

**SIEMENS**

GHM:97:007

Date: April 29, 1997

To: B. F. Bentley

From: B. G. Haugen/G. H. McClendon

Subject: Taproot of Overtilling NFI Shipping Containers

Distribution

## Team Members

M. A. Jaeger  
D. C. Kilian  
L. J. Maas  
G. F. Melde  
J. R. Tandy  
R. E. Vaughan  
G. N. Ward  
GHM/File  
GHM/LB

Per your request, the following is a team self-assessment investigation into NFI (Nuclear Fuel Industries) NT-IX packaging non-compliance from September 1996 to April 1997.

Assessment method was TapRoot™ analysis, using the Root Cause Tree™, Root Cause system improvement, event & causal factors charting and basic cause categories (see attachments).

Reason for Investigation

On Monday, March 24, 1997, the SPC T&W (Traffic & Warehousing) Supervisor received and reviewed a copy of CAC (Competent Authority Certification) Revision 5 for NT-IX container packaging issued by USDOT (United States Department of Transportation) and distributed by SPC Regulatory Compliance. Shortly after the Supervisor reviewed the CAC, the area Senior Technician walked by, prompting the Supervisor to give the CAC to the Senior Technician for review. After a quick review, the Senior Technician discovered what he thought to be a serious problem, in that the new CAC (Rev. 5) had loading restrictions he had never seen before, and T&W was at that time packing an NFI shipment.

Assessment Team

B.G. Haugen	Co-Chairman
G.H. McClendon	Co-Chairman
J.B. Edgar	
M.L. Koontz	
R.D. Norman	
R.A. Nunamaker	
L.G. Stephens	
R.L. Westover	

**Siemens Power Corporation**

Nuclear Division  
Engineering & Manufacturing

2101 Horn Rapids Road  
P.O. Box 130  
Richland, WA 99352-0130

Tel: (509) 375-8100  
Fax: (509) 375-8402

130044  
9705140056 970429  
PDR ADOCK 07001257  
C PDR



1E07

Distribution  
April 29, 1997

GHM:97:007  
Page 2

### Interviews Held

- 4/2/97 J.B. Edgar (Regulatory Compliance) - Regulatory Compliance and Operations Compliance had worked closely over the past couple years on compliance certification issues. Over this time, Regulatory Compliance came to rely on Operations Compliance to distribute necessary information to affected subsections/groups within T&W and Operations.

Regulatory Compliance identified that EMF30, Chapter 5 appendices had not been kept up to date for approximately 1½ years due to perceived inefficiencies in the document management system. A new system was conceived within Regulatory Compliance, but has not been implemented.

Regulatory Compliance noted that USDOT documents often contain errors and are not issued in a timely manner.

- 4/11/97 L.G. Stephens/R.L. Westover (Operations UO<sub>2</sub> Support) - Packed required pails per Scheduling lot letters and applicable SOP. UO<sub>2</sub> Support's primary contact was T&W Senior Technician to identify any changes to packing restrictions.

Due to past problems, the SOP for NFI Powder Packing had been updated and issued Feb 3, 1997 to include a table, prepared by T&W Senior Technician and UO<sub>2</sub> Support, which satisfied CAC Revision 3 packing limits as well as SPC safe batch limits. It was unknown at the time that CAC Revision 4 had been issued several months prior. The SOP was then routed and approved per SOP approval list.

- 4/11/97 M.L. Koontz (T&W Senior Technician) - Operates based on mini-library documents including SOP's and EMF-30, Chapter 5 requirements. He did not become aware of CAC Revision 4 until March 24, 1997 when a copy of CAC Revision 5 was sent to T&W Supervisor from Regulatory Compliance via company mail system, and the problem was discovered. Backtracking found that CAC Revision 4 had been issued months before. Senior Technician stated he had not received a copy of CAC Revision 4.
- 4/14/97 R.A. Nunamaker (Operations Compliance) - Receives CAC revisions from Regulatory Compliance. Reviews and highlights changes or special requirements in CAC and passes on highlighted copies to affected Senior Technician if there have been changes. If there are no changes, no copies are distributed. Operations Compliance maintains a copy of all latest revisions of CACs and believes this file is the controlled document for T&W.

Verified Regulatory Compliance's note about problems with USDOT documents.

