Thank them.
Provide call back information.
Provide interviewee with copy of statement and/or recording.
Get interviewee agreement on content of statement.
Listen, listen, listen....
Request suggestions on prevention strategies.
Use neutral questions: "Then what did he do?" "Worse, what you know about the accident?"
Begin with open ended statement: "Can you tell me in your own
Get facts (name, company, witness location, duty, etc).
Establish rapport with the interviewee.
Explain interview purpose (use NASA written statement).
Obtain witness permission before taking notes or recording.
Prepare for the interview (prepare questions, recording.
Interview as soon as possible.

Data Collection: Interviews

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and place of employment.

For the record, please state your full name, title, address, employer,

reside with a court or administrative body outside NASA. Under
ultimate decision as to whether your testimony may be released may
privileged to the greatest extent permitted by law. However, the
NASA will make every effort to keep your testimony confidential and

be released as part of the investigation. Your testimony will be documented and retained as
in this matter. Your testimony will be used to assist the board to the maximum extent of your knowledge
irreducible. Your testimony is entirely voluntary, but we hope that
future. It is not our purpose to place blame or to determine
cause(s) of the mishap that occurred on

The purpose of this safety investigation is to determine the root

NASAR Procedures and Guidelines (NPG) 8621.1
IntervIEWS or by other data sources.
• "Sharing Information" provided in other
jumping to conclusions.
• Leaking the witness by answering your own
questions.
• Intimidating or interrogating the witness.

Interview problem areas to avoid:

Data Collection: Interviews

Mission Success Starts With Safety
Processing or Launch:
- Begin well before the accident — e.g., Shuttle

Document mishap scenario in chronological order:
- 

Create Time Line of Events

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(Including conditions and events) The resultant tree should lead to a comprehensive picture of all potential causes of the accident.
If possible, show events in chronological order.

Events of and failed barriers.

Merge fault tree and event data to document actual

May be Multiple

Form Event & Causal Factor Tree

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cause are considered.

Tools such as the Incident Analysis Tool – Modified Identifies "organizational" root causes.

Should continue asking "why" until the analyses

Questions should be in line with the original issue.

From the box above, (Be sure to keep the logic –

Each lower box should answer the question "why"

---

Root Cause Analysis

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action execution error, violation

decision making error

interpretation error

perceptual error

- Must define the type of human action before
- Cause is identified. For example:

Analysis Tool - Modified, etc.
(e.g., root cause, MORT, barrier analysis, incident
undesired action(s), should be analyzed.

cause of unsafe act(s), violations and/or

cause of human error(s), should be analyzed.

Analysis - Human Factors

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Root Cause Analysis

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NASA
Some choose to leave contributing factors on the tree... if done, illustrate them differently (e.g.).

If no, then eliminate from the tree.

If yes, then it is a cause. If the deficiency or decision in question were corrected, eliminated or avoided, would the problem be prevented or avoided?

Apply the cause test.
Once the tree is complete,

• Similar causes.

Don't be surprised if more causes lead to one path.

• Contributing factors.

There may be more than one root cause and many proximate causes.

•

Root Cause Analysis

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and frustrated when new facts surface.
3. The investigation team becomes discouraged.

solid contradictory evidence is discovered.
2. It becomes difficult for the investigation team
to change its mind/direction even when new
evidence is provided.

Investigation in a narrow direction... which

Communications are made that steer the
First "Why" is grabbed. Three things happen:

Why? convincing "Why", cease investigating and start plausibility of "why".

There is a great temptation to grasp the first

Analysis Pitfalls
Mission Success Starts With Safety
There should be sound reasoning to indicate that it doesn’t apply. Better to leave it, and completely eliminate it later than fail to consider it. There is a great temptation to eliminate possibilities too quickly.

Analysis

Mission Success Starts With Safety
- Clearly state intended action.
- Identify severity.
- Eliminate or decrease risk (probability and/or
  Address both proximate and root causes.
- Recommendations

- Recommendations.
- Observations to...
- Findings (causes, contributing factors &
  Facts to...
  Demonstrated the from the

NPC: Appendix H-3 Sample Table of Contents

Report

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and reporting methods.

- Provides description of data collection, analysis,
  investigation of the facts.
- Ensures an unbiased, independent, and thorough
  policy and guidelines.

