KSC Critical Lift Determination

BACKGROUND

NASA-STD-8719.9, Standard for Lifting Devices and Equipment (LDE), mandates development of a process to identify critical lift operations and LDE. Refer to excerpt below:

"1.5.1 Critical lifts are lifts where failure/loss of control could result in loss of life, loss of or damage to flight hardware, or a lift involving special high dollar items, such as spacecraft, one-of-a-kind articles, or major facility components, whose loss would have serious programmatic or institutional impact. Critical lifts also include the lifting of personnel with a crane, lifts where personnel are required to work under a suspended load, and operations with special personnel and equipment safety concerns beyond normal lifting hazards. Personnel shall not be located under suspended or moving loads unless the operation adheres to the OSHA-approved NASA Alternate Standard for Suspended Load Operations (see Appendix A). Lifting of personnel with a crane shall be in accordance with 29 CFR 1926.550 (see Appendix C).

a. Each installation or program shall develop a process to identify critical lifting operations and lifting devices/equipment that must meet critical lift requirements. Input shall be gathered from facility, program, user, and assurance personnel. The results of the process shall be documented and approved, as a minimum, by the installation LDEM.

b. It is NASA policy that the comprehensive safeguards outlined in this standard be provided for critical lifting operations. This includes special design features, maintenance, inspection, and test intervals for the lifting devices/equipment used to make critical lifts.

c. Specific written procedures shall be prepared and followed for all critical lifts.

d. During critical lifts there shall be one person present (NASA or contractor) that is designated as responsible for the safety of the operations. That person may be a safety professional, a supervisor, an engineer, or a task leader."

Historically, nearly all critical lifts at KSC were identified and controlled per Operation and Maintenance Instructions (OMI). In the rare case a lift not controlled per OMI required assessment, the KSC Lifting Devices and Equipment Manager (LDEM) in conjunction with the affected Engineering, Safety and Mission Assurance, Program, and Operations organizations would determine the criticality of the lift and take appropriate steps to ensure compliance with NASA-STD-8719.9.

With the end of the Space Shuttle Program and the uncertainty of future Programs and operations, KSC has instituted a new process whereby operations may be assessed for classification as critical lifts. While future Programs retain the right to classify and control their own critical lifts in accordance with the requirements of NASA-STD-8719.9, the process contained in this document lays out an alternate framework which may be used to assess an operation, determine criticality of the lift, and document the results.

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GROUND RULES

1. This critical lift determination process is applicable only to NASA Operations (i.e. activities or processes under NASA direct control or including major NASA involvement) as defined in NASA-STD-8719.9. Construction of Facilities and other lifts not involving NASA Operations shall comply with 29 CFR and other requirements per contract.

2. In light of the current NASA-STD-8719.9 definition of the term "critical lift", and consistent with its intent, the KSC LDEM has proposed the following changes with accompanying rationale. These changes and new terms will be presented to the larger NASA LDE Committee during deliberations for the 2012 revision of NASA-STD-8719.9. For the purposes of this Critical Lift Determination Process, the following new terms and proposed changes shall be used with respect to the intent of current NASA-STD-8719.9 requirements. (Note: The term "flight hardware" in the current definition below implies "space flight hardware" and is not intended to drive critical lift requirements for lifts involving KSC aircraft.)

CURRENT NASA-STD-8719.9 DEFINTIONS

Critical Lift: A lift where failure/loss of control could result in loss of life, loss of or damage to flight hardware, or a lift involving special high dollar items, such as spacecraft, one-of-a-kind articles, or major facility components, whose loss would have serious programmatic or institutional impact. Critical lifts also include the lifting of personnel with a crane, lifts where personnel are required to work under a suspended load, and operations with special personnel and equipment safety concerns beyond normal lifting hazards.

Noncritical Lift: A lift involving routine lifting operations governed by standard industry rules and practices except as supplemented with unique NASA testing, operations, maintenance, inspection, and personnel licensing requirements contained in this standard.

PROPOSED CHANGES (with rationale)

Critical Lift (CL): Lifts where lifting devices and equipment (LDE) failure or loss of control could result in loss of life, or loss of / damage to Critical Hardware/Facility; additionally, all lifts of personnel with a crane or where personnel are required to work under a suspended load are considered critical lifts.