Distribution  
April 29, 1997

GHM:97:007  
Page 3

- 4/17/97 M.L. Koontz (Senior Technician) - Confirmation of timeline and support on causal factor chart.
- 4/17/97 R.D. Norman (T&W Supervisor) - Stated CAC Revision 4 was unknown to him and was not received based on personal CAC file records. Also provided overview of weakness resulting from potentially out-of-date formal documents.

### Contributory Causes

#### Communications:

Method of communication was an informal system that had several weak barriers. This system provided no training, so the explanation of how information was distributed and the exact responsibilities of involved people was not clear.

Distribution of CAC revisions and important changes was informal and it is unclear on who actually received and understood the changes. A few people do keep personal files of CACs, while others question the reliability of these files.

A few people say the mini-library EMF-30, Chapter 5 appendices have been out of date for over a year, while others had no idea and thought it was current. EMF-30, Chapter 5, Appendix N has been out of date since August 27, 1996. Other appendices of EMF-30, Chapter 5 were not reviewed as a part of this investigation.

As revealed by this TapRoot™ investigation, independent verification did not generally appear to be part of the system, and was not used on the most critical step of reviewing the CAC for changes. The system ultimately relied on Operations Compliance to find important changes and communicate them to the necessary individuals.

Instead of a formal system relying on EMF documents, review meetings, and formal communications, the current system was an informal system that was not backed up by well defined and consistently understood procedures, protocols, and responsibilities. Up to this time, the informal system appeared to be working, although some comments during interviews indicated that there was previous concern that the system was not adequate. The informal system broke down and was not identified until seven months later. The problem could have continued, had it not been for a set of fortunate events that led to the discovery of the problem.

The SPC-ND document control system utilizing the mini-library system should be utilized where control of procedures is necessary. The mini-library was designed to be the most up-to-date and reliable source of documents, available at all times for all SPC-ND employees. This documentation system had been bypassed.

Distribution  
April 29, 1997

GHM:97:007  
Page 4

As identified in the interviews section, CAC revisions received from USDOT often contain errors. Regulatory Compliance should continue to make requests to USDOT to increase the quality and accuracy of these revisions. It was also identified during this investigation that specific changes within a revision are not clearly identified. It would be of great help to SPC if all CAC revisions contained a section that clearly identified and stated all changes from the previous revisions, who initiated these changes, and why these changes were necessary.

#### Management System:

The team found that management was unaware of the shortcomings of the system by which CACs were distributed, reviewed, and implemented. Management did not realize that company standards and controls were less than adequate and that thorough reviews of CACs by SPC's responsible front line departments were not fully assured. The evolution of the current system was not realized so there was no management oversight for documented accountability.

During the past year it was realized by some people that the documentation system (EMF-30, Chapter 5) was out-of-date and they had formulated, but not yet implemented, a plan to correct it. An interim, less formal system was being utilized. This less formal system failed.

#### Root Cause

The lack of a formal system that would ensure all appropriate parties would be informed of any change to CACs which could affect the packaging and shipping of NFI powder.

#### Broken Barriers

- EMF-30, Chapter 5 appendices were not being maintained, having been replaced by an informal system that had evolved over the past several years.
- Job expectations and responsibilities were unclear and inconsistent between those who were interviewed. It appears Operations Compliance had informally taken on the responsibility for reviewing all revised CACs and determining if there were any changes from the previous revision. The nature and implications of these changes were then passed on to affected people. If there were no significant changes between revisions, the new revisions were not distributed.

#### Recommendations

1. Powder and Pellet Container MQT - Currently, there is a MQT assigned to "Containers". This MQT currently supports bundle shipping containers by reviewing and updating container drawings. Other limited support to T&W is provided for shipping container problems. It is recommended that the role of this MQT be expanded to include support for Powder and Pellet packaging. All revised CACs would be thoroughly reviewed by the MQT.

Distribution  
April 29, 1997

GHM:97:007  
Page 5

2. Communication Meetings - The MQT will be responsible for holding meetings to review packing requirements and ensuring that the requirements get communicated to the applicable departments and groups. It is recommended that initially the MQT consider having a review meeting each time a CAC revision is released and there be a contract meeting held prior to packing powder or pellets to discuss important issues. The MQT is ultimately responsible for creating the communication system which will ensure all packing requirements are presented to and understood by the individuals performing the packing function.
3. Loading Parameter Sheet - A loading parameter sheet should be developed and provided that supports the schedule, latest CAC, SPC-ND safe batch, etc. The sheet should be an approved document posted at pail loading work stations.