- Support agency mission objectives.
- Ensure safety of process and return to flight to
  NASA needs quick and thorough investigation to

- Non-punitive system.
- Proven investigation methodology.
  Prevent mishap recurrence using structured and
  Identify root cause and contributing factors to
  NASA philosophy.

Summary

Mission Success Starts With Safety
Overview Backup
A mishap, injury, or increase in severity should not occur

during the investigation that did not contribute to the mishap or

eliminated or modified would NOT by itself prevent the recurrence.

Contribution Factor - A condition or event that may have

prevented the undesirable outcome, and if eliminated or modified would have

Contributed to the occurrence of an undesirable outcome but if

Contributed to the occurrence of an undesirable outcome and subsequent

Contributed to / created the proximate cause and subsequent

Root Cause(s) - One of multiple organizational factors that

immediately before the undesirable outcome, directly caused its

immediately before the undesirable outcome, directly caused its

Proximate Cause(s) - The event(s) and condition that occurred

Definitions

Mission Success Starts With Safety
Sequence of Events for the MI Process – NPG 8621.1, Page 169

Mission Success Starts With Safety
MORT OVERVIEW
elements.

the adequacy of implementation of individual safety
Method for analyzing safety programs by evaluating

taunt tree methodology
Represeation of an "ideal" safety model using a

logical manner.

program elements in an orderly, coherent, and
An analytical "logic tree" that arranges safety

Management Oversight Risk Assessment Tree

What Is MORR?
Mission Success Starts With Safety
To find out "why" the "trigger" was allowed to occur, and to analyze every cause.

Goal of the Analysis:

- Determine general causal areas and root causes.
- MORT can be used to analyze a specific accident and its purpose.

MORT OVERVIEW

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NASA
problem
.immediately proceeds and „triggers“ the accident or
.Human error, process or equipment failure that
.trigger
 functionally
.barriers or ensure that barriers operate
.elements of the system that function as
.controls
.used to reduce hazards to acceptable levels
.barrier
.safety devices, both physical and administrative
.consequence
.a barrier - control inadequacy or a failure without
.incident
.condition that results in adverse consequence
.accident
.an unwanted flow of energy or environmental
.energy

more definitions
mission success starts with safety

nasa
MORF Tree Main Branches

Mission Success Starts With Safety
MORF Tree Main Branches - Accident
Mission Success Starts With Safety
Mission Success Starts With Safety

Energy Flow

- Radiation
- Biological and Chemical
- Electrical
- Kinetic
- Environmental
- Thermo
MORT BACK UP
Bill,

A tool to consider in use during the accident reconstruction. I do not have much knowledge of this tool. Darcy is a HF person in Ronnie Goodin's safety office at KSC.

From: "Miller-1, Darcy" <Darcy.H.Miller@nasa.gov>
To: "fchandle@hq.nasa.gov" <fchandle@hq.nasa.gov>
Subject: Crash and Crime Scene Investigation Software application
Date: Tue, 4 Feb 2003 14:07:40 -0500
X-Mailer: Internet Mail Service (5.5.2653.19)

Faith,

I would like to pass this information on to someone who may be able to use it in NASA, either now in Texas or in the future. It looks promising. It is designed for crash and crime scene investigation. It was referred to me by someone that I worked with in the past and the company has a good reputation with us. I would like to get this to the right person who can see if it could improve our recovery and reconstruction process. Optimus, the company, is not asking for money, just to help out, but of course the publicity would be outstanding for the product.

> Here are the additional benefits that I noted when I called Wesley Winn of
> Optimus. Although I do not know the system that we are using in Texas and
> I have not seen the Optimus system, Wesley compared it to other typical
> systems when he explained it.
> * Logging location of parts: Other systems are accurate within about
> 30 feet, this one is accurate within 1 cm.
> * Other systems require more than one person to take the reading, this
> one requires only one person with a laptop.
> * Makes use of "WAS", a satellite system and a patented filter.
> * It uses drop down menus and has areas for text entry to describe and
> document the parts for later reconstruction.
> * They work in the DC area, but can go to Texas.
> * Training to collect the data in the field requires about 30 minutes.

It was just released last month for commercial use, so not many people would know about it yet.

