.018	Holddown Post 2 PIC firing	0.008	E8 Camera
38:00.260	First Continuous Vertical Motion	0.250	E9 Camera
38:00.688	Confirmed smoke above field joint on RH SRM	0.678	E60 Camera
38:00.846	Eight puffs of smoke (from 0.836 thru 2.500 sec MET)	0.836	E63 Camera
38:02.743	Last positive evidence of smoke above right aft SRB/ET attach ring	2.733	CZR-1 Camera
38:03.385	Last positive visual indication of smoke	3.375	E60 Camera
38:04.349	SSME 104% Command	4.339	E41M2076D
38:05.684	RH SRM pressure 11.8 psi above nominal	5.674	B47P2302C
38:07.734	Roll maneuver initiated	7.724	V90R5301C
38:19.869	SSME 94% Command	19.859	E41M2076D
38:21.134	Roll maneuver completed	21.124	V90R5301C
38:35.389	SSME 65% Command	35.379	E41M2076D
38:37.000	Roll and Yaw Attitude Response to Wind (36.990 to 62.990 sec)	36.990	V95H352nC
38:51.870	SSME 104% Command	51.860	E41M2076D
38:58.798	First evidence of flame on RH SRM	58.788	E207 Camera
38:59.010	Reconstructed Max Q (720 psf)	59.000	BET
38:59.272	Continuous well defined plume on RH SRM	59.262	E207 Camera
38:59.763	Flame from RH SRM in +Z direction (seen from south side of vehicle)	59.753	E204 Camera
39:00.014	SRM pressure divergence (RH vs. LH)	60.004	B47P2302
39:00.248	First evidence of plume deflection, intermittent	60.238	E207 Camera
39:00.258	First evidence of SRB plume attaching to ET ring frame	60.248	E203 Camera
39:00.998	First evidence of plume deflection, continuous	60.988	E207 Camera
39:01.734	Peak roll rate response to wind	61.724	V90R5301C
39:02.094	Peak TVC response to wind	62.084	B58H1150C
39:02.414	Peak yaw rate response to wind	62.404	V90R5341C
39:02.494	RH outboard elevon actuator hinge moment spike	62.484	V58P0966C
39:03.934	RH outboard elevon actuator delta pressure change	63.924	V58P0966C
39:03.974	Start of planned pitch rate maneuver	63.964	V90R5321C
39:04.670	Change in anomalous plume shape (LH_2 tank leak near 2058 ring frame)	64.660	E204 Camera
39:04.715	Bright sustained glow on sides of ET	64.705	E204 Camera
39:04.947	Start SSME gimbal angle large pitch variations	64.937	V58H1100A
39:05.174	Beginning of transient motion due to changes in aero forces due to plume	65.164	V90R5321C
39:05.534	LH outboard elevon actuator delta pressure change	65.524	V58P0866C
39:06.774	Start ET LH_2 ullage pressure deviations	66.764	T41P1700C
39:12.214	Start divergent yaw rates (RH vs. LH SRB)	72.204	V90R2528C

39:12.294	Start divergent pitch rates (RH vs. LH SRB)	72.284	V90R2525C
39:12.488	SRB major high-rate actuator command	72.478	V79H2111A
39:12.507	SSME roll gimbal rates 5 deg/sec	72.497	V58H1100A
39:12.535	Vehicle max +Y lateral acceleration (+.227 g)	72.525	V98A1581C
39:12.574	SRB major high-rate actuator motion	72.564	B58H1151C
39:12.574	Start of H_2 tank pressure decrease with 2 flow control valves open	72.564	T41P1700C
39:12.634	Last state vector downlinked	72.624	Data reduction
39:12.974	Start of sharp MPS LOX inlet pressure drop	72.964	V41P1330C
39:13.020	Last full computer frame of TDRS data	73.010	Data reduction
39:13.054	Start of sharp MPS LH_2 inlet pressure drop	73.044	V41P1100C
39:13.055	Vehicle max -Y lateral acceleration (-.254 g)	73.045	V98A1581C
39:13.134	Circumferential white pattern on ET aft dome (LH_2 tank failure)	73.124	E204 Camera
39:13.134	RH SRM pressure 19 psi lower than LH SRM	73.124	B47P2302C
39:13.147	First hint of vapor at intertank	73.137	E207 Camera
39:13.153	All engine systems start responding to loss of fuel and LOX inlet pressure	73.143	SSME team
39:13.172	Sudden cloud along ET between intertank and aft dome	73.162	E207 Camera
39:13.201	Flash between Orbiter and LH_2 tank	73.191	E204 Camera
39:13.221	SSME telemetry data interference from 73.211 to 73.303	73.211	
39:13.223	Flash near SRB fwd attach and brightening of flash between Orbiter and ET	73.213	E204 Camera
39:13.292	First indication intense white flash at SRB fwd attach point	73.282	E204 Camera
39:13.337	Greatly increased intensity of white flash	73.327	E204 Camera
39:13.387	Start RCS jet chamber pressure fluctuations	73.377	V42P1552A
39:13.393	All engines approaching HPFT discharge temp redline limits	73.383	E41Tn010D
39:13.492	ME-2 HPFT disch. temp Chan. A vote for shutdown; 2 strikes on Chan. B	73.482	MEC data
39:13.492	ME-2 controller last time word update	73.482	MEC data
39:13.513	ME-3 in shutdown due to HPFT discharge temperature redline exceedance	73.503	MEC data
39:13.513	ME-3 controller last time word update	73.503	MEC data
39:13.533	ME-1 in shutdown due to HPFT discharge temperature redline exceedance	73.523	Calculation
39:13.553	ME-1 last telemetered data point	73.543	Calculation
39:13.628	Last validated Orbiter telemetry measurement	73.618	V46P0120A
39:13.641	End of last reconstructed data frame with valid synchronization and frame count	73.631	Data reduction
39:14.140	Last radio frequency signal from Orbiter	74.130	Data reduction
39:14.597	Bright flash in vicinity of Orbiter nose	74.587	E204 Camera
39:16.447	RH SRB nose cap sep/chute deployment	76.437	E207 Camera
39:50.260	RH SRB RSS destruct	110.250	E202 Camera
39:50.262	LH SRB RSS destruct	110.252	E230 Camera

ACT POS	-	Actuator Position
APU	-	Auxilliary Power Unit
BET	-	Best Estimated Trajectory
CH	-	Channel
DISC	-	Discharge
ET	-	External Tank
GG	-	Gas Generator
GPC	-	General Purpose Computer
GMT	-	Greenwich Mean Time
HPFT	-	High Pressure Fuel Turbopump
LH	-	Lefthand
LH_2	-	Liquid Hydrogen
LO_2	-	Liquid Oxygen (same as LOX)
MAX Q	-	Maximum Dynamic Pressure
ME	-	Main Engine (same as SSME)
MEC	-	Main Engine Controller
MET	-	Mission Elapsed Time
MPS	-	Main Propulsion System
PC	-	Chamber Pressure
PIC	-	Pyrotechnics Intitiator Controller
psf	-	Pounds per square foot
RCS	-	Reaction Control System
RGA	-	Rate Gyro Assembly
RH		Righthand
RSS	-	Range Safety System
SRM	-	Solid Rocket Motor
SSME	-	Space Shuttle Main Engine
TEMP	-	Temperature
TVC	-	Thrust Vector Control



(1) THIS VIEW IS LOOKING FORWARD (DIRECTION OF FLIGHT) OR "UP" WHEN VEHICLE IS ON LAUNCH PAD

(2) ANGLES ARE INCREASING COUNTERCLOCKWISE

ANGULAR COORDINATE SYSTEM FOR SOLID ROCKET BOOSTERS

NOTE: The Shuttle coordinate system used in Chapter 3 is relative to the Orbiter, as follows:

+X direction = forward (tail to nose)
-X direction = rearward (nose to tail)
+Y direction = right (toward the right wing tip)
-Y direction = left (toward the left wing tip)
+Z direction = down
-Z direction = up

Chapter IV

The Cause of the Accident

The consensus of the Commission and participating investigative agencies is that the loss of the Space Shuttle Challenger was caused by a failure in the joint between the two lower segments of the right Solid Rocket Motor. The specific failure was the destruction of the seals that are intended to prevent hot gases from leaking through the joint during the propellant burn of the rocket motor. The evidence assembled by the Commission indicates that no other element of the Space Shuttle system contributed to this failure.

In arriving at this conclusion, the Commission reviewed in detail all available data, reports and records; directed and supervised numerous tests, analyses, and experiments by NASA, civilian contractors and various government agencies; and then developed specific failure scenarios and the range of most probable causative factors.

Findings

1. A combustion gas leak through the right Solid Rocket Motor aft field joint initiated at or shortly after ignition eventually weakened and/or penetrated the External Tank initiating vehicle structural breakup and loss of the Space Shuttle Challenger during STS Mission 51-L.
2. The evidence shows that no other STS 51-L Shuttle element or the payload contributed to the causes of the right Solid Rocket Motor aft field joint combustion gas leak. Sabotage was not a factor.
3. Evidence examined in the review of Space Shuttle material, manufacturing, assembly, quality control, and processing of nonconformance reports found no flight hardware shipped to the launch site that fell outside the limits of Shuttle design specifications.
4. Launch site activities, including assembly and preparation, from receipt of the flight hardware to launch were generally in accord with established procedures and were not considered a factor in the accident.
5. Launch site records show that the right Solid Rocket Motor segments were assembled using approved procedures. However, significant out-of-round conditions existed between the two segments joined at the right Solid Rocket Motor aft field joint (the joint that failed).
   a. While the assembly conditions had the potential of generating debris or damage that could cause O-ring seal failure, these were not considered factors in this accident.
   b. The diameters of the two Solid Rocket Motor segments had grown as a result of prior use.
   c. The growth resulted in a condition at time of launch wherein the maximum gap between the tang and clevis in the region of the joint's O-rings was no more than .008 inches and the average gap would have been .004 inches.
   d. With a tang-to-clevis gap of .004 inches, the O-ring in the joint would be compressed to the extent that it pressed against all three walls of the O-ring retaining channel.
   e. The lack of roundness of the segments was such that the smallest tang-to-clevis clearance occurred at the initiation of the assembly operation at positions of 120 degrees and 300 degrees around the circumference of the aft field joint. It is uncertain if this tight condition and the resultant greater compression of the O-rings at these points persisted to the time of launch.