### General Implication

The assessment team feels that this problem could have continued, had it not been for a certain sequence of events which led to the discovery. A potential existed for nonconformance in any department that used EMF-30, Chapter 5, as other appendices were found to be out of revision also. A permanent fix is being pursued that will allow EMF-30, Chapter 5 to be more easily maintained in a fully current condition with respect to shipping container certificate information. In the meantime all holders of EMF-30, Chapter 5 have been notified by formal letter that the appendices are out-of-date in certain areas and that Regulatory Compliance needs to be contacted for any information regarding shipping container certificates.

ATTACHMENTS

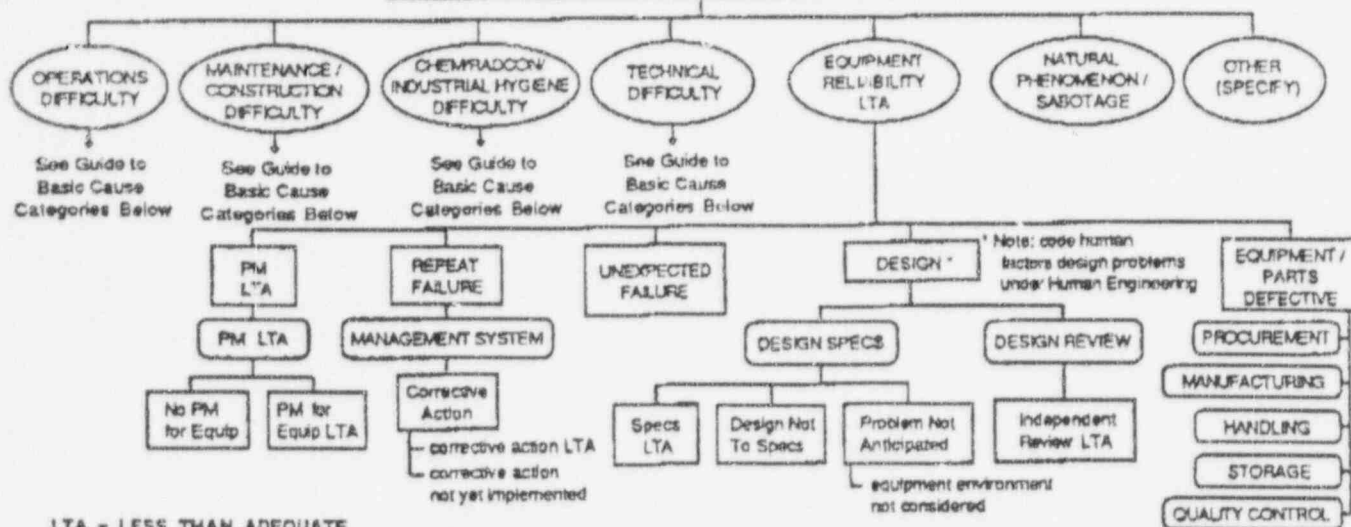
## TIMELINE OF IMPORTANT EVENTS FOR OVERFILLING NFI SHIPPING CONTAINERS

3/30/95	EMF-30, Ch. 5 Rev. 2 issued. (Appendix N contained CAC Rev. 2)
1/17/96	CAC Rev. 3 issued by USDOT
4/19/96	EMF-30, Ch. 5 Rev. 3 issued and is Current Revision. (Appendix N contains CAC Rev. 3)
6/30/96	CAC Rev. 3 expired
7/26/96	NFI Powder Pack SOP, P66,873 Rev. 8 issued. Does not include pail weight table.
8/26/96	Start loading NFI 17B
8/27/96	CAC Rev. 4 issued by USDOT
10/20/96	Start loading NFI 19B-1
11/1/96	Finished loading NFI 17B
11/7/96	Started loading NFI 18B
12/4/96	Shipped NFI 17B
1/9/97	Finished loading NFI 18B
1/21/97	Finished loading NFI 19B-1
2/3/97	NFI Powder Pack SOP, P66,873 Rev. 9 issued. Includes pail weight table based on CAC Rev. 3 limits.
2/12/97	Shipped NFI 18B
2/25/97	NFI Powder Pack SOP, P66,873 Rev. 10 issued. Includes pail weight table based on CAC Rev. 3 limits.
2/28/97	CAC Rev. 4 expired
3/6/97	CAC Rev. 5 issued by USDOT
3/24/97	-Problem was identified by T&W Supervisor, T&W Operations Compliance and T&W Lead Technician -T&W halted loading of shipping drums -Regulatory Compliance notified of problem
3/26/97	NFI repacking released to work by Management
3/28/97	NFI Powder Pack SOP, P66,873 Rev. 11 issued. Includes pail weight table based on CAC Rev. 3 limits.
6/30/97	CAC Rev. 5 will expire



