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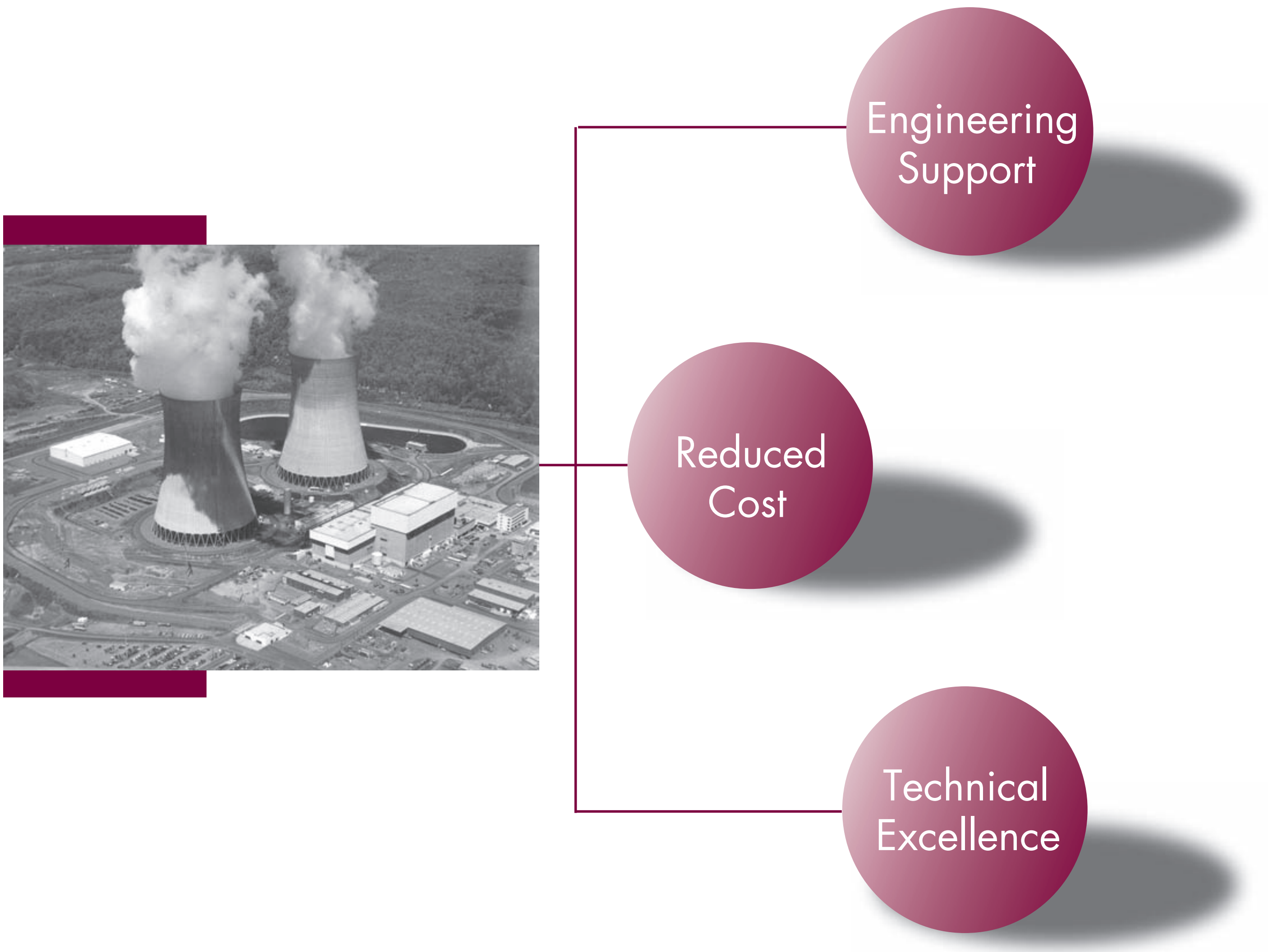
Plant Support Engineering: Obsolescence Management

Program Ownership and Development



Plant Support Engineering: Obsolescence Management

Program Ownership and Development

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Final Report, November 2008

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PRODUCT DESCRIPTION

This report describes the results of research conducted as part of EPRI Plant Support Engineering's Obsolescence Initiative. The objective of the initiative is to develop methodologies that can be used to minimize the impact that obsolescence has on plant production and cost. This report builds upon the concepts discussed in EPRI product 1015391, *Plant Support Engineering: Obsolescence Management – A Proactive Approach*, the technical update published by Plant Support Engineering in November 2007.