6. The ambient temperature at time of launch was 36 degrees Fahrenheit, or 15 degrees lower than the next coldest previous launch.
   a. The temperature at the 300 degree position on the right aft field joint circumference was estimated to be 28 degrees ± 5 degrees Fahrenheit. This was the coldest point on the joint.
   b. Temperature on the opposite side of the right Solid Rocket Booster facing the sun was estimated to be about 50 degrees Fahrenheit.
7. Other joints on the left and right Solid Rocket Boosters experienced similar combinations of tang-to-clevis gap clearance and temperature. It is not known whether these joints experienced distress during the flight of 51-L.
8. Experimental evidence indicates that due to several effects associated with the Solid Rocket Booster's ignition and combustion pressures and associated vehicle motions, the gap between the tang and the clevis will open as much as .017 and .029 inches at the secondary and primary O-rings, respectively.
   a. This opening begins upon ignition, reaches its maximum rate of opening at about 200-300 milliseconds, and is essentially complete at 600 milliseconds when the Solid Rocket Booster reaches its operating pressure.
   b. The External Tank and right Solid Rocket Booster are connected by several struts, including one at 310 degrees near the aft field joint that failed. This strut's effect on the joint dynamics is to enhance the opening of the gap between the tang and clevis by about 10-20 percent in the region of 300-320 degrees.
9. O-ring resiliency is directly related to its temperature.
   a. A warm O-ring that has been compressed will return to its original shape much quicker than will a cold O-ring when compression is relieved. Thus, a warm O-ring will follow the opening of the tang-to-clevis gap. A cold O-ring may not.
   b. A compressed O-ring at 75 degrees Fahrenheit is five times more responsive in returning to its uncompressed shape than a cold O-ring at 30 degrees Fahrenheit.
   c. As a result it is probable that the O-rings in the right solid booster aft field joint were not following the opening of the gap between the tang and clevis at time of ignition.
10. Experiments indicate that the primary mechanism that actuates O-ring sealing is the application of gas pressure to the upstream (high-pressure) side of the O-ring as it sits in its groove or channel.
   a. For this pressure actuation to work most effectively, a space between the O-ring and its upstream channel wall should exist during pressurization.
   b. A tang-to-clevis gap of .004 inches, as probably existed in the failed joint, would have initially compressed the O-ring to the degree that no clearance existed between the O-ring and its upstream channel wall and the other two surfaces of the channel.
   c. At the cold launch temperature experienced, the O-ring would be very slow in returning to its normal rounded shape. It would not follow the opening of the tang-to-clevis gap. It would remain in its compressed position in the O-ring channel and not provide a space between itself and the upstream channel wall. Thus, it is probable the O-ring would not be pressure actuated to seal the gap in time to preclude joint failure due to blow-by and erosion from hot combustion gases.
11. The sealing characteristics of the Solid Rocket Booster O-rings are enhanced by timely application of motor pressure.
   a. Ideally, motor pressure should be applied to actuate the O-ring and seal the joint prior to significant opening of the tang-to-clevis gap (100 to 200 milliseconds after motor ignition).
   b. Experimental evidence indicates that temperature, humidity and other variables in the putty compound used to seal the joint can delay pressure application to the joint by 500 milliseconds or more.
   c. This delay in pressure could be a factor in initial joint failure.

12. Of 21 launches with ambient temperatures of 61 degrees Fahrenheit or greater, only four showed signs of O-ring thermal distress; i.e., erosion or blow-by and soot. Each of the launches below 61. degrees Fahrenheit resulted in one or more O-rings showing signs of thermal distress.
    a. Of these improper joint sealing actions, one-half occurred in the aft field joints, 20 percent in the center field joints, and 30 percent in the upper field joints. The division between left and right Solid Rockter Boosters was roughly equal.
    b. Each instance of thermal O-ring distress was accompanied by a leak path in the insulating putty. The leak path connects the rocket's combustion chamber with the O-ring region of the tang and clevis. Joints that actuated without incident may also have had these leak paths.
13. There is a possibility that there was water in the clevis of the STS 51-L joints since water was found in the STS-9 joints during a destack operation after exposure to less rainfall than STS 51-L. At time of launch, it was cold enough that water present in the joint would freeze. Tests show that ice in the joint can inhibit proper secondary seal performance.
14. A series of puffs of smoke were observed emanating from the 51-L aft field joint area of the right Solid Rocket Booster between 0.678 and 2.500 seconds after ignition of the Shuttle Solid Rocket Motors.
    a. The puffs appeared at a frequency of about three puffs per second. This roughly matches the natural structural frequency of the solids at lift off and is reflected in slight cyclic changes of the tang-to-clevis gap opening.
    b. The puffs were seen to be moving upward along the surface of the booster above the aft field joint.
    c. The smoke was estimated to originate at a circumferential position of between 270 degrees and 315 degrees on the booster aft field joint, emerging from the top of the joint.
15. This smoke from the aft field joint at Shuttle lift off was the first sign of the failure of the Solid Rocket Booster O-ring seals on STS 51-L.
16. The leak was again clearly evident as a flame at approximately 58 seconds into the flight. It is possible that the leak was continuous but unobservable or non-existent in portions of the intervening period. It is possible in either case that thrust vectoring and normal vehicle response to wind shear as well as planned maneuvers reinitiated or magnified the leakage from a degraded seal in the period preceding the observed flames. The estimated position of the flame, centered at a point 307 degrees around the circumference of the aft field joint, was confirmed by the recovery of two fragments of the right Solid Rocket Booster.
    a. A small leak could have been present that may have grown to breach the joint in flame at a time on the order of 58 to 60 seconds after lift off.
    b. Alternatively, the O-ring gap could have been resealed by deposition of a fragile buildup of aluminum oxide and other combustion debris. This resealed section of the joint could have been disturbed by thrust vectoring, Space Shuttle motion and flight loads induced by changing winds aloft.
    c. The winds aloft caused control actions in the time interval of 32 seconds to 62 seconds into the flight that were typical of the largest values experienced on previous missions.

Conclusion

In view of the findings, the Commission concluded that the cause of the Challenger accident was the failure of the pressure seal in the aft field joint of the right Solid Rocket Motor. The failure was due to a faulty design unacceptably sensitive to a number of factors. These factors were the effects of temperature, physical dimensions, the character of materials, the effects of reusability, processing, and the reaction of the joint to dynamic loading. ▪

Chapter V

The Contributing Cause Of The Accident

The decision to launch the Challenger was flawed. Those who made that decision were unaware of the recent history of problems concerning the O-rings and the joint and were unaware of the initial written recommendation of the contractor advising against the launch at temperatures below 53 degrees Fahrenheit and the continuing opposition of the engineers at Thiokol after the management reversed its position. They did not have a clear understanding of Rockwell's concern that it was not safe to launch because of ice on the pad. If the decisionmakers had known all of the facts, it is highly unlikely that they would have decided to launch 51-L on January 28, 1986.

Findings

1. The Commission concluded that there was a serious flaw in the decision making process leading up to the launch of flight 51-L. A well structured and managed system emphasizing safety would have flagged the rising doubts about the Solid Rocket Booster joint seal. Had these matters been clearly stated and emphasized in the flight readiness process in terms reflecting the views of most of the Thiokol engineers and at least some of the Marshall engineers, it seems likely that the launch of 51-L might not have occurred when it did.

2. The waiving of launch constraints appears to have been at the expense of flight safety. There was no system which made it imperative that launch constraints and waivers of launch constraints be considered by all levels of management.

3. The Commission is troubled by what appears to be a propensity of management at Marshall to contain potentially serious problems and to attempt to resolve them internally rather than communicate them forward. This tendency is altogether at odds with the need for Marshall to function as part of a system working toward successful flight missions, interfacing and communicating with the other parts of the system that work to the same end.

4. The Commission concluded that the Thiokol Management reversed its position and recommended the launch of 51-L, at the urging of Marshall and contrary to the views of its engineers in order to accommodate a major customer. ■

Findings

The Commission is concerned about three aspects of the ice-on-the-pad issue.

1. An analysis of all of the testimony and interviews establishes that Rockwell's recommendation on launch was ambiguous. The Commission finds it difficult, as did Mr. Aldrich, to conclude that there was a no-launch recommendation. Moreover, all parties were asked specifically to contact Aldrich or Moore about launch objections due to weather. Rockwell made no phone calls or further objections to Aldrich or other NASA officials after the 9:00 Mission Management Team meeting and subsequent to the resumption of the countdown.

2. The Commission is also concerned about the NASA response to the Rockwell position at the 9:00 a.m. meeting. While it is understood that decisions have to be made in launching a Shuttle, the Commission is not convinced Levels I and II appropriately considered Rockwell's concern about the ice. However ambiguous Rockwell's position was, it is clear that they did tell NASA that the ice was an unknown condition. Given the extent of the ice on the pad (see photos pages 112 and 113), the admitted unknown effect of the Solid Rocket Motor and Space Shuttle Main Engines ignition on the ice, as well as the fact that debris striking the Orbiter was a potential flight

safety hazard, the Commission finds the decision to launch questionable under those circumstances. In this situation, NASA appeared to be requiring a contractor to prove that it was not safe to launch, rather than proving it was safe. Nevertheless, the Commission has determined that the ice was not a cause of the 51-L accident and does not conclude that NASA's decision to launch specifically overrode a no-launch recommendation by an element contractor.

3. The Commission concluded that the freeze protection plan for launch pad 39B was inadequate. The Commission believes that the severe cold and presence of so much ice on the fixed service structure made it inadvisable to launch on the morning of January 28, and that margins of safety were whittled down too far.

Additionally, access to the crew emergency slide wire baskets was hazardous due to ice conditions. Had the crew been required to evacuate the Orbiter on the launch pad, they would have been running on an icy surface. The Commission believes the crew should have been made aware of the situation, and based on the seriousness of the condition, greater consideration should have been given to delaying the launch. ■

Chapter VI

An Accident Rooted in History

Early Design

The Space Shuttle's Solid Rocket Booster problem began with the faulty design of its joint and increased as both NASA and contractor management first failed to recognize it as a problem, then failed to fix it and finally treated it as an acceptable flight risk.

Morton Thiokol, Inc., the contractor, did not accept the implication of tests early in the program that the design had a serious and unanticipated flaw.[1] NASA did not accept the judgment of its engineers that the design was unacceptable, and as the joint problems grew in number and severity NASA minimized them in management briefings and reports.[2] Thiokol's stated position was that "the condition is not desirable but is acceptable."[3]

Neither Thiokol nor NASA expected the rubber O-rings sealing the joints to be touched by hot gases of motor ignition, much less to be partially burned. However, as tests and then flights confirmed damage to the sealing rings, the reaction by both NASA and Thiokol was to increase the amount of damage considered "acceptable." At no time did management either recommend a redesign of the joint or call for the Shuttle's grounding until the problem was solved.

Findings

The genesis of the Challenger accident—the failure of the joint of the right Solid Rocket Motor—began with decisions made in the design of the joint and in the failure by both Thiokol and NASA's Solid Rocket Booster project office to understand and respond to facts obtained during testing.

The Commission has concluded that neither Thiokol nor NASA responded adequately to internal warnings about the faulty seal design. Furthermore, Thiokol and NASA did not make a timely attempt to develop and verify a new seal after the initial design was shown to be deficient. Neither organization developed a solution to the unexpected occurrences of O-ring erosion and blow-by even though this problem was experienced frequently during the Shuttle flight history. Instead, Thiokol and NASA management came to accept erosion and blow-by as unavoidable and an acceptable flight risk. Specifically, the Commission has found that:

1. The joint test and certification program was inadequate. There was no requirement to configure the qualifications test motor as it would be in flight, and the motors were static tested in a horizontal position, not in the vertical flight position.