# SYSTEM IMPROVEMENTS' ROOT CAUSE TREE™

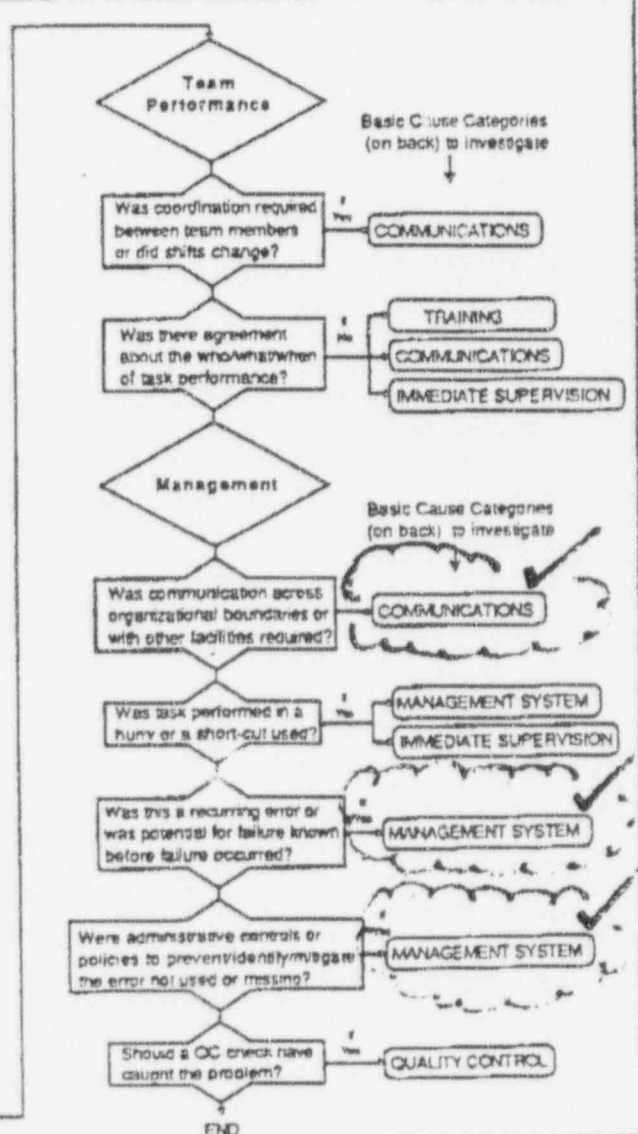
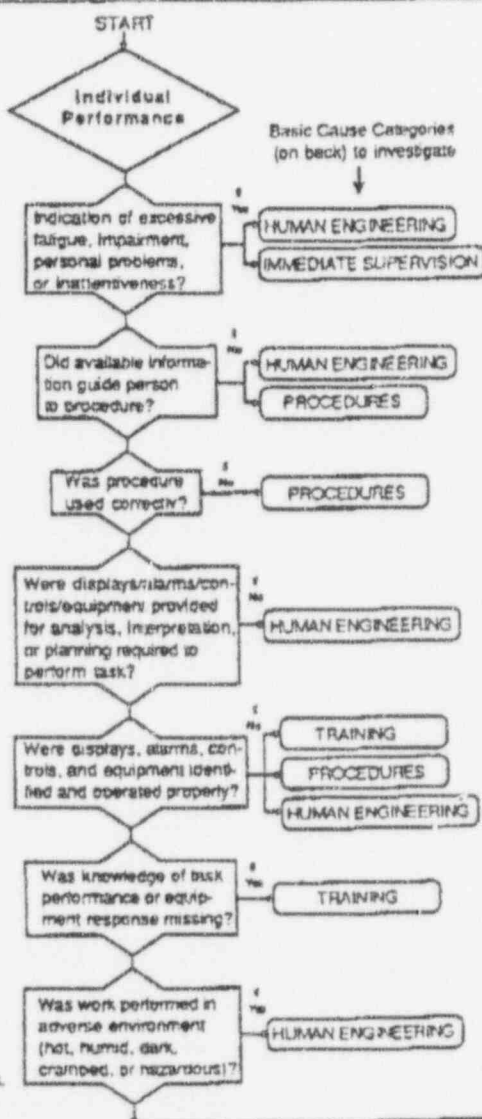
START HERE TO DETERMINE ROOT CAUSES