> Rationale for Change: Simplifies definition and removes ambiguity. Adds new term, Critical Hardware/Facility (defined below), in place of "whose loss would have serious programmatic or institutional impact," to more specifically address this concept.

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Noncritical Lift (NCL): Lifts of items other than Critical Hardware/Facility involving routine lifting operations governed by standard industry rules and practices.

Rationale for Change: Refers to new term Critical Hardware/Facility to enable Program Managers and Center Directors to accept some level of risk (see proposed Appendix to NASA-STD-8719.9 below). Removes unnecessary "except as supplemented…" verbiage.

PROPOSED NEW TERMS (with rationale)

Special Concerns Lift (SCL): Noncritical lifts where special safety concerns exist. Examples may include: load tests, planned engineered lifts; lifts using multiple cranes; lifts of explosives, pressurized vessels, or hazardous materials; lifts associated with demolition where the weight of the load is not known; lifts within a boom length of power lines; and lifts over occupied buildings, public roadways, etc.

Rationale for Change: Breaks out "special personnel and equipment safety concerns beyond normal lifting hazards" from old Critical Lift definition to enable enhanced safety for lifts without going full bore in the Critical Lift direction. SCL's require additional rigor in planning and execution (details TBD—lift plan, capacity reduction, structural analysis, spotters, etc.), but not necessarily all the requirements of a CL (e.g. "recognized safety hazard analysis", dual brakes, dual upper limit switches, etc.) This would enable NCL cranes to conduct operations with enhanced safety. Note: If we add this, we'll need to add specific requirements or recommendations for additional rigor to NASA-STD-8719.9.

Critical Hardware/Facility: Hardware or facility whose damage or loss would result in unacceptable programmatic or institutional impact as determined by the responsible authority.

Rationale for Change: Emphasizes Responsible Authority responsibility to determine extent of impact and accept certain risks.

Responsible Authority: Program Manager, Center Director, or their designees authorized to accept programmatic or institutional risk.

Rationale for Change: Defines Responsible Authority for risk acceptance.

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Critical Lift Determination Process

PARTICIPANTS

The assessment will be conducted by key members of the KSC LDE Committee including the KSC LDEM and representatives of the responsible Engineering, Safety and Mission Assurance, and Operations organizations. Other interested parties may participate as necessary.

PROCESS STEPS

1. Determine Critical Hardware/Facility Classification (see flowchart below).

    a. If the LDE Committee determines the loss of / damage to hardware or facility to be Negligible, Minor, or Catastrophic, document the lift in accordance with the requirements below. No Responsible Authority signature is required.

    b. Where loss of / damage to hardware or facility is determined to be Moderate or Severe, or where the LDE Committee has reason to elevate the issue to the Responsible Authority, the Critical Hardware/Facility Classification will include affected Program Manager and/or Center Director or their designees. Subsequent documentation shall include approval of the Responsible Authority.

2. Apply Critical Hardware/Facility Classification to Critical Lift Determination (see flowchart below).

3. Document the results of Critical Lift Determination Process using the format below.

4. KSC LDEM shall maintain copies of all critical lift determinations conducted using this process. (Note: Critical lifts identified and controlled by Programs shall be documented using Program-specific information systems.)