2. Prior to the accident, neither NASA nor Thiokol fully understood the mechanism by which the joint sealing action took place.
3. NASA and Thiokol accepted escalating risk apparently because they "got away with it last time." As Commissioner Feynman observed, the decision making was:

> "a kind of Russian roulette. . . . [The Shuttle] flies [with O-ring erosion] and nothing happens. Then it is suggested, therefore, that the risk is no longer so high for the next flights. We can lower our standards a little bit because we got away with it last time. . . . You got away with it, but it shouldn't be done over and over again like that." [154]

4. NASA's system for tracking anomalies for Flight Readiness Reviews failed in that, despite a history of persistent O-ring erosion and blow-by, flight was still permitted. It failed again in the strange sequence of six consecutive launch constraint waivers prior to 51-L, permitting it to fly without any record of a waiver, or even of an explicit constraint. Tracking and continuing only anomalies that are "outside the data base" of prior flight allowed major problems to be removed from, and lost by, the reporting system.
5. The O-ring erosion history presented to Level I at NASA Headquarters in August 1985 was sufficiently detailed to require corrective action prior to the next flight.
6. A careful analysis of the flight history of O-ring performance would have revealed the correlation of O-ring damage and low temperature. Neither NASA nor Thiokol carried out such an analysis; consequently, they were unprepared to properly evaluate the risks of launching the 51-L mission in conditions more extreme than they had encountered before. ■

Chapter VII

The Silent Safety Program

The Commission was surprised to realize after many hours of testimony that NASA's safety staff was never mentioned. No witness related the approval or disapproval of the reliability engineers, and none expressed the satisfaction or dissatisfaction of the quality assurance staff. No one thought to invite a safety representative or a reliability and quality assurance engineer to the January 27, 1986, teleconference between Marshall and Thiokol. Similarly, there was no representative of safety on the Mission Management Team that made key decisions during the countdown on January 28, 1986. The Commission is concerned about the symptoms that it sees.

The unrelenting pressure to meet the demands of an accelerating flight schedule might have been adequately handled by NASA if it had insisted upon the exactingly thorough procedures that were its hallmark during the Apollo program. An extensive and redundant safety program comprising interdependent safety, reliability and quality assurance functions existed during and after the lunar program to discover any potential safety problems. Between that period and 1986, however, the program became ineffective. This loss of effectiveness seriously degraded the checks and balances essential for maintaining flight safety.

On April 3, 1986, Arnold Aldrich, the Space Shuttle program manager, appeared before the Commission at a public hearing in Washington, D.C. He described five different communication or organization failures that affected the launch decision on January 28, 1986.[1] Four of those failures relate directly to faults within the safety program. These faults include a lack of problem reporting requirements, inadequate trend analysis, misrepresentation of criticality and lack of involvement in critical discussions.[2] A properly staffed, supported, and robust safety organization might well have avoided these faults and thus eliminated the communication failures.

NASA has a safety program to ensure that the communication failures to which Mr. Aldrich referred do not occur. In the case of mission 51-L, that program fell short.

Findings

1. Reductions in the safety, reliability and quality assurance work force at Marshall and NASA Headquarters have seriously limited capability in those vital functions.
2. Organizational structures at Kennedy and Marshall have placed safety, reliability and quality assurance offices under the supervision of the very organizations and activities whose efforts they are to check.
3. Problem reporting requirements are not concise and fail to get critical information to the proper levels of management.
4. Little or no trend analysis was performed on O-ring erosion and blow-by problems.
5. As the flight rate increased, the Marshall safety, reliability and quality assurance work force was decreasing, which adversely affected mission safety.
6. Five weeks after the 51-L accident, the criticality of the Solid Rocket Motor field joint was still not properly documented in the problem reporting system at Marshall. ■

Chapter VIII

Pressures on the System

With the 1982 completion of the orbital flight test series, NASA began a planned acceleration of the Space Shuttle launch schedule. One early plan contemplated an eventual rate of a mission a week, but realism forced several downward revisions. In 1985, NASA published a projection calling for an annual rate of 24 flights by 1990. Long before the Challenger accident, however, it was becoming obvious that even the modified goal of two flights a month was overambitious.

In establishing the schedule, NASA had not provided adequate resources for its attainment. As a result, the capabilities of the system were strained by the modest nine-mission rate of 1985, and the evidence suggests that NASA would not have been able to accomplish the 15 flights scheduled for 1986. These are the major conclusions of a Commission examination of the pressures and problems attendant upon the accelerated launch schedule.

Findings

1. The capabilities of the system were stretched to the limit to support the flight rate in winter 1985/1986. Projections into the spring and summer of 1986 showed a clear trend; the system, as it existed, would have been unable to deliver crew training software for scheduled flights by the designated dates. The result would have been an unacceptable compression of the time available for the crews to accomplish their required training.

2. Spare parts are in critically short supply. The Shuttle program made a conscious decision to postpone spare parts procurements in favor of budget items of perceived higher priority. Lack of spare parts would likely have limited flight operations in 1986.

3. Stated manifesting policies are not enforced. Numerous late manifest changes (after the cargo integration review) have been made to both major payloads and minor payloads throughout the Shuttle program.

- Late changes to major payloads or program requirements can require extensive resources (money, manpower, facilities) to implement.
- If many late changes to "minor" payloads occur, resources are quickly absorbed.
- Payload specialists frequently were added to a flight well after announced deadlines.
- Late changes to a mission adversely affect the training and development of procedures for subsequent missions.

4. The scheduled flight rate did not accurately reflect the capabilities and resources.

- The flight rate was not reduced to accommodate periods of adjustment in the capacity of the work force. There was no margin in the system to accommodate unforeseen hardware problems.
- Resources were primarily directed toward supporting the flights and thus not enough were available to improve and expand facilities needed to support a higher flight rate.

5. Training simulators may be the limiting factor on the flight rate: the two current simulators cannot train crews for more than 12-15 flights per year.

6. When flights come in rapid succession, current requirements do not ensure that critical anomalies occurring during one flight are identified and addressed appropriately before the next flight. ■

Chapter IX

Other Safety Considerations

In the course of its investigation, the Commission became aware of a number of matters that played no part in the mission 51-L accident but nonetheless hold a potential for safety problems in the future.

Some of these matters, those involving operational concerns, were brought directly to the Commission's attention by the NASA astronaut office. They were the subject of a special hearing.

Other areas of concern came to light as the Commission pursued various lines of investigation in its attempt to isolate the cause of the accident. These inquiries examined such aspects as the development and operation of each of the elements of the Space Shuttle—the Orbiter, its main engines and the External Tank; the procedures employed in the processing and assembly of 51-L, and launch damage.

This chapter examines potential risks in two general areas. The first embraces critical aspects of a Shuttle flight; for example, considerations related to a possible premature mission termination during the ascent phase and the risk factors connected with the demanding approach and landing phase. The other focuses on testing, processing and assembling the various elements of the Shuttle.

Ascent: A Critical Phase

The events of flight 51-L dramatically illustrated the dangers of the first stage of a Space Shuttle ascent. The accident also focused attention on the issues of Orbiter abort capabilities and crew escape. Of particular concern to the Commission are the current abort capabilities, options to improve those capabilities, options for crew escape and the performance of the range safety system.

It is not the Commission's intent to second-guess the Space Shuttle design or try to depict escape provisions that might have saved the 51-L crew. In fact, the events that led to destruction of the Challenger progressed very rapidly and without warning. Under those circumstances, the Commission believes it is highly unlikely that any of the systems discussed below, or any combination of those systems, would have saved the flight 51-L crew.

Findings

1. The Space Shuttle System was not designed to survive a failure of the Solid Rocket Boosters. There are no corrective actions that can be taken if the boosters do not operate properly after ignition, i.e., there is no ability to separate an Orbiter safely from thrusting boosters and no ability for the crew to escape the vehicle during first-stage ascent.

- Neither the Mission Control Team nor the 51-L crew had any warning of impending disaster.
- Even if there had been warning, there were no actions available to the crew or the Mission Control Team to avert the disaster.

Landing: Another Critical Phase

The consequences of faulty performance in any dynamic and demanding flight environment can be catastrophic. The Commission was concerned that an insufficient safety margin may have existed in areas other than Shuttle ascent. Entry and landing of the Shuttle are dynamic and demanding with all the risks and complications inherent in flying a heavyweight glider with a very steep glide path. Since the Shuttle crew cannot divert to any alternate landing site after entry, the landing decision must be both timely and accurate. In addition, the landing gear, which includes wheels, tires and brakes, must function properly.

In summary, although there are valid programmatic reasons to land routinely at Kennedy, there are concerns that suggest that this is not wise under the present circumstances. While planned landings at Edwards carry a cost in dollars and days, the realities of weather cannot be ignored. Shuttle program officials must recognize that Edwards is a permanent, essential part of the program. The cost associated with regular, scheduled landing and turnaround operations at Edwards is thus a necessary program cost.

Decisions governing Space Shuttle operations must be consistent with the philosophy that unnecessary risks have to be eliminated. Such decisions cannot be made without a clear understanding of margins of safety in each part of the system.

Unfortunately, margins of safety cannot be assured if performance characteristics are not thoroughly understood, nor can they be deduced from a previous flight's "success."

The Shuttle Program cannot afford to operate outside its experience in the areas of tires, brakes, and weather, with the capabilities of the system today. Pending a clear understanding of all landing and deceleration systems, and a resolution of the problems encountered to date in Shuttle landings, the most conservative course must be followed in order to minimize risk during this dynamic phase of flight.

Shuttle Elements

The Space Shuttle Main Engine teams at Marshall and Rocketdyne have developed engines that have achieved their performance goals and have performed extremely well. Nevertheless the main engines continue to be highly complex and critical components of the Shuttle that involve an element of risk principally because important components of the engines degrade more rapidly with flight use than anticipated. Both NASA and Rocketdyne have taken steps to contain that risk. An important aspect of the main engine program has been the extensive "hot fire" ground tests. Unfortunately, the vitality of the test program has been reduced because of budgetary constraints.

The number of engine test firings per month has decreased over the past two years. Yet this test program has not yet demonstrated the limits of engine operation parameters or included tests over the full operating envelope to show full engine capability. In addition, tests have not yet been deliberately conducted to the point of failure to determine actual engine operating margins.

Recommendations

The Commission has conducted an extensive investigation of the Challenger accident to determine the probable cause and necessary corrective actions. Based on the findings and determinations of its investigation, the Commission has unanimously adopted recommendations to help assure the return to safe flight.

