--SPECIFIC WAYS TO IMPROVE THE ORBITER MAINTAINANCE DOWN PERIOD.
--WHAT TO LOOK FOR ON BOLT FRACTURES, HOLDPOST ANOMALIES, SRB ATTACH RINGS, TEST EQUIPMENT AND TRAINING NEEDS.

CHAIRMANS WRAP UP:

-MOST ACCIDENT INVESTIGATIONS FAIL TO DIG DEEPLY ENOUGH INTO THE CAUSES BEYOND IDENTIFYING THE WIDGET THAT BROKE AND THE PERSON IN THE CAUSAL CHAIN CLOSEST TO THE WIDGET THAT BROKE…THIS IS A MISTAKE. THEY DON'T GET TO THE FIXES TO PREVENT FUTURE REPEATS
-FOUR DECOUPLINGS
--TAKE STEPS TO REDUCE DEBRIS CREATION IN THE FIRST PLACE
--TOUGHEN THE ORBITER
--INSPECT AND REPAIR THE ORBITER
--ENHANCE CREW SURVIVABILITY (NASA'S TASK)
-THREE TYPES OF RECOMMENDATIONS
--SHORT TERM: RTF
--MID-TERM: CONTINUING TO FLY, 3-12 YEARS
--LONG-TERM: REPLACE THE SHUTTLE
-IT IS OUR INTENT THAT THIS REPORT BE THE BASIS FOR AN IMPORTANT PUBLIC POLICY DEBATE THAT SHOULD FOLLOW US.
-WHAT IS THE NATIONS VISION FOR HUMAN SPACE FLIGHT
-ARE WE WILLING TO RESOURCE THAT VISION
-HOW URGENT IS IT TO REPLACE THE SHUTTLE
-WHAT SHOULD THE BALANCE BETWEEN ROBOTIC AND HUMAN EXPLORATION BE

THE ACCIDENT (DETAILED DESCRIPTION, FROM ALL DATA, of WHAT OCCURRED)

SOME PTS:

① LOADS @ TWANG > MAX Q (on SRBs)

⇒ at TWANG ⇒ IGNITION, JOINT WOULDN'T SEPARATE

- JET of GAS (BLACK SMOKE) AT T+.6 SEC

8 MORE W/IN 2 SEC

★ LAUNCH CAMERA DIDN'T CATCH MOMENT OF PUFF (NOT A CLEAR VIEW)

⇒ 2 WITH BEST VIEW ⇒ IN-OP

② T (ambient) = 36°F (15° colder than any other) (JOINT TEMP 28°F)

③ WIND SHEAR ⇒ PITCH / YAW LOADS > OTHERS

37 SEC → 65 SEC MAX LOADS W/IN EXPERIENCE (COMPARE LOADS of ALL FLTS @ ATTACH PTS + TO SPEC)

④ ALL PRIMARY EVIDENCE VISUAL (BACKED UP W/ TEM + DEBRIS)

↳ FOUND ~20% of ET

⑤ DETAILED T/L (make)

CAUSE of the ACCIDENT

DISCUSSION of JOINT (+PERFORMANCE)

TEST DATA, ENG DATA, ETC ① DETAILED DESCRIPTION of JOINTS ② EFFECT of T

P64 ③ OTHER INSTANCES: 8th FLT (10th JOINT of 180) (#, over 70°)

ANALYSIS of WRECKAGE

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Transcription:
THE ACCIDENT (DETAILED DESCRIPTION, FROM ALL DATA, OF WHAT OCCURRED)

SOME PTS:
1. LOADS @ [[GOOD GUESS??]] TWAIG [[/GOOD GUESS] > MAX A (on SRBS)
=> at [[GOOD GUESS??]] TWAIG [[/GOOD GUESS]-> IGNITION, JOINT WASN'T SEALED
- JET OF GAS (BLACK SMOKE)
AT T +.6 SEC
8 MORE W/IN 2 SEC
LAUNCH CAMERA DIDN'T CATCH
MOMENT OF PUFF (NOT A CLEAR VIEW)
=> 2 WITH BEST VIEW => IN-OP

2 T(ambient)= 36°F (15 colder than any other)
(JOINT TEMP 28°F)

3 WIND SHEAR => PITCH/YAW LOADS > OTHERS
37 SEC -> MAX LOADS W/IN EXPERIENCE
65sec (COMPARE LOADS OF ALL FLTS @ ATTACH PTS & TO SPEC)

