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ES43

MSFC TECHNICAL STANDARD

MSFC ELECTRICAL, ELECTRONIC, AND ELECTROMECHANICAL (EEE) PARTS OBSOLESCENCE MANAGEMENT AND CONTROL REQUIREMENTS

Approved for Public Release; Distribution is Unlimited

DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
Baseline		11/13/2012	Baseline Release; document authorized through MPDMS.

FOREWORD

This parts obsolescence control standard establishes requirements, guidelines and practices to mitigate the risk of electrical, electronic, and electromechanical (EEE) parts obsolescence impacts to Marshall Space Flight Center (MSFC) space flight and critical ground support equipment (GSE). This standard, along with MSFC-STD-3620 and MSFC-STD-3619, may be used to satisfy the control of parts obsolescence of Requirement 59092 of NPD 8730.2, NASA Parts Policy.

This document also standardizes requirements related to parts and supplier management, EEE parts selection, and procedures to follow if obsolete EEE parts are identified. The requirements of this document will be flowed down to the MSFC suppliers of military, military off-the-shelf (MOTS) and commercial off-the-shelf (COTS) EEE piece parts.

Questions concerning the application of this requirements document can be forwarded to the Office of Primary Responsibility (OPR), the MSFC EEE Parts Engineering Organization.

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1.0 SCOPE

The scope is to establish a parts obsolescence control document for use by MSFC programs and projects as a method of meeting Requirement 59092 of NPD 8730.2.

This document implements the requirements of NPD 8730.2 and MSFC-STD-3012 for parts obsolescence based on the guidelines of the Department of Defense SD-22, Diminishing Manufacturing Sources and Material Shortages (DMSMS) Guidebook.

The document standardizes practices to:

a. Establish a proactive approach to obsolescence management.

b. Forecast and monitor MSFC projects for EEE parts obsolescence risk.

c. Identify obsolescence risk mitigation strategies.

d. Report obsolescence impacts to MSFC projects.

1.1 Applicability

This document applies to flight hardware, critical ground support equipment (GSE), and critical ground test systems used in Category 1 and Category 2 projects as defined by NPR 7120.5, NASA Space Flight Program and Project Management Requirements, and/or Class A, B, or C payloads as defined in Appendix A of NPR 8705.4, Risk Classification for NASA Payloads. This document outlines procedures to be employed for risk assessment actions to mitigate EEE parts obsolescence impacts to MSFC projects.

Some flight projects have short product life cycles and are not exposed to high risk of parts obsolescence impact. However, EEE parts should be evaluated for availability issues to ensure life expectancy exceeds system design and production milestones. This process guarantees selected parts are available beyond initial system design and procurable for production. Performing a parts obsolescence assessment reduces cost, schedule and technical risk to hardware production of these flight projects.

Projects with extended product life cycles and those that plan to utilize heritage hardware are exposed to high risk of parts obsolescence impact. To mitigate this risk, EEE parts will be assessed prior to selection to ensure part availability meets or exceeds production milestones and mission duration. In addition, parts will be monitored throughout the system life cycle to identify and mitigate obsolescence issues before they occur. In the event a system is retained in service beyond its original life expectancy, spare parts will be required for repairs and maintenance operations. Obsolescence monitoring provides notification of part discontinuance to allow projects sufficient time for procurement of spares.

2.0 APPLICABLE DOCUMENTS

2.1 General

The following standards form a part of this document to the extent specified herein.

MSFC-STD-3012	Electrical, Electronic, and Electromechanical (EEE) Parts Management and Control Requirements for MSFC Space Flight Hardware
MSFC-STD-3619	MSFC Counterfeit Electrical, Electronic, and Electromechanical Parts Avoidance, Detection, Mitigation, and Disposition Requirements for Space Flight and Critical Ground Support Hardware
NPD 8730.2	NASA Parts Policy
NPR 7120.5	NASA Space Flight Program and Project Management Requirements
NPR 8705.4	Risk Classification for NASA Payloads
SD-22	Diminishing Manufacturing Sources and Material Shortages: A Guidebook of Best Practices for Implementing a Robust DMSMS Management Program