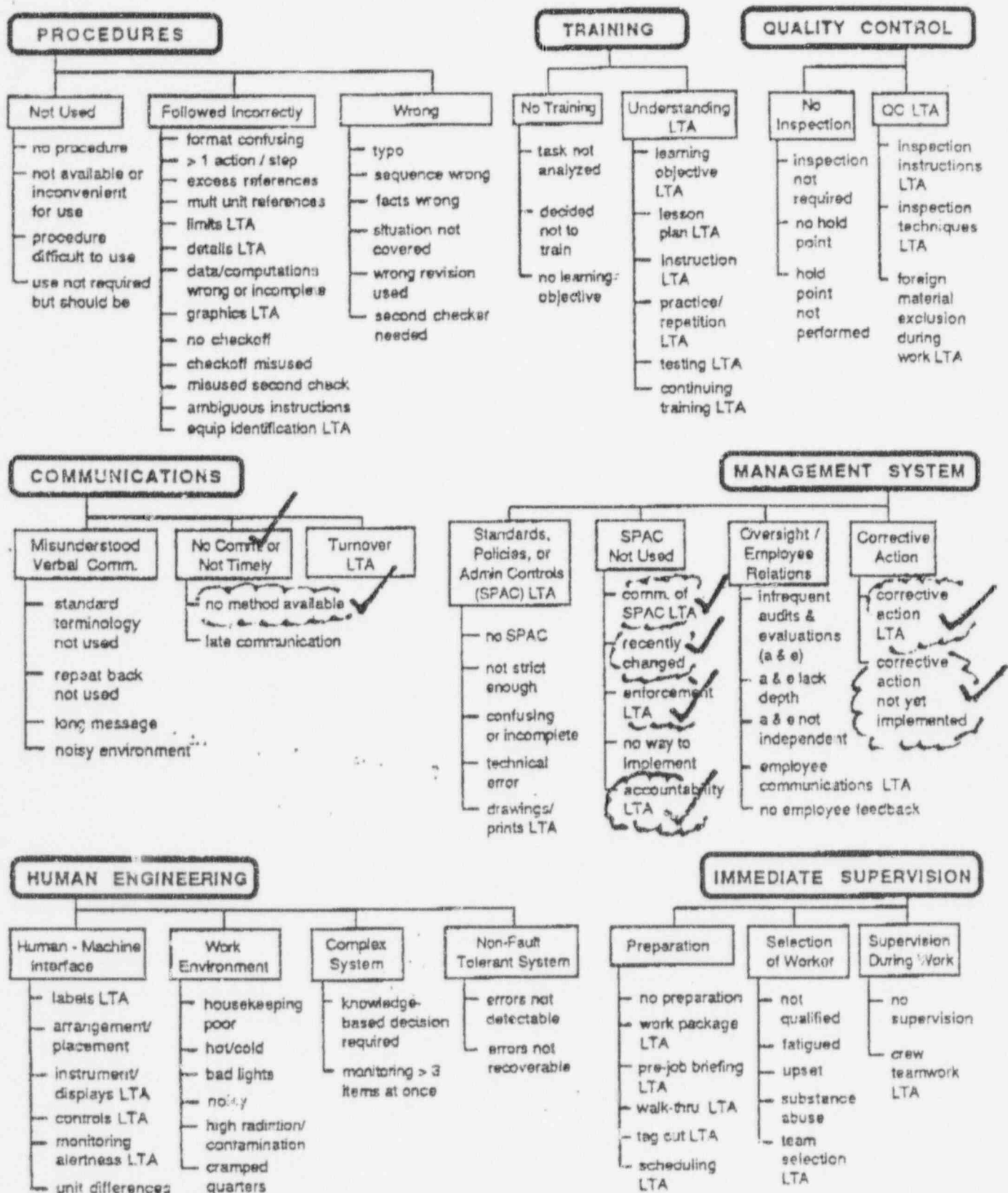
LTA = LESS THAN ADEQUATE

## GUIDE TO BASIC CAUSE CATEGORIES

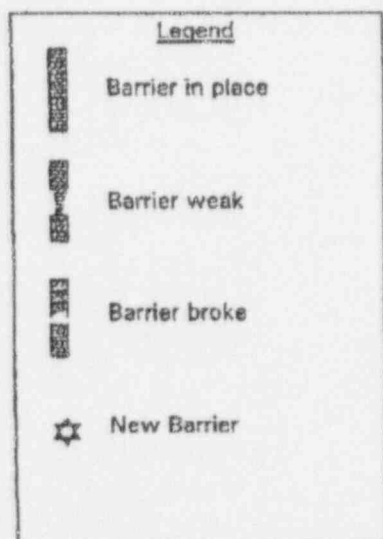
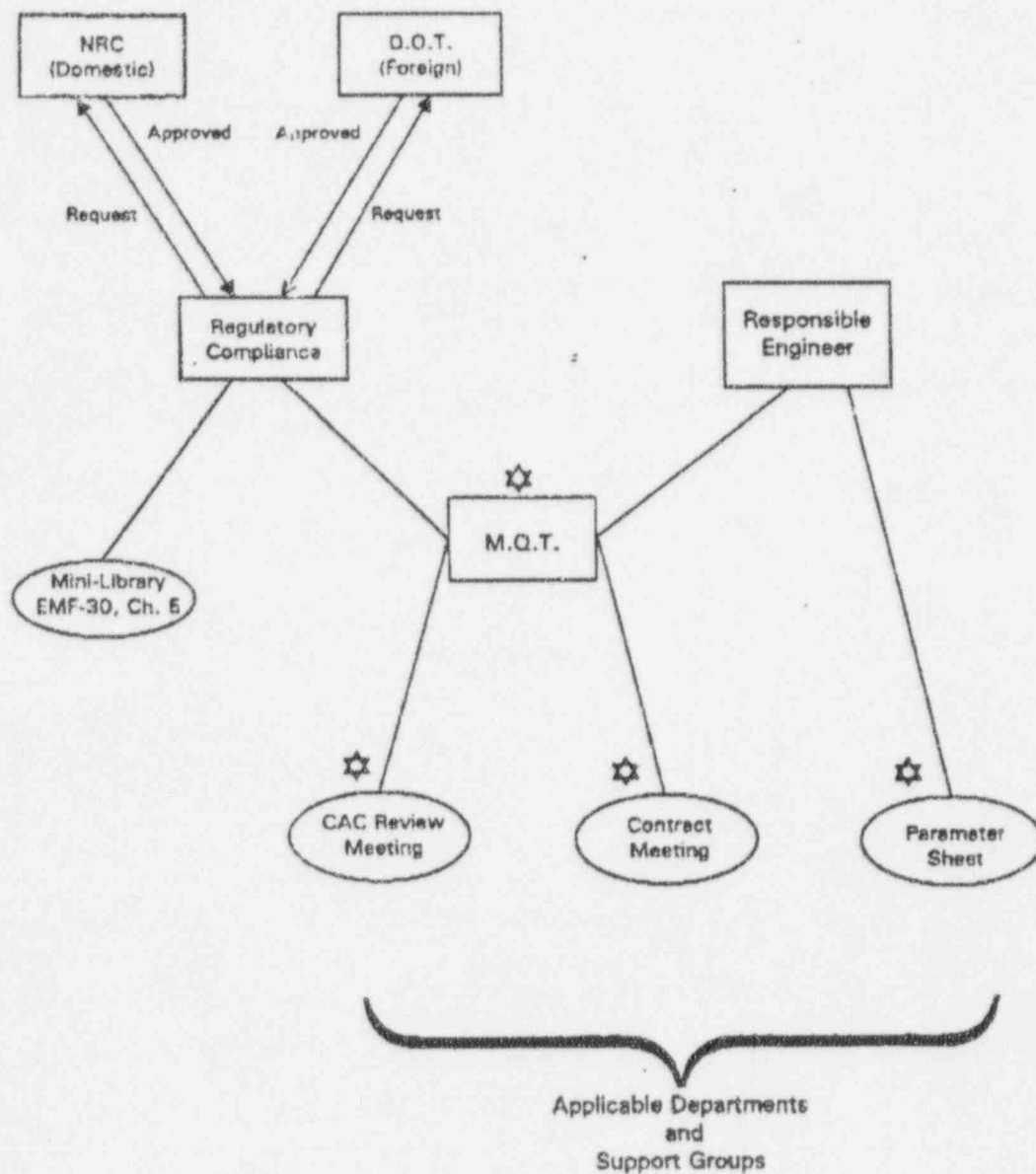
Directions:  
Answer all questions and then refer to the Basic Cause Categories on the back of this sheet to investigate the indicated potential root causes of the incident.



