ATTACHMENT 1. CAUSAL ANALYSIS TREE REV. 1



A1 Design / Engineering Problem

B1 DESIGN INPUT LTA

- C01 Design input cannot be met C02 Design input obsolete
- C03 Design input not correct
- C04 Necessary design input not available

B2 DESIGN OUTPUT LTA

- C01 Design output scope LTA
- C02 Design output not clear
- C03 Design output not correct
- C04 Inconsistent design output
- C05 Design input not addressed in design output
- C06 Drawing, specification, or
- C07 Error in equipment or material selection
- C08 Error not detectable
- C09 Errors not recoverable

B3 DESIGN/

DOCUMENTATION LTA

- C01 Design/ documentation not complete LTA
- C02 Design/ documentation not up-to-date
- C03 Design/ documentation not controlled

B4 DESIGN/ INSTALL ATION VERIFICATION LTA

- C01 Independent review of
- C02 Testing of design/installation
- C03 Independent inspection of design / installation LTA
- C04 Acceptance of design installation LTA

B5 OPERABILITY OF DESIGN/ ENVIRONMENT LTA

- C01 Ergonomics LTA C02 Physical environment LTA
- C03 Natural environment LTA

A2 Equipment / **Material Problem**

B1 CALIBRATION FOR INSTRUMENTS LTA

- C01 Calibration LTA C02 Equipment found outside
- B2 PERIODIC / CORRECTIVE MAINTENANCE LTA
- C01 Preventive maintenance for equipment LTA C02 Predictive maintenance
- C03 Corrective maintenance
- C04 Equipment history LTA

B3 INSPECTION / TESTING

- C01 Start-up testing LTA
- C02 Inspection / testing LTA C03 Post-maintenance / post modification testing LTA

B4 MATERIAL CONTROL

- C01 Material handling LTA
- C02 Material storage LTA C03 Material packaging LTA
- C04 Material shipping LTA
- C05 Shelf life exceeded C06 Unauthorized material substitution
- C07 Marking / labeling LTA

B5 PROCUREMENT CONTROL LTA

- C01 Control of changes to procurement specifications /
- purchase order LTA C02 Fabricated item did not meet requirements
- C03 Incorrect item received C04 Product acceptance requirements LTA

B6 DEFECTIVE, FAILED OR CONTAMINATED

- C01 Defective or failed part C02 Defective or failed material
- C03 Defective weld braze or soldering point
- C04 End of life failure C05 Electrical or instrument
- C06 Contamination

A3 Human Performance LTA

B1 SKILL BASED ERROR

- C01 Check of work was LTA C02 Step was omitted due to mental lapse
- C03 Incorrect performance due to mental lapse
- C04 Infrequently performed steps were performed incorrectly
- C05 Delay in time caused LTA actions
- C06 Wrong action selected based on similarity with other actions
- C07 Omission / repeating of steps due to assumptions for

B2 RULE BASED ERROR

- completion C01 Strong rule incorrectly chosen over other rules
 - C02 Signs to stop were ignored and step performed incorrectly C03 Too much activity was
 - occurring and error made in problem solving C04 Previous success in use of
 - rule reinforced continued use of rule
 - C05 Situation incorrectly identified or represented resulting in wrong rule used

B3 KNOWLEDGE BASED

- ERROR C01 Attention was given to
- wrong issues C02 LTA Conclusion based on sequencing of facts
- C03 Individual justified action by focusing on biased
- C04 LTA review based on assumption that process will
- not change C05 Incorrect assumption that a correlation existed between two or more facts
- C06 Individual underestimated the problem by using past event as basis

B4 WORK PRACTICES LTA

- C01 Individual's capability to perform work LTA [Examples include: Sensory/perceptual capabilities LTA. Motor/ physical capabilities LTA, and Attitude/ psychological profile
- C02 Deliberate violation

A4 Management Problem

B1 MANAGEMENT METHODS

- C01 Management policy guidance/ expectations not well-defined, understood or enforced
- C02 Job performance standards not adequately defined
- C03 Management direction created insufficient awareness of impact of actions on safety/ reliability
- C04 Management follow-up or monitoring of activities did not identify problems
- C05 Management assessment did not determine causes of previous event or known problem C06 Previous industry or in-house
- experience was not effectively used to prevent recurrence C07 Responsibility of personnel not
- well-defined or personnel not held accountable C08 Corrective action responses to a known or repetitive problem was
- untimely C09 Corrective actions for previously identified problem or event was not adequate to prevent