3.0 DEFINITIONS AND ACRONYMS

3.1 Definitions

Analysis of Alternatives	An analytical comparison of the operational effectiveness, cost, and risks associated with proposed solutions to EEE parts obsolescence issues.
Bridge Buy	Early procurement of EEE part requirements for a specific contract or timeframe.
Commercial	A classification for an assembly, part, or design for which the item manufacturer or vendor establishes performance and quality standards pursuant to market forces rather than by enforceable compliance to a government or MSFC approved industry standard.
Diminishing Manufacturing Sources and Material Shortages	The loss or impending loss of manufacturing or production sources or suppliers of components, end-items, and/or raw materials.
End-of-Life	Indication that a manufacturer will no longer produce or support a particular product after a specified discontinuance date.

Franchised Distributor	A source authorized by the original component manufacturer to distribute its parts.
Lifetime Buy	Early procurement of EEE part requirements to sustain the life of a system.
Military-off-the-Shelf	An off-the-shelf product that is developed or customized by a commercial vendor to respond to specific military requirements.
Obsolete Part	A part that is no longer produced or available from the Original Equipment Manufacturer.
Product Discontinuance Notice	Advanced notification from the Original Component Manufacturer (OCM) that a part has a planned end of production and procurement date.

3.2 Acronyms

AoA	Analysis of Alternatives
CDR	Critical Design Review
COTS	Commercial-off-the-Shelf
DMSMS	Diminishing Manufacturing Sources and Material Shortages
EEE	Electrical, Electronic, and Electromechanical
EOL	End-Of-Life
GSE	Ground Support Equipment
MOTS	Military-off-the-Shelf
MPDMS	Multiprogram Document Management System
MSFC	Marshall Space Flight Center
NASA	National Aeronautics and Space Administration
NPD	NASA Policy Directive
NPR	NASA Procedural Requirements
OCM	Original Component Manufacturer
OPR	Office of Primary Responsibility
PDN	Product Discontinuance Notice
PDR	Preliminary Design Review

4.0 GENERAL REQUIREMENTS

The requirements herein apply to the part types listed in Table I. Part types flagged with an asterisk represent commodities with an increased risk of product obsolescence. These parts have reduced procurement life cycles due to technology complexity and limited manufacturing sources. As a result, the flagged parts have a higher recognition rate by obsolescence analysis tools and receive continuous monitoring for product discontinuance. The remaining EEE part types not marked with an asterisk typically require manual research to determine part availability.

TABLE I. EEE Part Types

Part Types	Federal Stock Classes	Part Types	Federal Stock Classes
Capacitors	5910	Inductors	5950
Circuit Breakers	5925	Hybrid microcircuits*	5962
Connectors	5935	Magnetics	5950
Crystal Oscillators*	5955	Monolithic Microcircuits*	5962
Diodes*	5961	Relays	5945
Fiber Optic Accessories	6070	Resistors	5905
Fiber Optic Cables	6015	Switches	5930
Fiber Optic Conductors	6010	Thermistors	5905
Fiber Optic Devices	6030	Thyristors	5961
Fiber Optic Interconnects	6060	Transformers	5950
Filters	5915	Transistors*	5961
Fuses	5920	Wire and Cable	6145

* EEE part types with an increased risk of product obsolescence.

4.1 Obsolescence Management

MSFC and its contractors shall have a system in place to address the identification, prediction, and control of EEE parts obsolescence. Figure 1 describes a proactive obsolescence management process flow from initial obsolescence analysis and identification to resolution and implementation.

4.2 Obsolescence Management Team

Development of an obsolescence management structure is one of the primary foundations for a cost-effective, proactive obsolescence program. An obsolescence management team shall be formed to identify, track and provide resolution to DMSMS issues across MSFC projects. The team shall be comprised of personnel with knowledge and sufficient experience to comprehend the procedures, processes, and controls outlined within this document. Membership should include, but not limited to, EEE Parts Engineering, Design Engineering, and Project Management. Specific roles and responsibilities are further defined herein and in Appendix B.