This report discusses plant organizations that should be involved in a comprehensive obsolescence management program, and the role(s) each organization plays in ensuring the effectiveness of the program. It also discusses considerations for developing and implementing an obsolescence management program. In addition, the report emphasizes that although identification of the population of obsolete items is a good starting point, the key to an effective obsolescence management program lies in the ability to effectively identify and prioritize known obsolescence issues. Although one plant organization may own the obsolescence management program, successful prioritization involves input to and from several plant organizations, including the engineering, maintenance, and supply chain organizations.

Results and Findings

Based on available information, an industry average of approximately 20% of identifiable plant equipment is obsolete (no longer available in the marketplace). Attempts to categorize equipment in a single U.S. plant can result in identification of a population of obsolete equipment nearing 10,000 in number. Clearly, it is not possible to develop a proactive solution for each obsolete piece of equipment and/or the entire population of spare and replacement items required to support its continued operation.

Equipment for which spares and replacements will most likely be necessary must be identified and prioritized to implement an effective and practical proactive obsolescence program. Although an obsolescence management program owner must be defined, an effective obsolescence program is a plantwide endeavor, as it involves providing information to and soliciting feedback from several key plant organizations.

Challenges and Objectives

This report should be read by individuals responsible for establishing or maintaining a proactive obsolescence program. The approach to managing obsolescence presented in the report builds upon industry experience to date, and includes actual program information from EPRI members who have already implemented proactive obsolescence programs.

Applications, Value, and Use

This report can be used to assist in the development and implementation of a proactive obsolescence program, or to assess and enhance the effectiveness of an existing obsolescence program. In addition, it can be used to demonstrate that an effective obsolescence program requires active participation of several key plant organizations.

EPRI Perspective

The methodology contained in this report is based upon collaboration of individuals and organizations involved in addressing plant obsolescence issues and implementing proactive obsolescence programs.

Approach

The approach taken to develop this report was to gather a group of individuals interested in a proactive approach to addressing the issue of obsolescence, and collaboratively developing a basic process that could be implemented by the organization that owns the obsolescence program. The group of individuals included members who actively participate in the Nuclear Utility Obsolescence Group (NUOG), the EPRI Joint Utility Task Group, and the Equipment Reliability Working Group (ERWG). The effort considered existing products available to the nuclear industry, as well as existing proactive obsolescence programs and implementation efforts.

Keywords

Design change
Equivalency evaluation
Obsolete
Obsolescence
Proactive
Reverse engineer

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CONTENTS

1 EXECUTIVE SUMMARY AND INTRODUCTION....1-1
1.1 Executive Summary....1-1
1.2 Background....1-3
1.2.1 “Firefighting” Approach to Managing Obsolescence....1-3
1.2.2 Ability to Effectively Develop Collaborative Obsolescence Solutions....1-4
1.2.3 Understanding the Impact of Obsolescence....1-5
1.3 Challenges Associated with Implementing a Proactive Obsolescence Program....1-7
1.3.1 Focusing on Proactive Solutions....1-7
1.3.2 Understanding the Extent of Condition....1-8
1.3.3 Prioritization of Obsolescence Issues....1-8
1.4 Definition of Key Terms....1-9
1.5 Acronyms....1-9
1.6 Use of Key Points....1-12

2 PROACTIVE APPROACH TO OBSOLESCENCE MANAGEMENT....2-1
2.1 Overview of the Generic Process for Addressing Obsolescence....2-1
2.2 Proactive Obsolescence Management Process....2-2
2.2.1 Collect Equipment and Part Data....2-5
2.2.2 Determine Vendor Support for Equipment and Parts....2-6
2.2.3 Identify Obsolete Equipment and Parts....2-7
2.2.4 Implement Enhanced Processes to Flag Issues....2-7
2.2.5 Rank and Prioritize Issues....2-8
2.2.6 Obtain Funding and Develop Solutions....2-9
2.2.7 Monitor Performance....2-9
2.2.8 Standard Plant Processes....2-10
2.3 Existing Obsolescence Programs....2-10