The Commission urges that the Administrator of NASA submit, one year from now, a report to the President on the progress that NASA has made in effecting the Commission's recommendations set forth below:

— I —

Design. The faulty Solid Rocket Motor joint and seal must be changed. This could be a new design eliminating the joint or a redesign of the current joint and seal. No design options should be prematurely precluded because of schedule, cost or reliance on existing hardware. All Solid Rocket Motor joints should satisfy the following requirements:

- The joints should be fully understood, tested and verified.
- The integrity of the structure and of the seals of all joints should be not less than that of the case walls throughout the design envelope.
- The integrity of the joints should be insensitive to:
  - Dimensional tolerances.
  - Transportation and handling.
  - Assembly procedures.
  - Inspection and test procedures.
  - Environmental effects.
  - Internal case operating pressure.
  - Recovery and reuse effects.
  - Flight and water impact loads.
- The certification of the new design should include:
  - Tests which duplicate the actual launch configuration as closely as possible.
  - Tests over the full range of operating conditions, including temperature.
- Full consideration should be given to conducting static firings of the exact flight configuration in a vertical attitude.

Independent Oversight. The Administrator of NASA should request the National Research Council to form an independent Solid Rocket Motor design oversight committee to implement the Commission's design recommendations and oversee the design effort. This committee should:

- Review and evaluate certification requirements.
- Provide technical oversight of the design, test program and certification.
- Report to the Administrator of NASA on the adequacy of the design and make appropriate recommendations.

— II —

Shuttle Management Structure. The Shuttle Program Structure should be reviewed. The project managers for the various elements of the Shuttle program felt more accountable to their center management than to the Shuttle program organization. Shuttle element funding, work package definition, and vital program information frequently bypass the National STS (Shuttle) Program Manager.

A redefinition of the Program Manager's responsibility is essential. This redefinition should give the Program Manager the requisite authority for all ongoing STS operations. Program funding and all Shuttle Program work at the centers should be placed clearly under the Program Manager's authority.

Astronauts in Management. The Commission observes that there appears to be a departure from the philosophy of the 1960s and 1970s relating to the use of astronauts in management positions. These individuals brought to their positions flight experience and a keen appreciation of operations and flight safety.

- NASA should encourage the transition of qualified astronauts into agency management positions.
- The function of the Flight Crew Operations director should be elevated in the NASA organization structure.

Shuttle Safety Panel. NASA should establish an STS Safety Advisory Panel reporting to the STS Program Manager. The charter of this panel should include Shuttle operational issues, launch commit criteria, flight rules, flight readiness and risk management. The panel should include representation from the safety organization, mission operations, and the astronaut office.

— III —

Criticality Review and Hazard Analysis. NASA and the primary Shuttle contractors should review all Criticality 1, 1R, 2, and 2R items and hazard analyses. This review should identify those items that must be improved prior to flight to ensure mission success and flight safety. An Audit Panel, appointed by the National Research Council, should verify the adequacy of the effort and report directly to the Administrator of NASA.

— IV —

Safety Organization. NASA should establish an Office of Safety, Reliability and Quality Assurance to be headed by an Associate Administrator, reporting directly to the NASA Administrator. It would have direct authority for safety, reliability, and quality assurance throughout the agency. The office should be assigned the work force to ensure adequate oversight of its functions and should be independent of other NASA functional and program responsibilities.

The responsibilities of this office should include:

- The safety, reliability and quality assurance functions as they relate to all NASA activities and programs.
- Direction of reporting and documentation of problems, problem resolution and trends associated with flight safety.

— V —

Improved Communications. The Commission found that Marshall Space Flight Center project managers, because of a tendency at Marshall to management isolation, failed to provide full and timely information bearing on the safety of flight 51-L to other vital elements of Shuttle program management.

- NASA should take energetic steps to eliminate this tendency at Marshall Space Flight Center, whether by changes of personnel, organization, indoctrination or all three.
- A policy should be developed which governs the imposition and removal of Shuttle launch constraints.
- Flight Readiness Reviews and Mission Management Team meetings should be recorded.
- The flight crew commander, or a designated representative, should attend the Flight Readiness Review, participate in acceptance of the vehicle for flight, and certify that the crew is properly prepared for flight.

— VI —

Landing Safety. NASA must take actions to improve landing safety.

- The tire, brake and nosewheel steering systems must be improved. These systems do not have sufficient safety margin, particularly at abort landing sites.
- The specific conditions under which planned landings at Kennedy would be acceptable should be determined. Criteria must be established for tires, brakes and nosewheel steering. Until the systems meet those criteria in high fidelity testing that is verified at Edwards, landing at Kennedy should not be planned.
- Committing to a specific landing site requires that landing area weather be forecast more than an hour in advance. During unpredictable weather periods at Kennedy, program officials should plan on Edwards landings. Increased landings at Edwards may necessitate a dual ferry capability.

— VII —

Launch Abort and Crew Escape. The Shuttle program management considered first-stage abort options and crew escape options several times during the history of the program, but because of limited utility, technical infeasibility, or program cost and schedule, no systems were implemented. The Commission recommends that NASA:

- Make all efforts to provide a crew escape system for use during controlled gliding flight.
- Make every effort to increase the range of flight conditions under which an emergency runway landing can be successfully conducted in the event that two or three main engines fail early in ascent.

— VIII —

Flight Rate. The nation's reliance on the Shuttle as its principal space launch capability created a relentless pressure on NASA to increase the flight rate. Such reliance on a single launch capability should be avoided in the future.

NASA must establish a flight rate that is consistent with its resources. A firm payload assignment policy should be established. The policy should include rigorous controls on cargo manifest changes to limit the pressures such changes exert on schedules and crew training.

— IX —

Maintenance Safeguards. Installation, test, and maintenance procedures must be especially rigorous for Space Shuttle items designated Criticality 1. NASA should establish a system of analyzing and reporting performance trends of such items.

Maintenance procedures for such items should be specified in the Critical Items List, especially for those such as the liquid-fueled main engines, which require unstinting maintenance and overhaul.

With regard to the Orbiters, NASA should:

- Develop and execute a comprehensive maintenance inspection plan.
- Perform periodic structural inspections when scheduled and not permit them to be waived.
- Restore and support the maintenance and spare parts programs, and stop the practice of removing parts from one Orbiter to supply another.

Concluding Thought

The Commission urges that NASA continue to receive the support of the Administration and the nation. The agency constitutes a national resource that plays a critical role in space exploration and development. It also provides a symbol of national pride and technological leadership.

The Commission applauds NASA's spectacular achievements of the past and anticipates impressive achievements to come. The findings and recommendations presented in this report are intended to contribute to the future NASA successes that the nation both expects and requires as the 21st century approaches. ■

Presidential Commission on the Space Shuttle Challenger Accident

William P. Rogers, Chairman

Former Secretary of State under President Nixon (1969-1973), and Attorney General under President Eisenhower (1957-1961), currently a practicing attorney and senior partner in the law firm of Rogers & Wells. Born in Norfolk, New York, he was awarded the Medal of Freedom in 1973. He holds a J.D. from Cornell University (1937) and served as LCDR, U.S. Navy (1942-1946).

Neil A. Armstrong, Vice Chairman

Former astronaut, currently Chairman of the Board of Computing Technologies for Aviation, Inc. Born in Wapakoneta, Ohio, Mr. Armstrong was spacecraft commander for Apollo 11, July 16-24, 1969, the first manned lunar landing mission. He was Professor of Aeronautical Engineering at the University of Cincinnati from 1971 to 1980 and was appointed to the National Commission on Space in 1985.

David C. Acheson

Former Senior Vice President and General Counsel, Communications Satellite Corporation (1967-1974), currently a partner in the law firm of Drinker Biddle & Reath. Born in Washington, DC, he previously served as an attorney with the U.S. Atomic Energy Commission (1948-1950) and was U.S. Attorney for the District of Columbia (1961-1965). He holds an LL.B. from Harvard University (1948) and served as LT, U.S. Navy (1942-1946).

Dr. Eugene E. Covert

Educator and engineer. Born in Rapid City, South Dakota, he is currently Professor and Head, Department of Aeronautics and Astronautics, at Massachusetts Institute of Technology. Member of the National Academy of Engineering, he was a recipient of the Exceptional Civilian Service Award, USAF, in 1973 and the NASA Public Service Award in 1980. He holds a Doctorate in Science from Massachusetts Institute of Technology.

Dr. Richard P. Feynman

Physicist. Born in New York City, he is Professor of Theoretical Physics at California Institute of Technology. Nobel Prize winner in Physics, 1965, he also received the Einstein Award in 1954, the Oersted Medal in 1972 and the Niels Bohr International Gold Medal in 1973. He holds a Doctorate in Physics from Princeton (1942).

Robert B. Hotz

Editor, publisher. Born in Milwaukee, Wisconsin. He is a graduate of Northwestern University. He was the editor-in-chief of *Aviation Week & Space Technology* magazine (1953-1980). He served in the Air Force in World War II and was awarded the Air Medal with Oak Leaf Cluster. Since 1982, he has been a member of the General Advisory Committee to the Arms Control and Disarmament Agency.

Major General Donald J. Kutyna, USAF

Director of Space Systems and Command, Control, Communications. Born in Chicago, Illinois, and graduate of the U.S. Military Academy, he holds a Master of Science degree from Massachusetts Institute of Technology (1965). A command pilot with over 4,000 flight

hours, he is a recipient of the Distinguished Service Medal, Distinguished Flying Cross, Legion of Merit and nine air medals.

Dr. Sally K. Ride

Astronaut. Born in Los Angeles, California, she was a mission specialist on STS-7, launched on June 18, 1983, becoming the first American woman in space. She also flew on mission 41-G launched October 5, 1984. She holds a Doctorate in Physics from Stanford University (1978) and is still an active astronaut.

Robert W. Rummel

Space expert and aerospace engineer. Born in Dakota, Illinois, and former Vice President of Trans World Airlines, he is currently President of Robert W. Rummel Associates, Inc., of Mesa, Arizona. He is a member of the National Academy of Engineering and is holder of the NASA Distinguished Public Service Medal.

Joseph F. Sutter

Aeronautical engineer. Currently Executive Vice President of the Boeing Commercial Airplane Company. Born in Seattle, he has been with Boeing since 1945 and was a principal figure in the development of three generations of jet aircraft. In 1984, he was elected to the National Academy of Engineering. In 1985, President Reagan conferred on him the U.S. National Medal of Technology.

Dr. Arthur B. C. Walker, Jr.

Astronomer. Born in Cleveland, Ohio, he is currently Professor of Applied Physics and was formerly Associate Dean of the Graduate Division at Stanford University. Consultant to Aerospace Corporation, Rand Corporation and the National Science Foundation, he is a member of the American Physical Society, American Geophysical Union, and the American Astronomy Society. He holds a Doctorate in Physics from the University of Illinois (1962).

Dr. Albert D. Wheelon

Physicist. Born in Moline, Illinois, he is currently Executive Vice President, Hughes Aircraft Company. Also a member of the President's Foreign Intelligence Advisory Board, he served as a consultant to the President's Science Advisory Council from 1961 to 1974. He holds a Doctorate in Physics from Massachusetts Institute of Technology (1952).

Brigadier General Charles Yeager, USAF (Retired)

Former experimental test pilot. Born in Myra, West Virginia, he was appointed in 1985 as a member of the National Commission on Space. He was the first person to penetrate the sound barrier and the first to fly at a speed of more than 1,600 miles an hour.