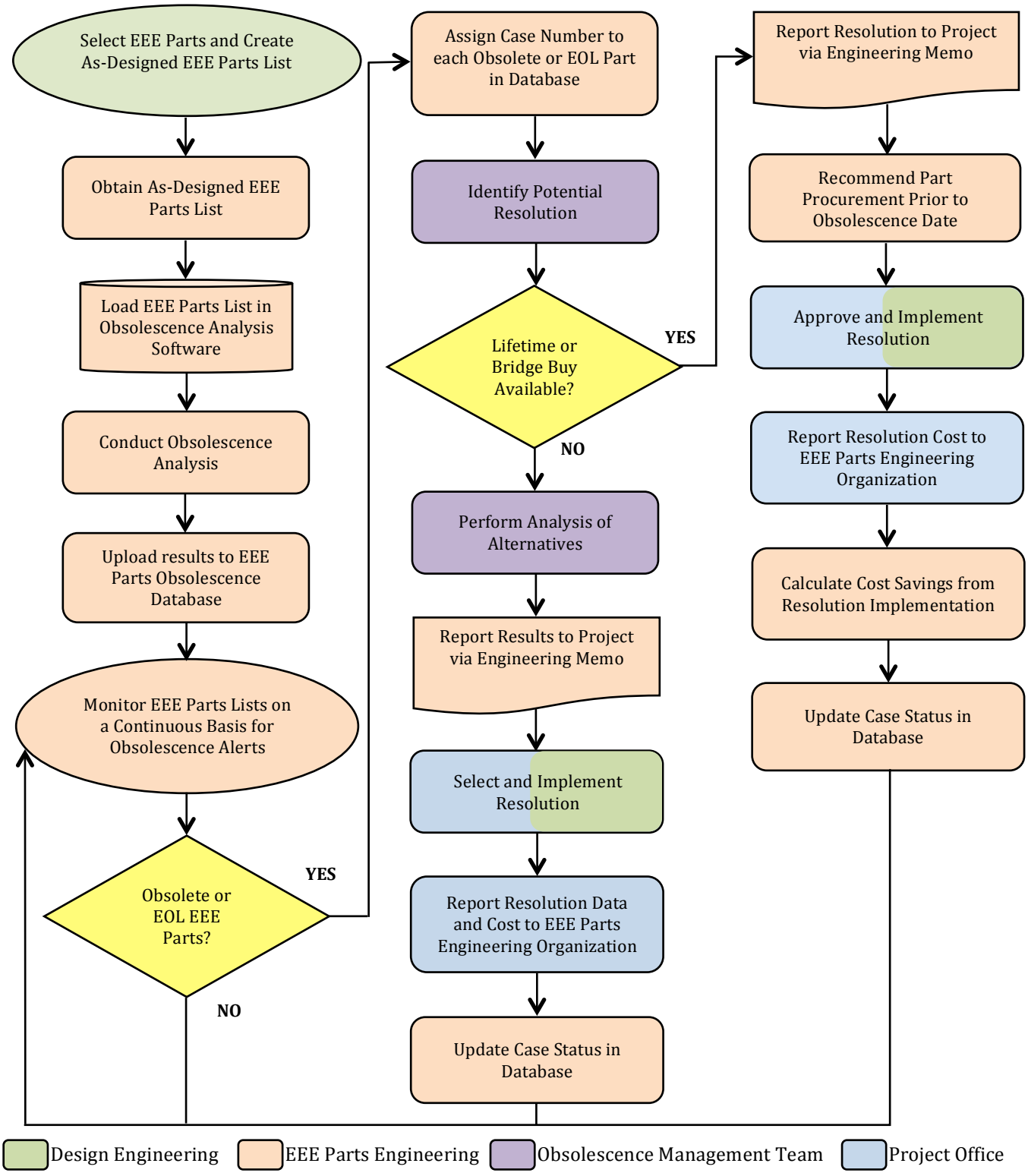

Figure I. EEE Parts Obsolescence Management Process

4.3 Obsolescence Analysis Process

4.3.1 Proactive Approach

Proactive obsolescence management activities ensure obsolete or limited-life EEE parts are not selected for system design and allow projects to eliminate part availability issues from MSFC hardware. Program implementation shall occur at system inception and design to ensure EEE parts are selected to meet mission lifetime requirements. This process includes continuous monitoring for EEE parts availability issues to identify product discontinuance dates. Forecasting techniques generated from obsolescence analysis tools are utilized to predict EEE part availability and estimate end of production dates. This proactive approach enables project planned technology upgrades versus forced redesigns due to obsolescence. Proactive obsolescence management activities result in increased system life cycle sustainment (if applicable) and decreased system life cycle costs.