Thank you,
> Darcy Miller
> PH-P1
> 321-861-1846
>
> -----Original Message-----
> From: 
> Sent: Tuesday, February 04, 2003 9:54 AM
> To: Darcy.H.Miller@nasa.gov
> Subject: OPTIMUS Corporation - AutoDOCS
>
> Ms. Miller,
> Acting Director of Public Safety gave me your name and
> contact information. As you may recall he and
> worked on the
> NASA EPIC project. I am contacting you in regards to another product we
> developed that came out of the SBIR program, AutoDOCS. It is a crash and
> crime scene reconstruction system using GPS technology. Points are
> measured within 1 CM of accuracy and car, plane, etc. parts are input
> electronically through scroll-down menus on a laptop computer. Upon
> completion of the measurements and data input, information is then stored
> in a database with a GIS to display all the points. We are trying to setup
> a pilot with NTSB for the use in air disasters, and wanted to know if you
> (or knew someone that would be) interested in using the product for the
> Columbia Disaster?
>
> If you are interested in learning more about the product or would like to
> use the system to assist in the data collection at no charge, please feel
> free to give me a call or email me.
>
> Sincerely,
>
> OPTIMUS Corporation
From: "RAILSBACK, JAN (JSC-NX) (NASA)" <jan.railsback-1@nasa.gov>
To: "Michael Stamatelatos" <mstamate@hq.nasa.gov>,
    "BOYER, ROGER L. (JSC-NC) (SAIC)" <roger.l.boyer1@jsc.nasa.gov>,
    Bill Vesely <wvesely@columbus.rr.com>,
    "Dennis Moore (E-mail)"
    <Dennis.R.Moore@msfc.nasa.gov>
Cc: "STEWARD, MICHAEL A. (JSC-NC) (SAIC)"
    <michael.a.stewart1@jsc.nasa.gov>,
    "ROELANT, HENK (JSC-NC) (NASA)"
    <henk.roelant-1@nasa.gov>
Subject: RE: Sequence
Date: Mon, 3 Feb 2003 09:06:42 -0600
X-Mailer: Internet Mail Service (5.5.2653.19)

This morning Yolanda came into my office and said that Bryan O’connor would be asking us for information, via channels, regarding the PRA model.
Attached is his note and a one-pager outlining his request. David Cazes also informed Yolanda that we have archived copies of the PRA on CD and that a copy of the analysts’ hard drives have been partitioned on a secure drive.

Dennis, if you haven’t locked down a copy of the models from MSFC, I suggest you do so. I have asked Bill Vesely to do the same.

Talk with you at 10:30 Central.

Jan W. Railsback
Lead Analyst
Safety, Reliability, and Quality Assurance
Advanced Programs and Analysis Division
Ph: 281-483-7265
Fax: 281-244-2318
jan.railsback-1@nasa.gov

-----Original Message-----
From: Michael Stamatelatos [mailto:mstamate@hq.nasa.gov]
Sent: Monday, February 03, 2003 8:43 AM
To: RAILBSACK, JAN (JSC-NX) (NASA); BOYER, ROGER L. (JSC-NC) (SAIC);
    Bill Vesely
Subject: Sequence
To: Pete Rutledge <prutledge@hq.nasa.gov>
From: Michael Stamatelatos <mstamate@hq.nasa.gov>
Subject: Re: Supporting Bryan on the Columbia Accident Investigation Board (CAIB)
Cc:
Bcc:
Attached: C:\Documents and Settings\mstamate\Desktop\Scenario.doc;

Pete:
Attached is a short description of a scenario that may be important for STS-107.
I have a telecon with the shuttle PRA group at 11:30 AM today.
Can I share this with them?
Michael

At 07:49 PM 2/2/2003 -0500, you wrote:
Code Q staff members,

As you may know Bryan is the ex-officio member of the Columbia Accident Investigation Board. He left for Barksdale AFB this afternoon around noon time. That is where he will meet up with the other CAIB members.

One of our main jobs in the immediate future will be to support him. We can support him in at least three ways: 1. We can respond to his requests. 2. We can collect, on our own initiative, data that could be of use to him (but we need to proceed most carefully on this one). 3. We can suggest questions or avenues of investigation that he might be able to inject into the work of the board.