Dr. Alton G. Keel, Jr., Executive Director

Detailed to the Commission from his position in the Executive Office of the President, Office of Management and Budget, as Associate Director for National Security and International Affairs; formerly Assistant Secretary of the Air Force for Research, Development and Logistics; and Senate Staff. Born in Newport News, Virginia, he holds a Doctorate in Engineering Physics from the University of Virginia (1970).

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Appendix A

Commission Activities

An Overview

President Reagan, seeking to ensure a thorough and unbiased investigation of the Challenger accident, announced the formation of the Commission on February 3, 1986. The mandate given by the President, contained in Executive Order 12546, required Commission members to:

1. Review the circumstances surrounding the accident to establish the probable cause or causes of the accident; and
2. Develop recommendations for corrective or other action based upon the Commission's findings and determinations.

The Commission itself divided into four investigative panels:

1. Development and Production, responsible for investigating the acquisition and test and evaluation processes for the Space Shuttle elements;
2. Pre-Launch Activities, responsible for assessing the Shuttle system processing, launch readiness process and pre-launch security;
3. Mission Planning and Operations, responsible for investigating mission planning and operations, schedule pressures and crew safety areas; and
4. Accident Analysis, charged with analyzing the accident data and developing both an anomaly tree and accident scenarios.

More than 160 individuals were interviewed and more than 35 formal panel investigative sessions were held generating almost 12,000 pages of transcript (Table 1 and Table 2). Almost 6,300 documents, totaling more than 122,000 pages, and hundreds of photographs were examined and made a part of the Commission's permanent data base and archives. These sessions and all the data gathered added to the 2,800 pages of hearing transcript generated by the Commission in both closed and open sessions.

In addition to the work of the Commission and the Commission staff, NASA personnel expended a vast effort in the investigation. More than 1,300 employees from all NASA facilities were involved and were supported by more than 1,600 people from other government agencies and over 3,100 from NASA's contractor organizations. Particularly significant were the activities of the military, the Coast Guard and the NTSB in the salvage and analysis of the Shuttle wreckage.

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ID# 408074

THE WHITE HOUSE
CORRESPONDENCE TRACKING WORKSHEET

OS001

INCOMING

DATE RECEIVED: JUNE 24, 1986

NAME OF CORRESPONDENT: THE HONORABLE KEN KRAMER

SUBJECT: WRITES IN SUPPORT OF CONSTRUCTION OF A REPLACEMENT SHUTTLE FOR THE CHALLENGER AND CONTINUATION OF THE SPACE PROGRAM

ROUTE TO: OFFICE/AGENCY	(STAFF NAME)	ACTION ACT CODE	ACTION DATE YY/MM/DD	ACTION TYPE RESP	DISPOSITION C D	DISPOSITION COMPLETED YY/MM/DD
WILLIAM BALL		ORG	86/06/24	WBA	A	86/06/25
	REFERRAL NOTE:					
	REFERRAL NOTE:					
	REFERRAL NOTE:					
	REFERRAL NOTE:					
	REFERRAL NOTE:					

NLS

COMMENTS: _____

ADDITIONAL CORRESPONDENTS: MEDIA:L INDIVIDUAL CODES: 1240 ___ ___

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*ACTION CODES:	*DISPOSITION	*OUTGOING CORRESPONDENCE:
*	*	*
*A-APPROPRIATE ACTION	*A-ANSWERED	*TYPE RESP=INITIALS
*C-COMMENT/RECOM	*B-NON-SPEC-REFERRAL	* OF SIGNER
*D-DRAFT RESPONSE	*C-COMPLETED	* CODE = A
*F-FURNISH FACT SHEET	*S-SUSPENDED	*COMPLETED = DATE OF
*I-INFO COPY/NO ACT NEC	*	* OUTGOING
*R-DIRECT REPLY W/COPY	*	*
*S-FOR-SIGNATURE	*	*
*X-INTERIM REPLY	*	*

REFER QUESTIONS AND ROUTING UPDATES TO CENTRAL REFERENCE (ROOM 75,OEOB) EXT-2590
KEEP THIS WORKSHEET ATTACHED TO THE ORIGINAL INCOMING LETTER AT ALL TIMES AND SEND COMPLETED RECORD TO RECORDS MANAGEMENT.

June 27, 1986

Dear Mr. Kramer:

On the President's behalf, I would like to thank you for your June 23 letter regarding our space program.

We agree with the view expressed in your letter that the United States depends upon our ability to operate in space for vital purposes which affect our security and commercial and scientific programs. We also agree that the Nation needs a vigorous space program and a robust space launch capacity. These are key elements of the President's program for continued U.S. leadership in space.

The Challenger accident and the subsequent failures of the Titan and Delta class expendable launch vehicles have raised many serious program and funding issues. Recognizing the importance of restoring a safe and adequate space launch capability and the severe fiscal environment, the Administration has given priority, high-level attention to thoroughly examining the many serious issues involved.

The Administration is now in the final stages of reviewing the programmatic and funding requirements for space launch recovery. Thus, we expect that the agencies involved will shortly be able to forward to the Congress their detailed program and funding plans for space launch recovery.

Thank you for your support of the President's space program.

With best wishes,

Sincerely,

William L. Ball, III
Assistant to the President

The Honorable Ken Kramer
House of Representatives
Washington, D.C. 20515

WLB:OMB:KRJ:hlb

cc: w/copy of inc to Beth Strauss - FYI
cc: w/copy of inc to Jerry May, NSC - FYI

4

408074

KEN KRAMER
5TH DISTRICT, COLORADO

COMMITTEE ON ARMED SERVICES
RANKING MINORITY MEMBER,
SUBCOMMITTEE ON MILITARY
INSTALLATIONS AND FACILITIES
SUBCOMMITTEE ON
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NUCLEAR SYSTEMS

BOARD OF VISITORS
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June 23, 1986

WB

President Ronald Reagan
The White House
Washington, D.C. 20500

Dear Mr. President:

As you know, opinion polls show the vast majority of the American people support the continuation of the space program in the wake of the Challenger tragedy. Moreover, those same polls indicate that Americans would like to see the construction of a replacement shuttle.

I know you have expressed your support for construction of a fourth orbiter. At this point, however, the administration has come forward with no specific proposals for a replacement shuttle.

I am writing to urge that the administration give full and complete backing to the construction of a replacement shuttle and that it make funding for a fourth shuttle a priority in the budgeting process. With only three shuttles, our ability to place satellites into orbit and to carry out the many vital programs and functions associated with the shuttle program is impaired.

Further, a replacement shuttle presents the best avenue for us right now to demonstrate our commitment not only to the fallen heroes of Challenger but to the space program in general.

Please let me know of any way I can help you in this effort.

Warmest regards,

Ken Kramer

KK/jp

ID# 408188

THE WHITE HOUSE
CORRESPONDENCE TRACKING WORKSHEET

05 001

INCOMING

DATE RECEIVED: JUNE 25, 1986

NAME OF CORRESPONDENT: THE HONORABLE JOHN MYERS

SUBJECT: ENCLOSES COPY OF LETTER FROM ALICE CAREY OF CRAWFORDSVILLE, INDIANA REGARDING HER DESIRE TO PARTICIPATE IN A SPACE SHUTTLE FLIGHT

ROUTE TO: OFFICE/AGENCY (STAFF NAME)	ACTION ACT CODE	ACTION DATE YY/MM/DD	ACTION TYPE RESP	DISPOSITION C	DISPOSITION COMPLETED YY/MM/DD
WILLIAM BALL	ORG	86/06/25	WB	A	86/06/25 TR
NASA REFERRAL NOTE:	A	86/07/02 TR			
REFERRAL NOTE: JACK MURPHY					
REFERRAL NOTE:					
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*D-DRAFT RESPONSE	*C-COMPLETED	*COMPLETED = DATE OF OUTGOING
*F-FURNISH FACT SHEET	*S-SUSPENDED	
*I-INFO COPY/NO ACT NEC		
*R-DIRECT REPLY W/COPY		
*S-FOR-SIGNATURE		
*X-INTERIM REPLY		

REFER QUESTIONS AND ROUTING UPDATES TO CENTRAL REFERENCE (ROOM 75,OEOB) EXT-2590
KEEP THIS WORKSHEET ATTACHED TO THE ORIGINAL INCOMING LETTER AT ALL TIMES AND SEND COMPLETED RECORD TO RECORDS MANAGEMENT.

June 25, 1986

Dear Mr. Myers:

Thank you for your June 23 letter enclosing correspondence from Ms. Alice Carey, who would like to participate in a future space flight and has requested the President's assistance.

As much as he would like to, President Reagan is unable to personally respond to the great number of requests he receives such as Ms. Carey's. You may be assured, however, that I have brought her letter to the attention of the appropriate Administration officials to ensure that a response may be sent on the President's behalf.

With best wishes,

Sincerely,

William L. Ball, III
Assistant to the President

The Honorable John Myers
House of Representatives
Washington, D.C. 20515

WLB:KRJ:MDB:mdb
cc: w/copy of inc to Jack Murphy, Legis Affairs, NASA - for further action
WH RECORDS MANAGEMENT HAS RETAINED ORIGINAL INCOMING

4081-8

JOHN T. MYERS
7TH DISTRICT, INDIANA

OFFICES:
2372 RAYBURN BUILDING
WASHINGTON, D.C. 20515
TELEPHONE: 202-225-5805

107 FEDERAL BUILDING
TERRE HAUTE, INDIANA 47808
TELEPHONE: 812-238-1619

107 FEDERAL BUILDING
LAFAYETTE, INDIANA 47901
TELEPHONE: 317-423-1661

COMMITTEE ON APPROPRIATIONS
RANKING MINORITY MEMBER,
SUBCOMMITTEE ON ENERGY AND
WATER DEVELOPMENT
SUBCOMMITTEE ON AGRICULTURE,
RURAL DEVELOPMENT AND
RELATED AGENCIES
COMMITTEE ON STANDARDS
OF OFFICIAL CONDUCT

Congress of the United States
House of Representatives
Washington, D.C. 20515

June 23, 1986

WB

Mr. William L. Ball
Assistant to the President for
Legislative Affairs
The White House
1600 Pennsylvania Avenue, N.W.
Washington, D.C. 20500

Dear Mr. Ball:

Attached please find a copy of a letter I received from my constituent, Alice Carey, regarding her desire to participate in a space shuttle flight.

As you will note, she is disappinted over the decision made by the officials at the National Aeronautics and Space Administration on her application, and requested that I forward her letter to the President.

Thank you, and best wishes.

Sincerely,

John Myers

John Myers

p

Enclosure

410A Dunn Ave.
Crawfordsville, IN.
47933

JUN 18 P.M.

Dear Congressman Myers:

Your probably getting tired of hearing from me about the subject of space-flight. I promise I won't bother you anymore about this. I wrote to Mr. Murphy again since my last letter to you. I explained the situation to him about space-flight for me and didn't get any satisfaction. I have been asking about this for about a year now. Space flight isn't an overnight thing, but a great ambition for about 25 years now (I'm 39). I would have taken steps to become an astronaut if I had not been so overweight until about 10 years ago. I would have joined the Air Force also.