4.3.1.1 EEE Part Selection

EEE Parts will be selected in accordance with the project approved EEE parts requirements document and shall be analyzed per the requirements herein to determine EEE part availability and manufacturing status. Obsolete and limited-life EEE parts shall not be selected for hardware design unless approved by the project. Part procurement requirements and production milestones should be considered when selecting EEE parts. EEE Part availability should coincide with project life cycle requirements to avoid obsolescence impacts. Project As-Designed EEE Parts Lists shall be analyzed prior to Preliminary Design Review (PDR) and Critical Design Review (CDR) to screen for potential obsolescence issues. This process ensures obsolescence is not incorporated into hardware design and eliminates DMSMS risk to system production.

4.3.1.2 Obsolescence Risk Assessment

As-Designed EEE Parts Lists are required to perform obsolescence analysis and shall be provided to the obsolescence management team by project management. The parts lists shall be monitored via obsolescence analysis tools to identify known obsolete EEE parts, total sources of supply, and forecast future part availability issues. Obsolescence analysis shall require risk assessment procedures described in Appendix A.

4.4 Mitigation

Resolution of obsolete EEE parts shall require mitigation procedures described in Appendix B.

4.5 Reporting

The obsolescence management team shall provide a formal obsolescence report to project management. The report will include an analysis of current and projected EEE part availability issues, identification of impacted hardware, and resolution recommendations.

4.5.1 Frequency

Reports will be submitted on a quarterly or as-needed basis. Quarterly submittals will reflect project-specific obsolescence impacts for a given period. In the event an obsolescence alert for EEE part discontinuance occurs, MSFC EEE Parts Engineering will notify the project of part procurement, cost and last buy date.

4.6 In-House Obsolescence Database

MSFC EEE parts lists for in-house projects and associated obsolescence data are stored in an internal EEE parts obsolescence database. The database serves as the central repository for obsolescence identification and case tracking. The obsolescence management team shall maintain and update the database to ensure current status is reflected.

4.7 Counterfeit Parts Avoidance

Counterfeit parts avoidance shall be in accordance with the counterfeit parts avoidance requirements of MSFC-STD-3012 and MSFC-STD-3619.

APPENDIX A

Obsolescence Risk Assessment Procedure

Appendix A

Obsolescence Risk Assessment Procedure

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A.1.0 PURPOSE

The purpose of this appendix is to establish an obsolescence risk assessment procedure for use by MSFC projects. This procedure will address identification and analysis of obsolescence issues as they relate to EEE parts used on MSFC hardware.

A.2.0 PART AVAILABILITY STATUS

A.2.1 Manufacturing Status

A manufacturing status color code will be assigned to each EEE part to denote the number of current, active manufacturing sources. Table A.I lists each EEE part manufacturing status and associated definition.

TABLE A.I. EEE Part Manufacturing Status

EEE Part Manufacturing Status	Definition
Obsolete (Red)	No production sources are available.
End-of-Life (Orange)	The manufacturer issued a part discontinuance notice.
Sole Source (Yellow)	Only one production source is available.
Two or More Sources (Green)	Two or more production sources are available.
Unknown (White)	EEE Part availability not recognized by tools and requires manual research.

A.2.2 Projected Availability

Each EEE part will be assigned projected years of availability and an estimated obsolescence date. This forecasting technique, as seen in Table A.II., allows projects to prepare and plan for EEE part obsolescence issues that may occur throughout the system life cycle.