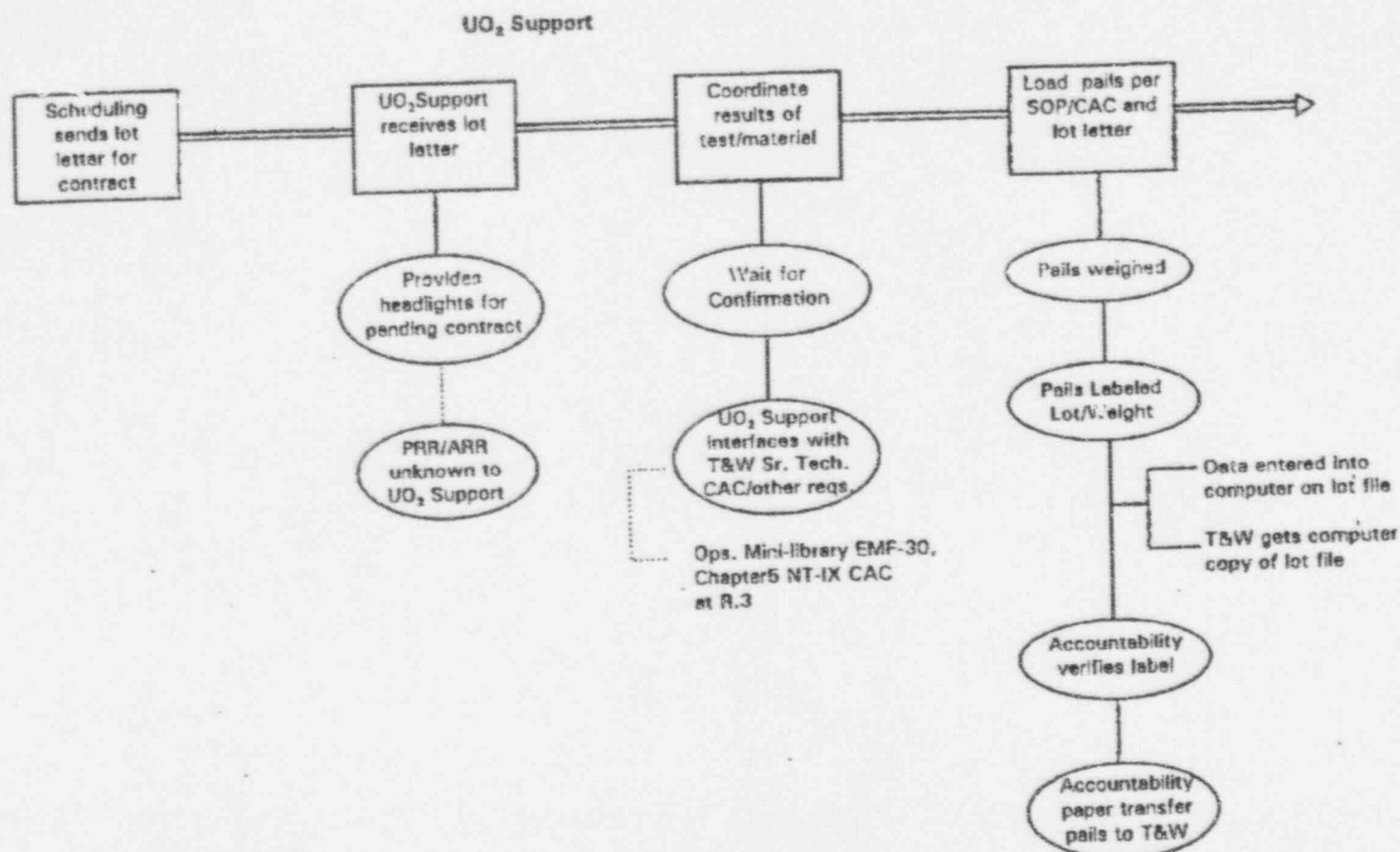
# BASIC CAUSE CATEGORIES







# Events for NFI Packaging



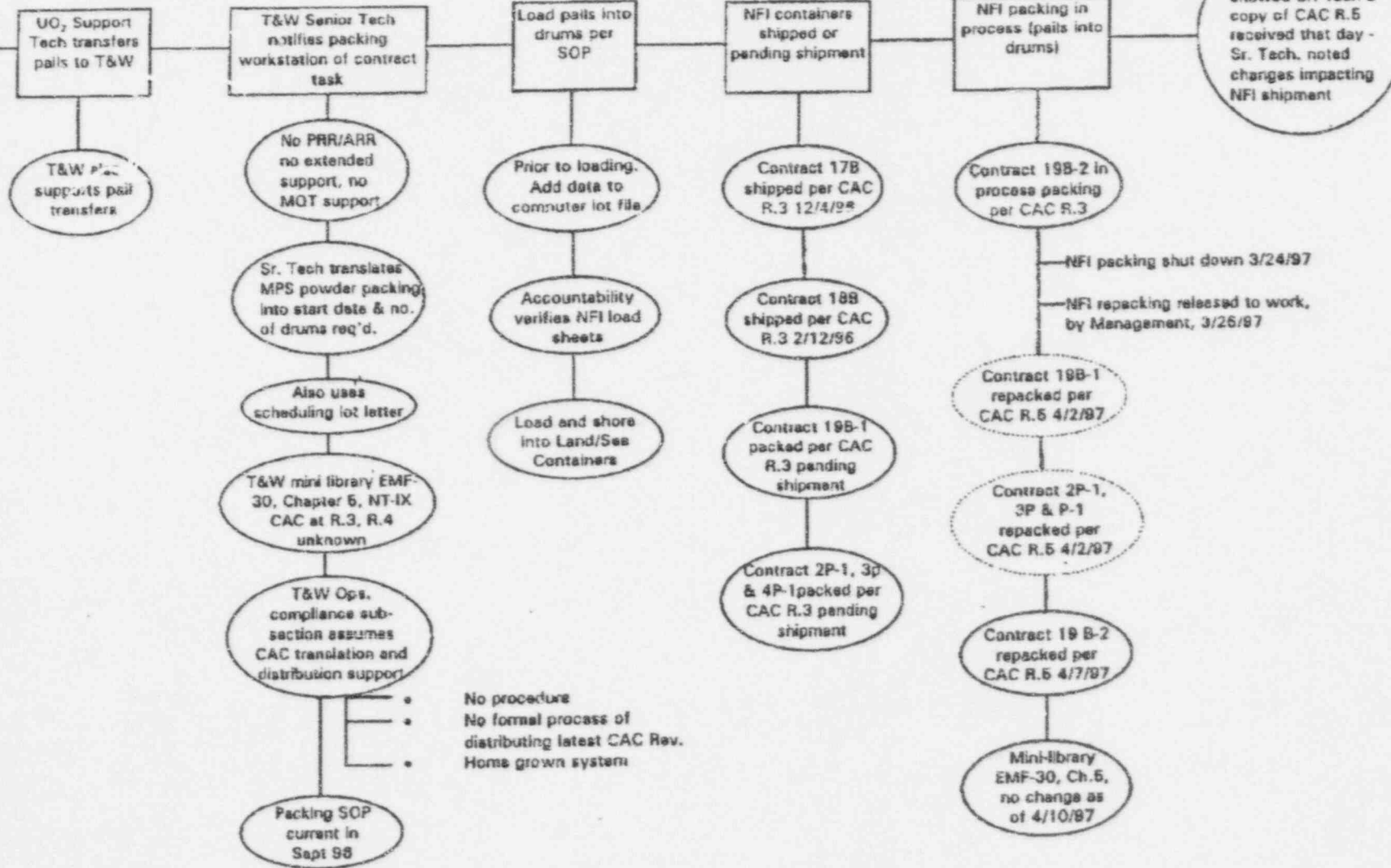
Traffic & Warehousing

Continued on Next Page

# Events for NFI Packaging (Cont.)

## Traffic & Warehousing

P. 16



TOTAL P. 16

APR-23-1997 16:01