This problem is getting to the place where I'm beginning to have suicidal feelings, since space flight has become so much a part of my life and didn't realized it would come to this. I have never felt this way about any other ambition or desire. I sure hope NASA will find enough kindness in their hearts to give me a chance at space flight, as a truly ordinary citizen, that don't have anything special going or isn't rich. My hobbies, however, are amatuer radio, computers and art. As Mr. Murphy mentioned in one of his letters, private citizens would have a chance through the Space Flight Participation Program or as a payload specialist. I feel strongly that I will never be able to get in on one of NASA's Space Flight Participation Programs. NASA seems to want people to make them look good, such as rich outstanding citizens or politicians. Please don't get me wrong because I don't have anything against the rich or the politicians. I'm very unhappy with NASA because the little person like me don't even have a chance. The most I could ever hope for is a payload position.

Please forward this letter to President Reagan, since I feel like he would have the highest authority on this matter. I sure hope and pray that this letter reach the President because the other letters I've written were read by the President's people then forwarded to NASA.

Once again thank you very much. Your help will very much be appreciated.

Very sincerely yours,

Alice Carey

One last thing; I'm a firm believer of making private citizen's work just like the rest, instead of wasting our tax dollars letting citizens just go along for the ride. After all NASA officials complains about weight requirements and other things.

JD# 408188

THE WHITE HOUSE
CORRESPONDENCE TRACKING WORKSHEET

05 001

INCOMING

DATE RECEIVED: JUNE 25, 1986

NAME OF CORRESPONDENT: THE HONORABLE JOHN MYERS

SUBJECT: ENCLOSES COPY OF LETTER FROM ALICE CAREY OF CRAWFORDSVILLE, INDIANA REGARDING HER DESIRE TO PARTICIPATE IN A SPACE SHUTTLE FLIGHT

ROUTE TO: OFFICE/AGENCY (STAFF NAME)	ACTION ACT CODE	ACTION DATE YY/MM/DD	ACTION TYPE RESP	DISPOSITION C D	DISPOSITION COMPLETED YY/MM/DD
WILLIAM BALL	ORG	86/06/25	WB	A	86/06/25 TR
NASA REFERRAL NOTE:	A	86/07/02 TR		A	86/07/16 TR
REFERRAL NOTE: JACK MURPHY Letter to Ms. Alice Carey					
LABALL REFERRAL NOTE:	A	86/08/11 TR	FYI	C	86/08/11 AB
REFERRAL NOTE:		/ /			/ /
REFERRAL NOTE:		/ /			/ /

COMMENTS: _____

ADDITIONAL CORRESPONDENTS: MEDIA:L INDIVIDUAL CODES: 1240 ____ ____

__ MAIL USER CODES: (A)_____ (B)_____ (C)_____

*ACTION CODES:	*DISPOSITION	*OUTGOING CORRESPONDENCE:
*A-APPROPRIATE ACTION	*A-ANSWERED	*TYPE RESP=INITIALS OF SIGNER
*C-COMMENT/RECOM	*B-NON-SPEC-REFERRAL	* CODE = A
*D-DRAFT RESPONSE	*C-COMPLETED	*COMPLETED = DATE OF OUTGOING
*F-FURNISH FACT SHEET	*S-SUSPENDED	
*I-INFO COPY/NO ACT NEC		
*R-DIRECT REPLY W/COPY		
*S-FOR-SIGNATURE		
*X-INTERIM REPLY		

REFER QUESTIONS AND ROUTING UPDATES TO CENTRAL REFERENCE (ROOM 75,OEOB) EXT-2590
KEEP THIS WORKSHEET ATTACHED TO THE ORIGINAL INCOMING LETTER AT ALL TIMES AND SEND COMPLETED RECORD TO RECORDS MANAGEMENT.

AEM

C:psn:C19626;A62127f

JUL 16 1986

Ms. Sally Kelley
Agency Liaison, Room 91
The White House
Washington, DC 20500

Dear Ms. Kelley:

In response to your July 2 request, enclosed is a proposed response to Ms. Alice Carey who requested that her letter to The Honorable John Myers be forwarded to President Reagan.

For your information, the Space Flight Participant Program Manager has responded to letters from Ms. Carey and this office has also responded to her interest in flying on the space shuttle in letters to Senator Jake Garn and Congressman Myers. Our proposed response can only reiterate their contents and NASA policy.

Please contact me if you have any questions concerning this matter.

Sincerely,

Original Signed By
John Murphy

John F. Murphy
Assistant Administrator
for Legislative Affairs

bcc: AEM, ME

C:PNewcomer:453-1071:7/10/86

Ms. Alice Carey
410A Dunn Ave.
Crawfordsville, IN 47933

Dear Ms. Carey:

As you requested, the Honorable John Myers has forwarded to President Reagan your letter of June 18 concerning your desire to participate in a space flight. Unfortunately, due to the large number of letters he receives, the President is unable to personally respond to each one.

You are no doubt aware that due to the space shuttle Challenger accident there are no flights scheduled at this time. When shuttle flights resume, it is expected that only trained astronauts will be aboard the first few missions.. It is not known when there will be an opportunity for a civilian to fly; however, the first opportunity has been offered to Barbara Morgan who was selected as the backup candidate in the Teacher in Space Project.

It is our understanding that, as you stated in your letter, the only opportunities for civilians to fly on a shuttle mission are the Space Flight Participant Program or as a Payload Specialist . The categories for the Space Flight Participate Program are announced through the news media and persons fitting the category and qualifications are encouraged to apply. The candidates selected by the NASA Administrator have undergone extensive screening in this extremely competitive program.

NASA continues to receive many letters from citizens who, like you, want to participate in a space shuttle flight. The agency does not foresee the selection of individuals to fly as a Space Flight Participant without benefit of open competition.

Senator Jake Garn and Congressman Bill Nelson were offered the opportunity to fly in their capacity as Chairmen of the Senate Subcommittee on HUD-Independence Agencies, Committee on Appropriations, and Chairman of the House of Representatives Subcommittee on Space Science and Applications respectively.

We regret that you are under stress and disappointed because NASA will not change its policies regarding the Space Flight Participant Program. We sincerely hope that if a category fitting your qualifications is announced that you will apply following the stated procedures and we hope you will get the opportunity to fly on a future mission.

Sincerely,

4391

THE WHITE HOUSE OFFICE

REFERRAL

JULY 2, 1986

TO: NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
ATTN: JACK MURPHY

ACTION REQUESTED:
APPROPRIATE ACTION

DESCRIPTION OF INCOMING:

ID: 408188

MEDIA: LETTER, DATED JUNE 23, 1986

TO: WILLIAM BALL

FROM: THE HONORABLE JOHN MYERS
U.S. HOUSE OF REPRESENTATIVES

WASHINGTON DC 20515

SUBJECT: ENCLOSES COPY OF LETTER FROM ALICE CAREY OF CRAWFORDSVILLE, INDIANA REGARDING HER DESIRE TO PARTICIPATE IN A SPACE SHUTTLE FLIGHT

PROMPT ACTION IS ESSENTIAL -- IF REQUIRED ACTION HAS NOT BEEN TAKEN WITHIN 9 WORKING DAYS OF RECEIPT, PLEASE TELEPHONE THE UNDERSIGNED AT 456-7486.

RETURN CORRESPONDENCE, WORKSHEET AND COPY OF RESPONSE (OR DRAFT) TO:
AGENCY LIAISON, ROOM 91, THE WHITE HOUSE, 20500

RECEIVED
JUL 3 2 43 PM '86

SALLY KELLEY
DIRECTOR OF AGENCY LIAISON
PRESIDENTIAL CORRESPONDENCE

H62127

June 25, 1986

Dear Mr. Myers:

Thank you for your Jun 23 letter enclosing correspondence from Ms. Alice Carey, who would like to participate in a future space flight and has requested the President's a sistance.

As much as he would like to, President Reagan is unable to personally respond to the great number or requests he receives such as Ms. Carey's. You may be assured, however, that I hav brought her letter to the attention of the appropriate Administration officials to ensure that a response may be sent on the President's behalf.

With best wishe ,

Sincerelv,

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Assistant to the President

The Honorable John Myers
House of Representatives
Washington, D.C. 20515

WLB:KRJ:MDB:mdb
cc: w/copy of inc to Jack Murphy, Legis Affairs, NASA - for further action
WH RECORDS MANAGEMENT HAS RETAINED ORIGINAL INCOMING

408 18

JOHN T. MYERS
7TH DISTRICT, INDIANA

OFFICES:
2372 RAYBURN BUILDING
WASHINGTON, D.C. 20515
TELEPHONE: 202-225-5805

107 FEDERAL BUILDING
TERRE HAUTE, INDIANA 47808
TELEPHONE: 812-238-1619

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COMMITTEE ON APPROPRIATIONS
RANKING MINORITY MEMBER,
SUBCOMMITTEE ON ENERGY AND
WATER DEVELOPMENT
SUBCOMMITTEE ON AGRICULTURE,
RURAL DEVELOPMENT AND
RELATED AGENCIES
COMMITTEE ON STANDARDS
OF OFFICIAL CONDUCT

Congress of the United States
House of Representatives
Washington, D.C. 20515

June 23, 1986

WB

Mr. William L. Ball
Assistant to the President for
Legislative Affairs
The White House
1600 Pennsylvania Avenue, N.W.
Washington, D.C. 20500

Dear Mr. Ball:

Attached please find a copy of a letter I received from my constituent, Alice Carey, regarding her desire to participate in a space shuttle flight.

As you will note, she is disappinted over the decision made by the officials at the National Aeronautics and Space Administration on her application, and requested that I forward her letter to the President.

Thank you, and best wishes.

Sincerely,

John Myers

John Myers

p

Enclosure

410A Dunn Ave.
Crawfordsville, IN.
47933

JUN 18 P.M.

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Very sincerely yours,

Alice Carey

One last thing; I'm a firm believer of making private citizen's work just like the rest, instead of wasting our tax dollars letting citizens just go along for the ride. After all NASA officials complains about weight requirements and other things.