TABLE A.II. EEE Part Availability Projections

Projected Years of Availability	Obsolescence Date
Obsolete	Current Date
1-2 years	Current Date + 1 Year
3-4 years	Current Date + 3 Years
5-7 years	Current Date + 5 Years
8-10 years	Current Date + 9 Years
11-15 years	Current Date + 13 Years
16-18 years	Current Date + 17 Years

A.2.3 Tools

Obsolescence analysis tools shall be utilized to generate EEE part manufacturing status and part availability projections referenced herein. EEE Parts Lists are monitored on a continuous basis by obsolescence software applications for product discontinuance notification. In the event multiple tools are utilized, obsolescence analysis results should be consolidated to generate a single, accurate obsolescence status.

A.2.3.1 Obsolescence Alert Monitoring

EEE parts shall be monitored on a continuous basis for manufacturer product discontinuance notification (PDN). EEE part manufacturers announce a product as end-of-life (EOL) to notify consumers of the last buy date for part procurements. Notification is typically provided one year in advance of the actual obsolescence date. Advanced notification allows the project ample time to plan for product obsolescence and budget for part procurement. Obsolescence analysis tools provide direct notification from the manufacturers to announce EOL EEE parts. In the event product discontinuance impacts MSFC projects, an auto-generated email will be issued to the obsolescence management team with notification of last-buy date, alternate part options and reason for product obsolescence.

APPENDIX B

Obsolescence Mitigation Procedure

Appendix B

Obsolescence Mitigation Procedure

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B.1.0 PURPOSE

The purpose of this appendix is to provide mitigation strategies for EEE parts obsolescence impacts to MSFC hardware. Selection and implementation of appropriate obsolescence mitigations are crucial to system life cycle management and ensure cost-effective engineering practices are in place. The mitigation strategies specified herein are categorized as either proactive or reactive approaches to obsolescence management.

B.2.0 PROACTIVE APPROACH

Proactive identification of obsolete EEE parts typically results in inexpensive, low-risk resolutions with minimal impact to project cost, schedule and technical risk. Continuous monitoring of part availability and advanced notification of product discontinuance allow for proper DMSMS planning and early part procurement. Proactive mitigation of an EOL part results in procurement prior to the last buy date and is the most cost-effective DMSMS resolution. Project management shall determine if early part procurement is feasible for project requirements and mission duration. If procurement is not an option, the guidelines specified in section B.3 provide reactive measures for obsolescence mitigation.

B.2.1 Part Procurement

When product discontinuance occurs, the obsolescence management team shall provide notification in writing to the project. The report will include last buy date for procurement, part cost, production lead-time, and minimum buy requirements. EEE parts shall be procured only from the OCM or their franchised (authorized) distributors in accordance with MSFC-STD-3012 Procurement Sources. If parts cannot be procured from authorized sources, then the risk of counterfeit parts shall be avoided by complying with the requirements of MSFC-STD-3012 and MSFC-STD-3619.

B.2.1.1 Lifetime Buy and Bridge Buy

Early part procurement, also known as a Lifetime Buy or Bridge Buy, entails procurement of sufficient part quantities to sustain current and/or future production requirements. A Lifetime Buy refers to procurement of sufficient quantities to sustain the life of the program, while a Bridge Buy satisfies part requirements for a specific contract or timeframe. The project shall determine the quantity required to sustain the project and comply with the part availability requirements in MSFC-STD-3012 Parts Availability.

B.2.2 Planned Technology Refresh

Proactive resolution of EOL EEE parts reduces the risk of costly, unplanned redesigns of MSFC hardware. Continuous monitoring of EEE part availability allows the project to plan for technology insertion and redesign. The project should consider timeframe for planned upgrades when selecting an obsolescence resolution. DMSMS issues that occur in conjunction with or near a scheduled system upgrade provide optimal timing for technology refresh and mitigation of obsolescence. Identification of known obsolescence and projection of future obsolescence issues are used to prioritize assembly-level refresh cycles. System life cycle, parts sparing

requirements, and project budget allocations should be considered for obsolescence resolution and technology insertion.

B.3.0 REACTIVE APPROACH

A reactive approach to obsolescence mitigation involves the resolution of discontinued parts after they are no longer procurable or available in the supply chain. Reactive measures occur as a result of unexpected or pre-existing obsolescence events.

