



# Discovering Leaks in the Primary Seal

## Description

Discovering Leaks in the Primary Seal, Part One of Seven Discussions Concerning the Challenger Disaster.

## Body

The significance of January 1985 as the starting point results from the observations made during the post-flight hardware inspection of Flight 51C. During this inspection I found evidence that hot combustion gases had compromised the primary seals on two field joints. My concern heightened as a result of the large amount of blackened grease I observed between the two seals. Subsequent to reporting the findings to my superiors, I was asked to proceed to the Marshall Space Flight Center (MSFC) in Huntsville, Alabama, to brief them with a preliminary viewgraph presentation which included my observations and an explanation of the scenarios that caused the seal erosion and hot gas blow-by.

Morton Thiokol was then asked to prepare a detailed presentation as part of the Flight Readiness Review for Flight 51E, which was scheduled for launch in April 1985. This presentation was given in February at three successively higher-level review boards with refinements in contents made at each level. I presented my belief that the lower-than-usual launch temperature was responsible for such a large witness of hot gas blow-by, but NASA management insisted that this position be softened for the final review board.

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## Discussion Questions

What is the problem confronting Boisjoly here? The shuttle is already behind

schedule, and the leaks in the primary seal in Flight 51C in January 1985 occurred during the worst temperature change in Florida history -- hardly everyday conditions. Which of the following actions would be appropriate to take at this point?

**Answer 1: Consult peers at work.**

This idea is a good one, for several reasons. Checking your assessment of the situation and ideas for remedy with someone else will help you correct any of your own misperceptions. Alerting others to a possible problem will enlist their aid in monitoring it or remedying it. Consulting others helps to build support for finding a solution and for carrying it out.

**Answer 2: Consult personal advisors.**

Consulting personal advisors is always acceptable except when faced with an emergency -- which this is not. Consulting those who know you well and whom you trust is a particularly good idea when you need to do something that is particularly difficult, or that "pushes your buttons." For example, when dealing with authority figures, suppose you find it difficult to disagree with them, or suppose you are prone to be belligerent. Those who know you well can help you cope with your own foibles. Occasions that expose foibles or "push your buttons" vary greatly with the individual.

**Answer 3: Perform experiments.**

Good idea. What experiments?

**Answer 4: Take concerns to superiors.**

If their approval is needed at this point to authorize resources to perform experiments or to obtain more knowledge of the problem, this may be warranted; otherwise, you may want to wait until you have more evidence to offer.

**Answer 5: Write memos far up the corporate ladder.**

There is no need to get the immediate attention of upper management; another

record cold condition could not occur for many months. Therefore, if cold weather has caused the seal erosion, you have time to gather more information. If you do need to take your concern to the top, you will want to have good reasons and evidence to substantiate your concerns.

[Continue to Early Evidence of a Temperature Effect](#)

## **Rights**

Use of Materials on the OEC

## **Resource Type**

Case Study / Scenario

## **Topics**

Catastrophes, Hazards, Disasters

Public Health and Safety

## **Discipline(s)**

Aerospace Engineering

Mechanical Engineering

Engineering