ID# 408188

THE WHITE HOUSE
CORRESPONDENCE TRACKING WORKSHEET

05 001

INCOMING

DATE RECEIVED: JUNE 25, 1986

NAME OF CORRESPONDENT: THE HONORABLE JOHN MYERS

SUBJECT: ENCLOSES COPY OF LETTER FROM ALICE CAREY OF CRAWFORDSVILLE, INDIANA REGARDING HER DESIRE TO PARTICIPATE IN A SPACE SHUTTLE FLIGHT

ROUTE TO: OFFICE/AGENCY (STAFF NAME)	ACTION ACT CODE	ACTION DATE YY/MM/DD	DISPOSITION TYPE RESP	DISPOSITION C D	DISPOSITION COMPLETED YY/MM/DD
WILLIAM BALL	ORG	86/06/25	WB	A	86/06/25-TR
NASA REFERRAL NOTE:	A	86/07/02 TR		C	86/07/16 TR
REFERRAL NOTE: JACK MURPHY LA Ball	A	86/07/18	WB	A	86/07/21
REFERRAL NOTE: (See NASA memo)		/ /			/ /
REFERRAL NOTE:		/ /			/ /
REFERRAL NOTE:		/ /			/ /

AB

COMMENTS: _____

ADDITIONAL CORRESPONDENTS: MEDIA:L INDIVIDUAL CODES: 1240 ____ ____

__ MAIL USER CODES: (A)_____ (B)_____ (C)_____

*ACTION CODES:	*DISPOSITION	*OUTGOING CORRESPONDENCE:
*A-APPROPRIATE ACTION	*A-ANSWERED	*TYPE RESP=INITIALS OF SIGNER
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REFER QUESTIONS AND ROUTING UPDATES TO CENTRAL REFERENCE (ROOM 75,OEOB) EXT-2590
KEEP THIS WORKSHEET ATTACHED TO THE ORIGINAL INCOMING LETTER AT ALL TIMES AND SEND COMPLETED RECORD TO RECORDS MANAGEMENT.

July 21, 1986

Dear Mr. Myers:

This is in further response to your June 18 letter on behalf of Ms. Alice Carey, who would like to participate in a space flight.

You are no doubt aware that due to the space shuttle Challenger accident there are no flights scheduled at this time. When shuttle flights resume, it is expected that only trained astronauts will be aboard the first few missions. It is not known when there will be an opportunity for a civilian to fly; however, the first opportunity has been offered to Barbara Morgan who was selected as the backup candidate in the Teacher in Space Project.

It is our understanding that the only opportunities for civilians to fly on a shuttle mission are the Space Flight Participant Program or as a Payload Specialist. The categories for the Space Flight Participant Program are announced through the news media and persons fitting the category and qualifications are encouraged to apply. The candidates selected by the NASA Administrator have undergone extensive screening in this extremely competitive program.

NASA continues to receive many letters from citizens who, like Ms. Carey, want to participate in a space shuttle flight. The agency does not foresee the selection of individuals to fly as a Space Flight Participant without the benefit of open competition.

We sincerely hope that if a category fitting Ms. Carey's qualifications is announced, that she will apply following the stated procedures.

With best wishes,

Sincerely,

William L. Ball, III
Assistant to the President

The Honorable John T. Myers
House of Representatives
Washington, D.C. 20515

WLB:NASA:KRJ:hlb

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Sincerely,

William L. Ball, III
Assistant to the President

The Honorable John T. Myers
House of Representatives
Washington, D.C. 20515

WLB:NASA:KRJ:hlb

National Aeronautics and
Space Administration

Washington, D.C.
20546

Reply to Attn of: C:psn:C19626;A62127f

JUL 16 1986

Ms. Sally Kelley
Agency Liaison, Room 91
The White House
Washington, DC 20500

Dear Ms. Kelley:

In response to your July 2 request, enclosed is a proposed response to Ms. Alice Carey who requested that her letter to The Honorable John Myers be forwarded to President Reagan.

For your information, the Space Flight Participant Program Manager has responded to letters from Ms. Carey and this office has also responded to her interest in flying on the space shuttle in letters to Senator Jake Garn and Congressman Myers. Our proposed response can only reiterate their contents and NASA policy.

Please contact me if you have any questions concerning this matter.

Sincerely,

John F. Murphy
Assistant Administrator
for Legislative Affairs

4391

THE WHITE HOUSE OFFICE

REFERRAL

JULY 2, 1986

TO: NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
ATTN: JACK MURPHY

ACTION REQUESTED:
APPROPRIATE ACTION

DESCRIPTION OF INCOMING:

ID: 408188

MEDIA: LETTER, DATED JUNE 23, 1986

TO: WILLIAM BALL

FROM: THE HONORABLE JOHN MYERS
U.S. HOUSE OF REPRESENTATIVES

WASHINGTON DC 20515

SUBJECT: ENCLOSES COPY OF LETTER FROM ALICE CAREY OF CRAWFORDSVILLE, INDIANA REGARDING HER DESIRE TO PARTICIPATE IN A SPACE SHUTTLE FLIGHT

PROMPT ACTION IS ESSENTIAL -- IF REQUIRED ACTION HAS NOT BEEN TAKEN WITHIN 9 WORKING DAYS OF RECEIPT, PLEASE TELEPHONE THE UNDERSIGNED AT 456-7486.

RETURN CORRESPONDENCE, WORKSHEET AND COPY OF RESPONSE (OR DRAFT) TO:
AGENCY LIAISON, ROOM 91, THE WHITE HOUSE, 20500

JUL 3 2 43 PM '86

RECEIVED

SALLY KELLEY
DIRECTOR OF AGENCY LIAISON
PRESIDENTIAL CORRESPONDENCE

H62127

June 25, 1986

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Assistant to the President

The Honorable John Myers
House of Representatives
Washington, D.C. 20515

WLB:KRJ:MDB:mdb
cc: w/copy of inc to Jack Murphy, Legis Affairs, NASA - for further action
WH RECORDS MANAGEMENT HAS RETAINED ORIGINAL INCOMING

JOHN T. MYERS
7TH DISTRICT, INDIANA

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WASHINGTON, D.C. 20515
TELEPHONE: 202-225-5805

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COMMITTEE ON APPROPRIATIONS

RANKING MINORITY MEMBER,
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WATER DEVELOPMENT

SUBCOMMITTEE ON AGRICULTURE,
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RELATED AGENCIES

COMMITTEE ON STANDARDS
OF OFFICIAL CONDUCT

Congress of the United States
House of Representatives
Washington, D.C. 20515

June 23, 1986

WB

Mr. William L. Ball
Assistant to the President for
Legislative Affairs
The White House
1600 Pennsylvania Avenue, N.W.
Washington, D.C. 20500

Dear Mr. Ball:

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As you will note, she is disappointed over the decision made by the officials at the National Aeronautics and Space Administration on her application, and requested that I forward her letter to the President.

Thank you, and best wishes.

Sincerely,

John Myers

John Myers

p

Enclosure

Crawfordsville, IN.
47933

JUN 18 P.M.

Dear Congressman Myers;

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Once again thank you very much. Your help will very much be appreciated.

Very sincerely yours,

Alice Carey

One last thing; I'm a firm believer of making private citizen's work just like the rest, instead of wasting our tax dollars letting citizens just go along for the ride. After all NASA officials complains about weight requirements and other things.

ID# 408397

OS 001

THE WHITE HOUSE
CORRESPONDENCE TRACKING WORKSHEET

INCOMING

DATE RECEIVED: JUNE 27, 1986

NAME OF CORRESPONDENT: THE HONORABLE DON FUQUA

SUBJECT: WRITES SUPPORTING THE REPLACEMENT OF THE CHALLENGER

ROUTE TO: OFFICE/AGENCY	(STAFF NAME)	ACTION: ACT CODE	ACTION: DATE YY/MM/DD	DISPOSITION: TYPE RESP	DISPOSITION: C D	DISPOSITION: COMPLETED YY/MM/DD
WILLIAM BALL		ORG	86/06/27	WB	A	86/07/24 AB

REFERRAL NOTE:

REFERRAL NOTE:

REFERRAL NOTE:

REFERRAL NOTE:

REFERRAL NOTE:

COMMENTS: AB Acknowledgement also sent to Cong Nelson & Cong Boland

ADDITIONAL CORRESPONDENTS: 2 MEDIA:L INDIVIDUAL CODES: 1230

__ MAIL USER CODES: (A)________ (B)________ (C)________

****

*ACTION CODES:	*DISPOSITION	*OUTGOING CORRESPONDENCE:
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*S-FOR-SIGNATURE		
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****

REFER QUESTIONS AND ROUTING UPDATES TO CENTRAL REFERENCE (ROOM 75,OEOB) EXT-2590
KEEP THIS WORKSHEET ATTACHED TO THE ORIGINAL INCOMING LETTER AT ALL TIMES AND SEND COMPLETED RECORD TO RECORDS MANAGEMENT.

July 24, 1986

Dear Bill:

On the President's behalf, I would like to thank you for the recent letter which you cosigned with Congressmen Boland and Fuqua, regarding our space program. We appreciated receiving your comments and have shared with the appropriate advisers your concerns about alternatives to the shuttle.

We agree with you that the Nation needs a vigorous space program and a robust space launch capacity. These are key elements of the President's program for continued U.S. leadership in space.

The Challenger accident and the subsequent failures of the Titan and Delta class expendable launch vehicles have raised many serious program and funding issues. Recognizing the importance of restoring a safe and adequate space launch capability and the severe fiscal environment, the Administration has given priority, high-level attention to thoroughly examining the many serious issues involved.

The Administration is now in the final stages of reviewing the programmatic and funding requirements for space launch recovery. Thus, we expect that the agencies involved will shortly be able to forward to the Congress their detailed program and funding plans for space launch recovery.

Thank you for your support of the President's space program.

With best wishes,

Sincerely,

William L. Ball, III
Assistant to the President

The Honorable Bill Nelson
House of Representatives
Washington, D.C. 20515

WLB:OMB:KRJ:hlb

cc: w/copy of inc to Beth Strauss - FYI
cc: w/copy of inc to Jerry May, NSC - FYI

Letter also sent to Congs. Boland

July 24, 1986

Dear Mr. Chairman:

Thank you for your most recent correspondence reiterating your strong support for the replacement of the Challenger. We appreciated hearing from you again and receiving your additional concerns about alternatives to the shuttle.

As I indicated in my June 2 letter to you on this subject, we recognize the importance of restoring a safe and adequate space launch capability, and are thoroughly examining the many serious issues involved. This matter continues to receive high-level priority and you may be assured that the points which you raised will be taken into consideration in the final review of the programmatic and funding requirements for space launch recovery.

With best wishes,

Sincerely,

William L. Ball, III
Assistant to the President

The Honorable Don Fuqua
House of Representatives
Washington, D.C. 20515

WLB:KRJ:hlb

cc: w/copy of inc to Beth Strauss - FYI

cc: w/copy of inc to Jerry May, NSC - FYI

We wish that the need for the replacement Orbiter could be met without appropriating additional funds, but it cannot. We have conducted many detailed reviews of NASA's budget and we can assure you that forcing NASA to find the funds internally would cause damage that would be inconsistent with your commitment to a vigorous civilian space program. We hope you will promptly forward a budget amendment requesting funds for a new Orbiter.

In summary, a replacement for Challenger is necessary to assure a viable United States launch capability. We cannot afford to jeopardize that capability and should delay no longer in procuring the replacement Orbiter.

Sincerely,

DON FUQUA
Member of Congress

BILL NELSON
Member of Congress

EDWARD P. BOLAND
Member of Congress

408397

Congress of the United States
House of Representatives
Washington, D.C. 20515

June 26, 1986

The President
The White House
Washington, DC 20500

Dear Mr. President:

We urge you once again to support the replacement of the Challenger. The need is compelling and clear for many reasons.