Attached is a rough list we prepared today of investigative areas--for the most part these are areas in which the SMA community has some special expertise. For each area we have tentatively named an OSMA lead (and in some cases more than one person to work together). If you can think of other areas that we have not captured, and should, let me know. If we’ve associated you with the wrong area(s) or failed to associate you with the right area(s), let me know. We don’t want to disrupt the investigation--we want to be prudent; we want to help Bryan. Think about whether and how you might be able to be helpful in these areas; then, before you take any action, write down your plan in a clear, concise manner, and send it to me--state what you might be able to do and how you would propose to do it. Then wait for a go-ahead from Jim or me. Keep in mind that we have asked the SMA directors at JSC, MSFC, KSC, LaRC, ARC, and SSC to work with us as needed, so this can be part of your plan, if appropriate.

We have also asked all 10 SMA directors to think of questions or issues that Bryan might pursue with the CAIB. I will be collecting these inputs. Your questions and issues are solicited, as well. Put your investigator hat on, think about this, do your own personal fault trees and

Printed for Michael Stamatelatos <Michael.G.Stamatelatos@nas...
hazard analyses, send me your ideas. I'll collect them up, as well, to send to Bryan.

Let's do a great job for Bryan on this important matter.

Thanks,

Pete

-------------------------------
Peter J. Rutledge, Ph.D.
Director, Enterprise Safety and Mission Assurance Division
Acting Director, Review and Assessment Division
Office of Safety and Mission Assurance
NASA Headquarters, Code QE, Washington, DC 20546

ph: 202-358-0579
FAX:202-358-2778
e-mail: pete.rutledge@hq.nasa.gov

Mission Success Starts with Safety!
X-Sender: prutledg@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Mon, 03 Feb 2003 09:20:46 -0500
To: Michael Stamatelatos <mstamate@hq.nasa.gov>
From: Pete Rutledge <prutledg@hq.nasa.gov>
Subject: Re: Supporting Bryan on the Columbia Accident Investigation Board (CAIB)

Yes, as they know its your scenario and not from the MIB.

Pete

At 08:59 AM 2/3/2003 -0500, you wrote:

Pete:
Attached is a short description of a scenario that may be important for STS-107.
I have a telecon with the shuttle PRA group at 11:30 AM today.
Can I share this with them?
Michael

At 07:49 PM 2/2/2003 -0500, you wrote:

Code Q staff members,

As you may know Bryan is the ex-officio member of the Columbia Accident Investigation Board. He left for Barksdale AFB this afternoon around noon time. That is where he will meet up with the other CAIB members.

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appropriate.

We have also asked all 10 SMA directors to think of questions or issues that Bryan might pursue with the CAIB. I will be collecting these inputs. Your questions and issues are solicited, as well. Put your investigator hat on, think about this, do your own personal fault trees and hazard analyses, send me your ideas. I'll collect them up, as well, to send to Bryan.

Let's do a great job for Bryan on this important matter.

Thanks,

Pete

-----------------------------------
Peter J. Rutledge, Ph.D.
Director, Enterprise Safety and Mission Assurance Division
Acting Director, Review and Assessment Division
Office of Safety and Mission Assurance
NASA Headquarters, Code QE, Washington, DC 20546

ph: 202-358-0579
FAX:202-358-2778
e-mail: pete.rutledge@hq.nasa.gov

MISSION SUCCESS STARTS WITH SAFETY

***************************************************************************
Dr. Michael Stamatelatos
Manager, Agency Risk Assessment Program
NASA Headquarters - Mail Code QE
Office of Safety and Mission Assurance
300 E Street, SW
Washington, DC 20024
Phone: 202/358-1668 Fax: 202/358-2778
E-mail: Michael.G.Stamatelatos@nasa.gov
(Please note change in e-mail address)
***************************************************************************
"Mission success starts with safety"

-----------------------------------
Peter J. Rutledge, Ph.D.
Director, Enterprise Safety and Mission Assurance Division
Acting Director, Review and Assessment Division
Office of Safety and Mission Assurance
NASA Headquarters, Code QE, Washington, DC 20546

ph: 202-358-0579
FAX: 202-358-2778
e-mail: pete.rutledge@hq.nasa.gov

Mission Success Starts with Safety!
From: "RAILSBACK, JAN (JSC-NX) (NASA)" <jan.railsback-1@nasa.gov>
To: "Michael Stamatelatos" <mstamate@hq.nasa.gov>
Subject: RE: Status of accident investigation and RTOPS
Date: Fri, 28 Feb 2003 14:07:56 -0600
X-Mailer: Internet Mail Service (5.5.2653.19)

Michael,

Okay with me. As a preview I'm attaching a couple of org charts for the accident investigation team.