B2 RESOURCE MANAGEMENT

- C01 Too many administrative duties assigned to immediate supervisor
- C02 Insufficient supervisory resources to provide necessary supervision
- C03 Insufficient manpower to support identified goal/ objective
- C04 Resources not provided to assure adequate training was provided / maintained
- C05 Needed resource changes not approved / funded C06 Means not provided for assure
- procedures/ documents/ records were of adequate quality and up-
- C07 Means not provided for assuring adequate availability of appropriate materials / tools
- C08 Means not provided for assuring adequate equipment quality, reliability, or operability
- C09 Personnel selections did not assure match of worker motivations / job descriptions
- C10 Means / method not provided for assuring adequate quality of contract services

B3 WORK ORGANIZATION & PLANNING LTA

- C01 Insufficient time for worker to prepare task
- C02 Insufficient time allotted for task
- C03 Duties not well-distributed among personnel
- C04 Too few workers assigned to task C05 Insufficient number of trained or experienced workers assigned to task
- C06 Planning not coordinated with inputs from walk-downs/ task analysis
- C07 Job scoping did not identify potential task interruptions and/or environmental stress C08 Job scoping did not identify special circumstances and/or
- conditions C09 Work planning not coordinated with all departments
- C10 Problem performing repetitive tasks and/or subtasks

C11 Inadequate work package preparation B4 SUPERVISORY METHODS LTA

- C01 Tasks and individual accountability not made clear to worker
- C02 Progress/status of task not adequately tracked
- C03 Appropriate level of in-task supervision not determined
- C04 Direct supervisory involvement in task interfered with overview role
- C05 Emphasis on schedule exceeded emphasis on
- methods/doing a good job C06 Job performance and self-checking standards not properly unicated
- C07 Too many concurrent tasks assigned to worker
- C08 Frequent job or task "shuffling"
- C09 Assignment did not consider worker's need to use higher-
- C10 Assignment did not consider worker's previous task
- C11 Assignment did not consider worker's ingrained work patterns C12 Contact with personnel too infrequent to detect work
- habit/attitude changes C13 Provided feedback on negative performance but not on

B5 CHANGE MANAGEMENT LTA

positive performance

- C01 Problem identification did not identify need for change C02 Change not implemented in a timely manner
- C03 Inadequate vendor support of change
- C04 Risks/consequences associated with change not adequately reviewed/ assessed
- C05 System interactions not considered
- C06 Personnel/ department interactions not considered
- C07 Effects of change on schedules not adequately addressed C08 Change-related training/ retraining not performed or not
- C09 Change-related documents not developed or revised
- C10 Change-related equipment not developed or revised
- C11 Changes not adequately communicated C12 Change not identifiable during task
- C13 Accuracy/ effectiveness of change not verified or not

A5 Communication LTA

METHODS OF PRESENTATION

- C01 Format deficiencies
- C02 Improper referencing or branching
- C03 Checklist LTA C04 Deficiencies in user aids (charts,
- C05 Recent changes not made apparent to user
- C06 Instruction step/ information in wrong sequence C07 Unclear/ complex wording or

grammar B2 WRITTEN COMMUNICATION

- CONTENT LTA C01 Limit inaccuracies
- C02 Difficult to implement C03 Data/ computations wrong/
- incomplete
- C04 Equipment identification LTA C05 Ambiguous instructions
- requirements C06 Typographical error C07 Facts wrong/ requirements not
- correct C08 Incomplete/ situation not covered

C09 Wrong revision used B3 WRITTEN COMMUNICATION

- NOT USED C01 Lack of written communication
- C02 Not available or inconvenient to

B4 VERBAL COMMUNICATION

- C01 Communication between work groups LTA
- C02 Shift communications LTA
- C03 Correct terminology not used C04 Verification/ repeat back not used C05 Information sent but not
- understood C06 Suspected problems not
- communicated to supervision C07 No communication method

A6 Training Deficiency

B1 WRITTEN COMMUNICATIONS B1 NO TRAINING PROVIDED

- C01 Decision not to train
- C02 Training requirements not identified
- C03 Work incorrectly considered "skill of the craft"

B2 TRAINING METHODS LTA

- C01 Practice or hands-on experience
- LTA
- C02 Testing LTA C03 Refresher training LTA
- C04 Inadequate presentation B3 TRAINING MATERIAL LTA
- C01 Training objectives LTA
- C02 Inadequate content C03 Training on new work methods
- C04 Performance standards LTA

A7 Other Problem

B1 EXTERNAL PHENOMENA

- C01 Weather or ambient conditions LTA
- C02 Power failure or transient
- C03 External fire or explosion

C04 Other natural phenomena LTA B2 RADIOLOGICAL./

- HAZARDOUS MATERIAL PROBLEM C01 Legacy contamination
- C02 Source unknown B3 LEGACY

C01 Legacy issues that are not related to radiological or hazardous material B4 NO CAUSE IS APPLICABLE

C01 No cause is known for this event LISED ONLY FOR ORPS CODING

Level A nodes are underlined.

Level B nodes are in ALL CAPS. Level C nodes are in

"Sentence case." LTA - Less than adequate