A four Orbiter fleet, when modified as recommended by the Rogers Commission, will provide reliable access to space without the need to undertake risky new developments. Building the Space Station, for which you have called, is predicated on a four Orbiter fleet. A four Orbiter fleet is required for resiliency. The loss, or even lengthy repair, of one of only three Orbiters would crimp United States access to space.

The arguments advanced against replacing Challenger are not persuasive. Shuttle technology is the best available for immediate production. In testimony before the Committee on Science and Technology, Mr. Rogers specifically stated that the basic Shuttle technology is sound and that the country can continue to rely on it. The National Aerospace Plane or an alternate advanced Shuttle would require major technology development and are, therefore, well in the future.

Relying on private industry to step in and meet the country's need for launch capability seems unwise. A commercial launch vehicle industry may ultimately develop, but it does not exist today. Our access to space is simply too important to risk on the speculative development of this industry.

ID# 409185

THE WHITE HOUSE
CORRESPONDENCE TRACKING WORKSHEET

05 001

INCOMING

DATE RECEIVED: JULY 11, 1986

NAME OF CORRESPONDENT: THE HONORABLE FRANCIS "BROWNIE" BYERS

SUBJECT: FEELS THE PRESIDENT SHOULD RETHINK A DECISION MADE RECENTLY TO PUT THE SHUTTLE PROGRAM ON THE "BACK BURNER" FOR A TWO YEAR PERIOD

ROUTE TO: OFFICE/AGENCY (STAFF NAME)	ACTION ACT CODE	ACTION DATE YY/MM/DD	ACTION TYPE RESP	DISPOSITION C D	DISPOSITION COMPLETED YY/MM/DD
KAE PAIRDIN	ORG	86/07/11	ICKR	A	86/7/14
REFERRAL NOTE:					
NASA	R	86/07/17		A	87/02/18
REFERRAL NOTE:					
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COMMENTS: _____

ADDITIONAL CORRESPONDENTS: MEDIA:L INDIVIDUAL CODES: 2200 ____ ____

IA MAIL USER CODES: (A)_____ (B)_____ (C)_____

*ACTION CODES:	*DISPOSITION	*OUTGOING CORRESPONDENCE:
*A-APPROPRIATE ACTION	*A-ANSWERED	*TYPE RESP=INITIALS OF SIGNER
*C-COMMENT/RECOM	*B-NON-SPEC-REFERRAL	* CODE = A
*D-DRAFT RESPONSE	*C-COMPLETED	*COMPLETED = DATE OF
*F-FURNISH FACT SHEET	*S-SUSPENDED	* OUTGOING
*I-INFO COPY/NO ACT NEC		
*R-DIRECT REPLY W/COPY		
*S-FOR-SIGNATURE		
*X-INTERIM REPLY		

REFER QUESTIONS AND ROUTING UPDATES TO CENTRAL REFERENCE (ROOM 75,OEOB) EXT-2590
KEEP THIS WORKSHEET ATTACHED TO THE ORIGINAL INCOMING LETTER AT ALL TIMES AND SEND COMPLETED RECORD TO RECORDS MANAGEMENT.

White House
I.D. 409185

NASA

National Aeronautics and
Space Administration

Washington, D.C.
20546

Reply to Attn of:

M-1

February 18, 1987

The Honorable Francis Byers
Member of the House of Representatives
of the State of Wisconsin
State Capitol
Post Office Box 8952
Madison, WI 53708

Dear Representative Byers:

Your letter to President Reagan has been referred to my office for reply. Please accept my apology for the delay in responding.

As you probably know, we expect to resume Space Shuttle launches in February 1988. This date reflects the time anticipated to incorporate changes required by the solid rocket booster redesign effort as well as other ongoing Shuttle system modifications.

We appreciate your enthusiastic support for our nation's space program.

Sincerely,

/s/

Barbara E. Selby
Public Information Officer
Office of Space Flight

T H E W H I T E H O U S E O F F I C E

REFERRAL

JULY 17, 1986

TO: NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

ACTION REQUESTED:
DIRECT REPLY, FURNISH INFO COPY

DESCRIPTION OF INCOMING:

ID: 409185

MEDIA: LETTER, DATED JULY 8, 1986

TO: PRESIDENT REAGAN

FROM: THE HONORABLE FRANCIS "BROWNIE" BYERS
STATE REPRESENTATIVE
WISCONSIN STATE ASSEMBLY
STATE CAPITOL
POST OFFICE BOX 8952
MADISON WI 53708

SUBJECT: FEELS THE PRESIDENT SHOULD RETHINK A DECISION MADE RECENTLY TO PUT THE SHUTTLE PROGRAM ON THE "BACK BURNER" FOR A TWO YEAR PERIOD

PROMPT ACTION IS ESSENTIAL -- IF REQUIRED ACTION HAS NOT BEEN TAKEN WITHIN 9 WORKING DAYS OF RECEIPT, PLEASE TELEPHONE THE UNDERSIGNED AT 456-7486.

RETURN CORRESPONDENCE, WORKSHEET AND COPY OF RESPONSE (OR DRAFT) TO:
AGENCY LIAISON, ROOM 91, THE WHITE HOUSE, 20500

SALLY KELLEY
DIRECTOR OF AGENCY LIAISON
PRESIDENTIAL CORRESPONDENCE

7/17

THE WHITE HOUSE

WASHINGTON, D.C.

July 14, 1986

Dear Representative Byers:

On behalf of the President, I want to thank you for your recent correspondence.

I have forwarded a copy of your comments to the appropriate officials at the National Aeronautic Space Administration for their review and direct reply.

Thank you for sharing your comments with the Administration. If I can be of assistance in the future, please feel free to contact me.

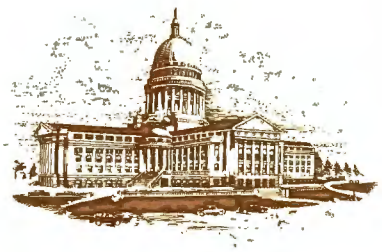
Sincerely,

K. Kae Rairdin
Special Assistant to the President for
Intergovernmental Affairs

The Honorable Francis Byers
Member of the House of Representatives
of the State of Wisconsin
State Capitol
Post Office Box 8952
Madison, Wisconsin 53708

409185

Wisconsin
State
Assembly



State Representative
FRANCIS R. BYERS
40th Assembly District

Member:
Committee on State Affairs
Committee on Veterans and Military Affairs
Committee on Government Operations
Educational Communications Board

Office:
State Capitol
P.O. Box 8952
Madison, WI 53708
608-266-3794

Home:
P.O. Box 495
Marion, WI 54950
715-754-2233

K. Rawdin

July 8, 1986

President Ronald Reagan
The White House
1600 Pennsylvania Avenue
Washington, D.C. 20500

Dear Mr. President -

The debacle of the Challenger catastrophe had nation-wide effects and implications. It was a real national disaster - and many of us saw it take place!

While interruption and a temporary postponement of the shuttle series was expected and understandable, long-term curtailment is not justified, in my opinion.

Failures will be with us forever - and injury and death will, too. But these facts have never been allowed to prevent the United States from pursuing a worthwhile goal. I think you should rethink a decision made recently to put the shuttle program on the "back burner", so to speak, for a two-year period. I feel we absolutely must proceed apace with this effort.

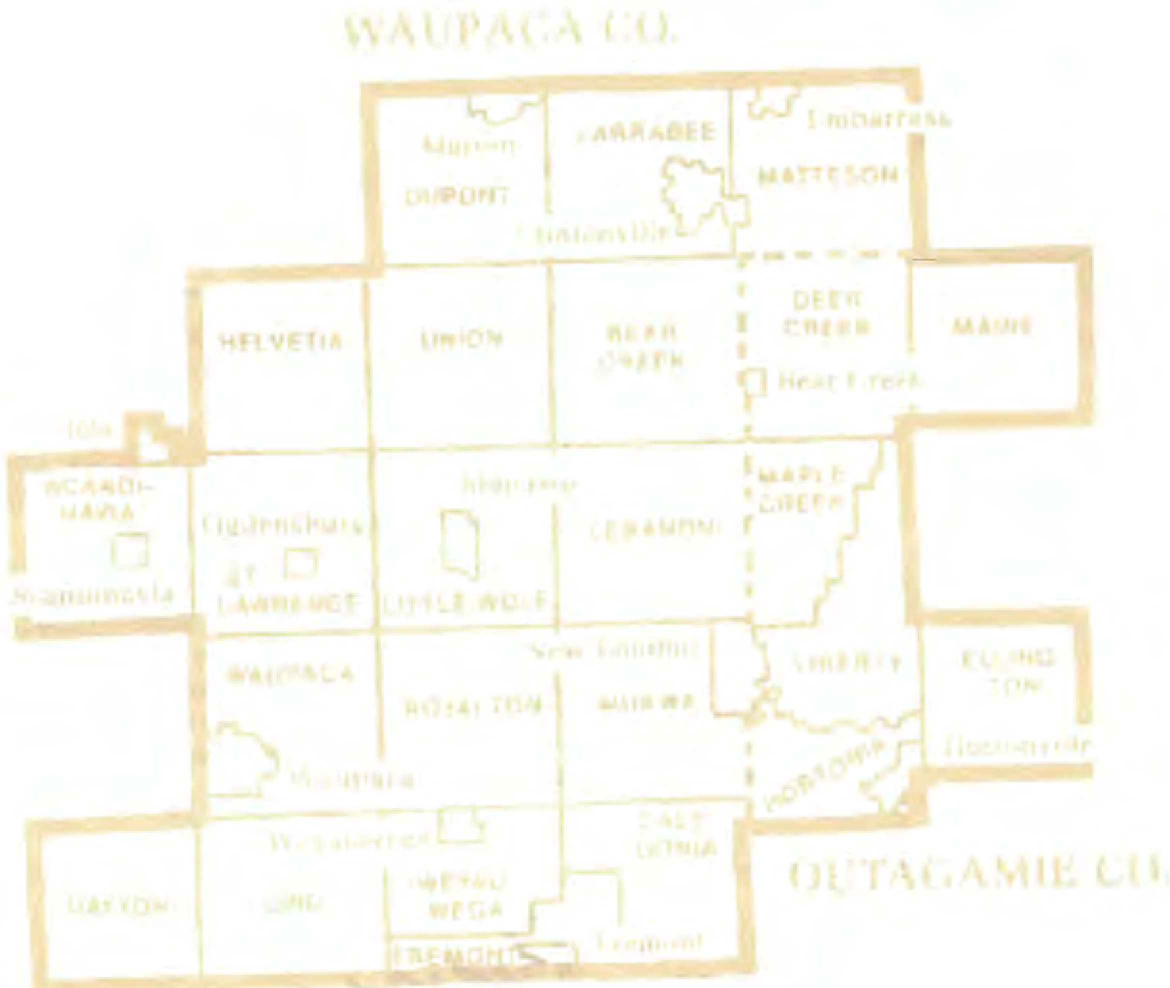
Cordially,

Francis Byers

FRANCIS "Brownie" BYERS
State Representative
40th Assembly District

FRB:lmi

A62397



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