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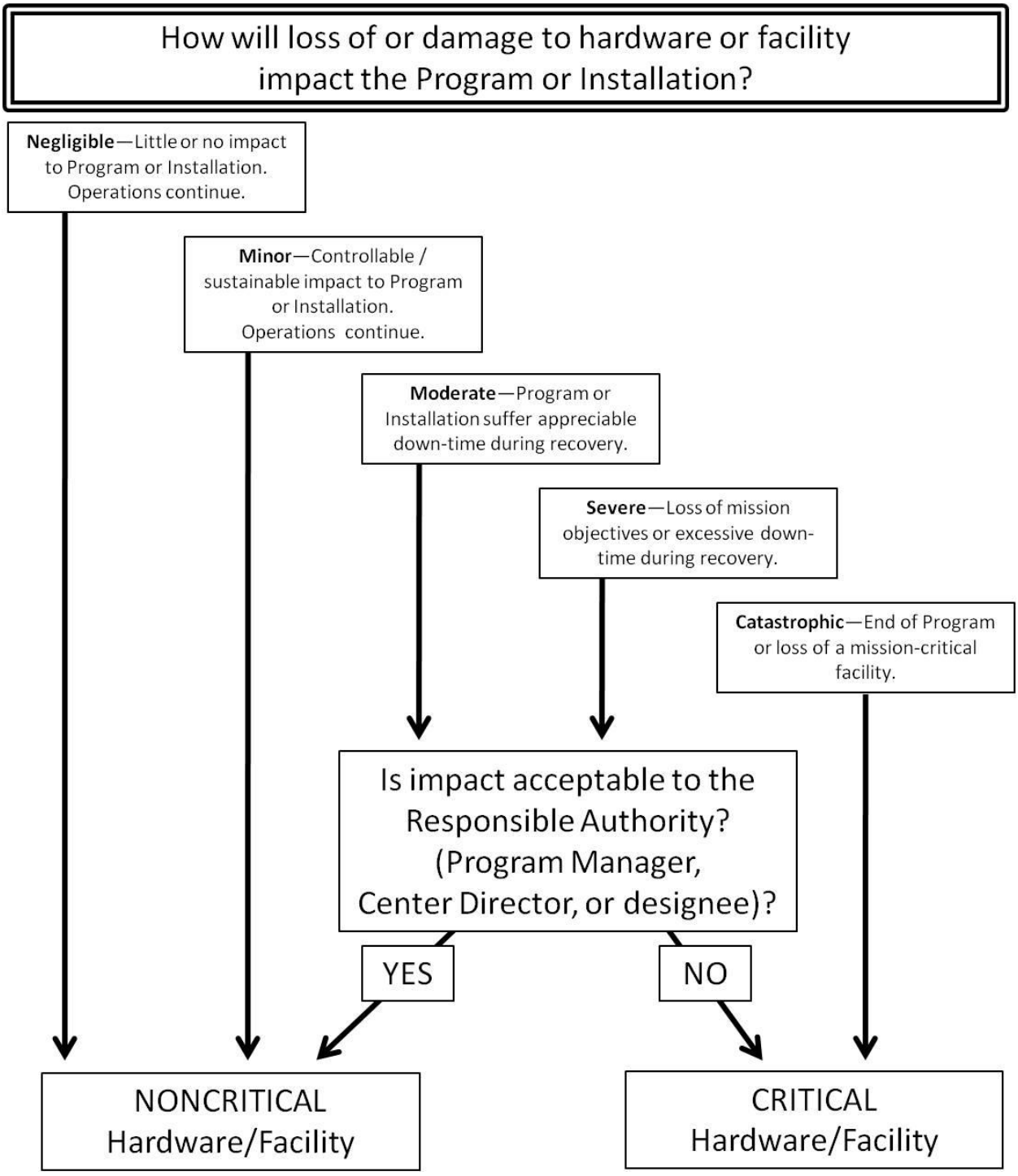
Critical Hardware/Facility Classification