B.3.1 Analysis of Alternatives (AoA)

If unexpected obsolescence occurs without warning and the project is unable to prepare for DMSMS impacts, an AoA shall be performed by the obsolescence management team to identify potential obsolescence resolutions. This approach assumes no authorized sources of supply for the original, obsolete part are available and part procurement (Lifetime Buy or Bridge Buy) is not an option. Reactive measures to obsolescence are not optimal for system life cycle management and result in increased cost, schedule and technical risk to the project.

B.3.1.1 Resolution Factors

The obsolescence management team will perform an AoA utilizing the mitigation factors specified in Table B.I. The resolutions stated herein include, but are not limited to, the most common approaches for reactive mitigation of an obsolescence issue. Each activity should be considered as a potential resolution and evaluated against project planning and production milestones.

TABLE B.I. Reactive Obsolescence Mitigations

Resolution	Description
Existing Inventory	Utilize existing and in-house inventories.
Form, Fit, Function Alternate Part	Alternate part maintains compatible package type, mounting and function as original part.
Functional Alternate Part	Alternate part maintains same function as original part, but may require a circuit or mounting change.
Equivalent Alternate Part	Alternate part maintains similar attributes as the original part.
New Manufacturing Source	Identification of a new, approved source of supply for the original obsolete part.
Redesign or Technology Refresh	Design-out obsolescence items via engineering changes at system indenture levels, with the goals of enhancing system performance and improving reliability and maintainability.

B.3.1.2 Mitigation Risk Factors

The obsolescence management team shall evaluate each potential resolution for cost, schedule, and technical risk. Table B.II. provides typical risk levels associated with obsolescence resolutions defined in Table B.I. Risk levels may vary depending on system life cycle phase, project requirements and mission duration. Resolution risk factors will be incorporated with the AoA and reported to the project per the requirements of section 4.5 herein.

TABLE B.II. Obsolescence Mitigation Risk Matrix

Resolution	Risk		
	Cost	Schedule	Technical
Existing Inventory	Low	Low	Low
Form, Fit, Function Alternate Part	Low	Low	Low
Functional Alternate Part	Low	Medium	Medium
Equivalent Alternate Part	Low	Medium	Medium
New Manufacturing Source	High	High	Medium
Redesign or Technology Refresh	High	High	High

B.4.0 MITIGATION SELECTION AND IMPLEMENTATION

B.4.1 Selection

Project Management shall select obsolescence mitigations in accordance with project life cycle requirements and mission duration. Results of the AoA and resolution risk matrix should be used as guidance for mitigation selection.

B.4.2 Implementation

MSFC Project Management shall implement the selected mitigation and report resolution details to the obsolescence management team. Obsolescence mitigations shall be stored and tracked in an internal EEE parts obsolescence database.

B.5.0 OBSOLESCENCE CASE TRACKING

Each obsolete and EOL EEE part will be assigned a case number to report results of the AoA and track resolution implementation. A status of open, pending or closed will be assigned to each case to reflect current resolution state. Case status will be reported in a formal obsolescence report and tracked in an internal EEE parts obsolescence database. Table B.III. defines resolution criteria for each case status.

TABLE B.III. Case Status Definitions

Case Status	Definition
Open	Obsolescence issue identified with no proposed resolution in place.
Pending	Proposed resolution in place pending project approval and solution implementation.
Closed	Obsolescence resolution activity complete.

B.6.0 MITIGATION COSTS

B.6.1 Proactive Approach

Cost of resolution implementation (Lifetime Buy or Bridge Buy) will be documented to track program life cycle cost savings. The total cost of part procurement shall be provided by the project to the obsolescence management team. Cost savings will be reported upon resolution implementation and stored in an internal EEE parts obsolescence database.

B.6.2 Reactive Approach

Reactive obsolescence resolutions typically result in increased program costs. Costs incurred for resolution implementation will be documented and tracked in an internal EEE parts obsolescence database. Documentation of resolution costs may be utilized as a "lessons learned" for future obsolescence mitigation decisions and shared by MSFC projects.

B.7.0 REPORTING

The obsolescence management team will provide a formal obsolescence report in accordance with section 4.5 herein to document mitigations, obsolescence case status and program cost savings.