4 ALL PRIMARY EVIDENCE VISUAL
(BACKED UP W/ TLM + DEBRIS)
-> FOUND ~ 20% OF ET

5 DETAILED T/L [[good guess]] (male) [[/good guess]]
CAUSE OF ACCIDENT
[[left align]] DISCUSSION OF JOINT + PERFORMANCE) [[/left align]]
TEST DATA, ENG DATA, ETC 1 DETAILED DESCRIPTION
OF JOINTS 2 EFFECT OF T
P64 3 OTHER INSTANCES: 8th FLT
(10th JOINT OF 150)
(4, over 70°)

ANALYSIS OF WRECKAGE

(1ST section of FINDINGS) ⇒ 16 FINDINGS

25 FEB 21 > 61° (4 problems)

4 < 61° all had problems

PUTTY
O-RING
SEATING
GAPS
DYNAMIC
HANDLING

/ CONCLUSION:

⇒ due to faulty design, unacceptably sensitive to a number of factors (T, physical dimensions/tol, materials, effect of reusability/processing, reaction of joint to dynamics)

CONTRIBUTING CAUSES

- DECISIONS BASED ON INCOMPLETE, SOMETIMES MISLEADING INFO
- DIDN'T GET TO EQUIV of DITTMORE (ALDRICH) (whole discussion, not launch decision)

⇒ LOWER PEOPLE DECIDED IT WASN'T A CONCERN

NOTE: LEVEL I = AA/CD, CEO

LEVEL IV = contractors

↳ ⇒ III = PROJ MGRS (NASA)

(cont'd)

↳ II = PGM MGRS

COFR (3⇒2) ↳ I

ARC (2⇒1)

4 FINDINGS: ① FLAW IN LAUNCH DECISION-MAKING PROCESS

② WAIVING of CONSTRAINTS at expense of safety — no requirement that waivers had to be reviewed/considered at all levels

③ MSFC ④ Thiokol reversed position

3 MORE REGARDING ICE-ON-PAD (+ LAUNCH DECISION)

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Transcription:
(1st SECTION OF FINDINGS) => 16 FINDINGS
25 FEB 21 > 61° (4 problems) 4 < 61° all had problems

[[List from right top margin]] [PUTTY
[O-RING [SEALING
[GAPS [DYNAMICS
[HANDLING
[[/List from right top margin]]
[[arrow pointing from top list to "1 CONCLUSIONS"]]

1 CONCLUSION :
-> due to faulty design, unacceptably
sensitive to a number of factors
(T, physical dimensions/ tol, materials
effect of re-usability/ processing, reaction
of joint to dynamics)

CONTRIBUTING CAUSES
- DECISIONS BASED ON INCOMPLETE, SOMETIMES MISLEADING INFO
- DIDN'T GET TO
EQUIV OF DITTEMORE
(ALDRICH)
(whole discussion,
not launch discussion)
=> LOWER PEOPLE DECIDED
IT WASN'T A CONCERN

[[right margin]]
NOTE :
LEVEL I = AA/CD/E8
LEVEL IV = contractors NASA
III PROJ MGRS
Cert [[?]] [[arrow pointing to III]]
II = PGM MGRS
I
FRR
(2 # 1
[[left of # I]]
COFR
(3 # 2)
[[/right margin]]

4 FINDINGS = (1) FLAW IN LAUNCH DECISION - MAKING PROCESS

(2) WAIVING OF CONSTRAINTS at EXPENSE OF safety - no requirement that waivers had to be reviewed / considered at all levels
(3) MSFC (4) [[good guess]] Thiokol reversed position

3 MORE REGARDING ICE - ON - PAD (& LAUNCH DECISION)

ACCIDENT ROOTED IN HISTORY

BAD DESIGN – ① FAILED TO RECOGNIZE IT AS A PROBLEM, ② FAILED TO FIX IT, ③ TREATED IT AS AN ACCEPTABLE FLT RISK

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Transcription:
ACCIDENT ROOTED IN HISTORY
BAD DESIGN- (1) FAILED TO RECOGNIZE IT AS A PROBLEM, then (2) FAILED TO FIX IT, [[?]] (3) TREATED IT AS AS ACCEPTABLE FIT RISK