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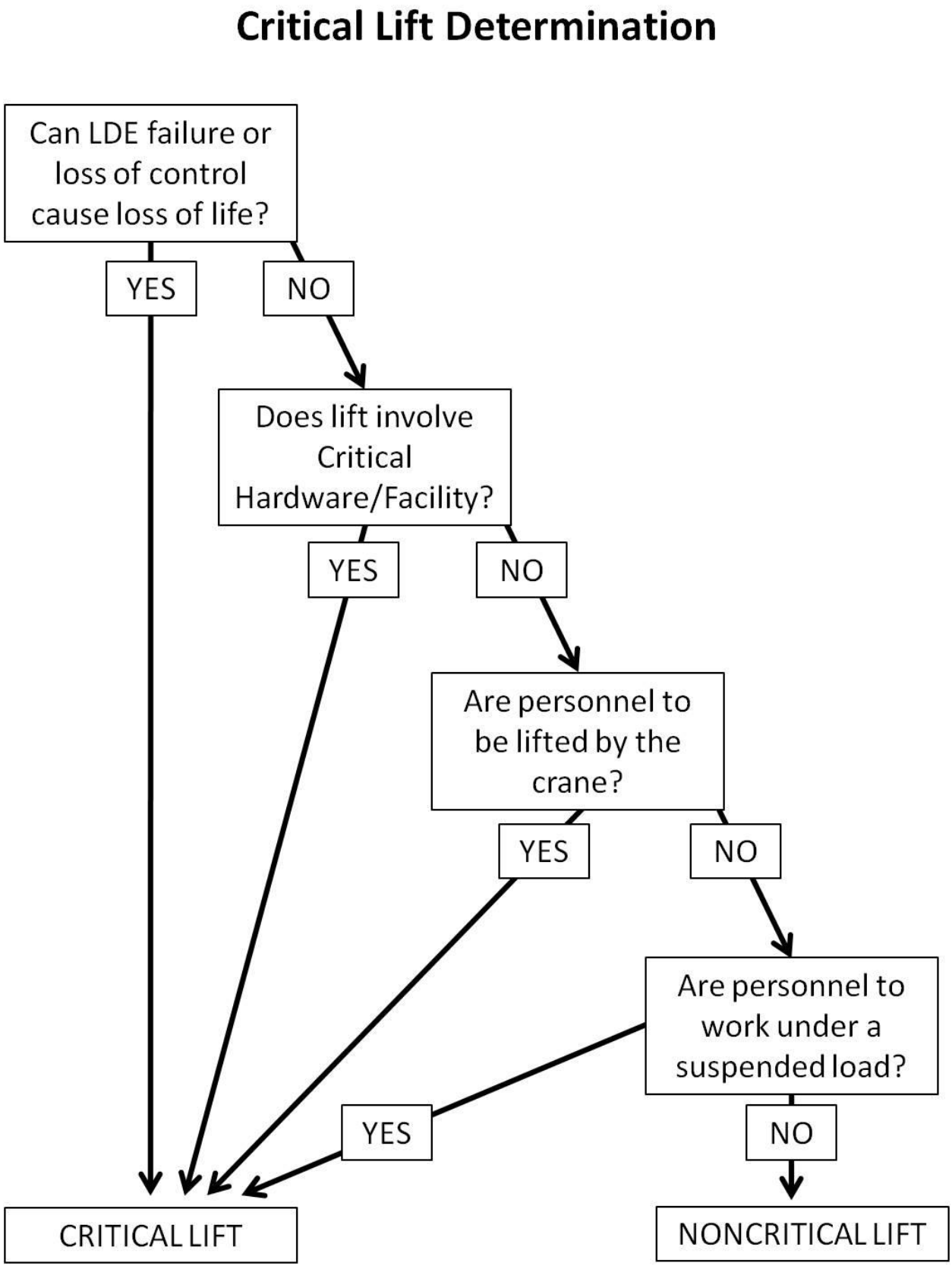

KSC Critical Lift Determination

Critical Lift Determination Document

ID #: KSC-CLDD-xxxx (contact KSC LDEM for number assingment)

1. **Describe the operation.**
2. **Document answers to the following questions:**
    a. **Can Lifting Devices and Equipment (LDE) failure or loss of control cause loss of life?** (If Yes, then Critical Lift.)
    b. **Does lift involve Critical Hardware/Facility?** (If Yes, then Critical Lift.)
        i. **Describe hardware or facility at risk:**
        ii. **Identify Responsible Authority and designee if applicable:**
        iii. **Describe how loss of or damage to hardware or facility affects / impacts the Responsible Authority's Program or Installation**? (If Catastrophic, then Critical Lift.)
        iv. **If not Catastrophic, is impact acceptable to the responsible authority—Program Manager, Center Director, or designee?** (If Unacceptable, then Critical Lift.)
    c. **Are personnel to be lifted by the crane?** (If Yes, then Critical Lift.)
    d. **Are personnel to work under a suspended load?** (If Yes, then Critical Lift.)
3. **Dissenting Opinion(s):**
4. **Signatories:**
    a. **Responsible Authority** (Program Manager, Center Director, or designee)
    b. **Responsible Engineering Organization Representative**
    c. **Responsible Operations Organization Representative**
    d. **Center Safety and Mission Assurance Representative**
    e. **Center Lifting Devices and Equipment Manager**
    f. **Others as necessary**

See http://ksc-lde.ndc.nasa.gov/ for additional information and references.

Contact KSC LDEM for Assistance.

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