Jan W. Railsback
Lead Analyst
Safety, Reliability, and Quality Assurance
Advanced Programs and Analysis Division
Ph: 281-483-7265
Fax: 281-244-2318
jan.railsback-1@nasa.gov

-----Original Message-----
From: Michael Stamatelatos [mailto:mstamate@hq.nasa.gov]
Sent: Friday, February 28, 2003 11:56 AM
To: RAILSBACK, JAN (JSC-NX) (NASA)
Subject: Re: Status of accident investigation and RTOPS

Jan:
I believe we should have a telephone conversation on all these items next week. Tuesday would be better for me. How about you?
Michael

At 05:36 PM 2/27/2003 -0600, you wrote:
>Michael,
>
> I apologize for not getting back with you from time to time on the status of
> the accident investigation. If you have a chance, you should get on a plane
> and come down here for a good view of how the accident investigation fault
> tree is going. We have been working considerable hours on this effort and
> the Shuttle Program has expressed their approval. We have many people
working on the tree in a "badgeless" atmosphere. But we do have some concern.

on the RTOPs and their progress with which we could use your advice. The same goes for the Shuttle PRA, though we are working on a revised schedule.

I'll try to call you tomorrow.

Jan W. Railsback
Lead Analyst
Safety, Reliability, and Quality Assurance
Advanced Programs and Analysis Division
Ph: 281-483-7265
Fax: 281-244-2318
jan.railsback-1@nasa.gov

Dr. Michael Stamatelatos
Manager, Agency Risk Assessment Program
NASA Headquarters - Mail Code QE
Office of Safety and Mission Assurance
300 E Street, SW
Washington, DC 20024
Phone: 202/358-1668 Fax: 202/358-2778
E-mail: Michael.G.Stamatelatos@nasa.gov
(Please note change in e-mail address)

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OVE Working Group Small Org Chart.ppt

02112003MRT_STS-107-Investigation-Organization.pdf
Jim & Pete,

I gathered together all the STS-107 OSMA-related data that OSMA touched, saw, or responded to.

Jim: As requested, I will hand it over to you when I see you in person.

I asked Bill to provide copies of any email and launch day notes that he may have. I'll add those to the binder when I get them.

Here is the outline of the two-volume data set:

Mark

STS-107 OSMA mission related data products

1) Volume I, STS-107 OSMA Data
   a) Safety & Mission Assurance Report
      i) FRR version
   
ii) PMMT version
      b) Pre-flight Assessment Reviews (PFA)
         i) RSRM-88 PFA
      
   ii) SRB - B116 PFA (SR&QA Review)
   iii) SSME PFA
   iv) ET-93 PFA

   c) Preflight Assessment Review
      i) PAR-5 Minutes Topics (PAR Planning Notes from JSC)
         (1) Jan 10, 2003

(2) Jan 17, 2003
(3) Jan 24, 2003

   ii) Pre-Flight Assessment Review

   iii) PFA - FRR Tag-up
iv) PFA - PMMT Tag-up
v) Range Safety Data Package

2) Volume II, STS-107 Email Exchange
   a) Email Exchange
      i) Email MER daily status reports
   ii) Email OSF status messages to Code Q
   iii) Email SR&QA Reports
   iv) Email Inter-office (OSMA)
       b) Launch Operations Data (on-console)
          i) Interim Problem Reports (Pre-tankng report)
   ii) ET Tanking Meeting SRB Special Topic
   iii) PMMT (L-1) and Launch Day Notes (Kowaleski)
       PMMT (L-1) and Launch Day Notes (Bihner)
for posting to the PBMA website. Since this has phone numbers, I presume we can keep this internal to NASA.

I have passed on to Bryan.

From: "Malone, Roy" <Roy.W.Malone@nasa.gov>
To: "wfrazier@hq.nasa.gov" <wfrazier@hq.nasa.gov>
Subject: FW: MSFC STS-107 Contingency Working Groups
Date: Mon, 3 Feb 2003 10:35:48 -0600
X-Mailer: Internet Mail Service (5.5.2653.19)

Here is the information that we discussed.

R/Roy

-----Original Message-----
From: Coleman, Sandy
Sent: Sunday, February 02, 2003 6:43 PM
To: McCoil, Alex; Hopson, George; Singer, Jody; Smelser, Jerry; Martin, David M; Mullane, Dan; Adams, Alex; Goldman, Gene; Otte, Nell; Lusk, Joe; Cash, Steve; Burt, Rick; Murphy, Alan; Schutzenhofer, Scott A; Tepool, Ronald; Greenwood, Terry; Martin, Jolene; Goodson, Amanda; Kilpatrick, Bill; Fuller, Pat; Humphries, Randy Jr; Harris, Yolanda; Nave, Lionel R; Brettel-, Stephen P; Munafio, Paul; Rodriguez, Pete; McConnaughey, Helen; McConnaughey, Paul; Brunky, Joseph; Malone, Roy; Washington, Terease; Cloud, Sheila; Kross, Denny; Singer, Chris
Subject: MSFC STS-107 Contingency Working Groups

Attached is a summary sheet of the five MSFC Contingency Working Groups including chairpersons, team members/focus areas, and room numbers/phone numbers for the working groups. Also attached are more detailed lists of the five teams which include phone numbers for the team members. Please send me updates as appropriate.

<<MSFC Contingency Working Groups.xls>> <<STS-107 Final LH Space Shuttle Contingency Working Group List .doc>>

Sandy
Deputy Manager
Space Shuttle Projects Office
(256) 544-6201
Wayne R. Frazier
NASA Headquarters - Code QS
Office of Safety and Mission Assurance
Washington, DC 20546-0001
Ph: 202 358-0588 Fax: 202 358-3104

"Mission success starts with safety"

</x-html>
# STS-113 MSFC SPACE SHUTTLE CONTINGENCY WORKING GROUPS  
FEBRUARY 2, 2003

## EXTERNAL TANK WORKING GROUP

<table>
<thead>
<tr>
<th>TITLE/AREA OF RESPONSIBILITY</th>
<th>NAME</th>
<th>MSFC ORG</th>
<th>PHONE (AS REQUIRED)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTING CHAIRPERSON</td>
<td>P. MUNAFO</td>
<td>ED30</td>
<td>OFC 256-544-2566</td>
</tr>
<tr>
<td>ALTERNATE</td>
<td>N. OTTE</td>
<td>MP31</td>
<td>OFC 256-544-7231</td>
</tr>
<tr>
<td>SUPPORT MEMBERS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STRUCTURAL</td>
<td>P. ROGERS</td>
<td>ED22</td>
<td>OFC 256-544-4632</td>
</tr>
<tr>
<td>ALT: W. GREGG</td>
<td></td>
<td>ED22</td>
<td>OFC 256-544-5501</td>
</tr>
<tr>
<td>MATERIALS</td>
<td>S. GENTZ</td>
<td>ED35</td>
<td>OFC 256-544-2570</td>
</tr>
<tr>
<td>S&amp;MA</td>
<td>K. NEMECEK</td>
<td>QS20</td>
<td>OFC 435-863-2926</td>
</tr>
<tr>
<td>THERMAL</td>
<td>D. BRYAN</td>
<td>ED25</td>
<td>OFC 256-544-4265</td>
</tr>
<tr>
<td>ELECTRICAL</td>
<td>J. RATLEY</td>
<td>ED12</td>
<td>OFC 256-544-3448</td>
</tr>
<tr>
<td>DYNAMICS/ENVIRONMENTS</td>
<td>L. FOSTER</td>
<td>TD50</td>
<td>OFC 256-544-1589</td>
</tr>
<tr>
<td>PHOTO ENG ANALYSIS</td>
<td>T. RIECKHOFF</td>
<td>TD53</td>
<td>OFC 256-544-7677</td>
</tr>
<tr>
<td>EX-OFFICIO</td>
<td>S. BRETTEL</td>
<td>MP31</td>
<td>OFC 504-257-0700</td>
</tr>
<tr>
<td>EX-OFFICIO</td>
<td>J. SMELSER</td>
<td>MP31</td>
<td>OFC 256-544-4082</td>
</tr>
<tr>
<td>INTEGRATION</td>
<td>R. CLAYTON</td>
<td>JSC/MS2</td>
<td>OFC 281-483-7117</td>
</tr>
<tr>
<td>MATERIALS</td>
<td>S. SPARKS</td>
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