3 **IDENTIFICATION OF OBSOLETE EQUIPMENT/ITEMS 3-1**

3.1 Background Regarding the Current Scope of Obsolete Equipment 3-1

3.2 Determining the Scope of Obsolete Equipment Affecting Each Licensee 3-2

3.3 Determining the Population of Inventory Items Impacted 3-3

3.4 Identification of Obsolete Equipment and Associated Parts 3-4

4 **PRIORITIZATION OF OBSOLESCENCE ISSUES..4-1**

4.1 Equipment Criticality Classification 4-3

4.1.1. Background 4-3

4.1.2 Defining and Determining Critical Equipment/Components 4-4

4.1.3 Defining Critical Parts..4-4

4.1.4 Precautions for Run-to-Failure Items 4-4

4.2 Safety Classification...4-5

4.3 Available Supply of Replacement Items 4-5

4.3.1 Sources of Replacement Items 4-6

4.3.2 Complexity of Design 4-6

4.3.3 Known Capabilities of Replacement Solution Providers 4-6

4.4 Probability That a Replacement Will Be Needed 4-7

4.4.1 Condition of the Installed Items 4-7

4.4.2 Published Component Life 4-9

4.4.3 Actual Condition of Obsolete Items..4-9

4.5 Incorporating Obsolescence Considerations into the Organization's Processes.........4-9

4.5.1 Obtaining Feedback from Normal Plant Processes 4-9

4.5.2 Typical Plant Prioritization Criteria for Programs 4-10

5 **OBSOLESCENCE PROGRAM OWNERSHIP 5-1**

5.1 Program Ownership...5-1

5.1.1 Supply Chain Versus Engineering 5-1

5.1.2 Identify the Need as Early as Possible...5-2

5.2 Plant Health Committee Involvement..5-3

5.3 Introduction to Component/System Health Reports..5-3

6 MAINTENANCE AND WORK PLANNING ROLE....6-1
6.1 Decisions and Processes 6-1
6.2 Obsolescence Information Provided to Maintenance 6-1
6.3 Prioritization Information Provided by Maintenance....6-2
6.4 Involvement in Development of Obsolescence Management Tools and Solutions 6-2

7 SYSTEM/COMPONENT ENGINEERING ROLE....7-1
7.1 Decisions and Processes 7-1
7.1.1 Maintenance Basis Process....7-1
7.2 Obsolescence Information Input to System Engineering....7-1
7.3 System Engineering Output for Use in Prioritization of Obsolescence Issues....7-2
7.4 Involvement in Development of Obsolescence Management Tools and Solutions 7-2

8 DESIGN ENGINEERING ROLE 8-1
8.1 Decisions and Processes 8-1
8.2 Obsolescence Information Input to Design Engineering....8-1
8.3 Design Engineering Output for Use in Prioritization of Obsolescence Issues 8-2
8.4 Involvement in Development of Obsolescence Management Tools and Solutions 8-2

9 PROCUREMENT ENGINEERING ROLE....9-1
9.1 Decisions and Processes 9-1
9.2 Obsolescence Information Input to Procurement Engineering 9-1
9.3 Procurement Engineering Output Used for Prioritization of Obsolescence Issues....9-1
9.4 Involvement in Development of Obsolescence Management Tools and Solutions 9-2

10 PROCUREMENT ROLE (PURCHASING AND CONTRACTS) AND VENDOR QUALITY 10-1
10.1 Decisions and Processes....10-1
10.2 Obsolescence Information/Input to Procurement....10-1
10.3 Procurement Output for Use in Prioritization of Obsolescence Issues 10-1
10.4 Involvement in Development of Obsolescence Management Tools and Solutions 10-2

11 INVENTORY AND SUPPLY CHAIN MANAGEMENT 11-1

11.1 Decisions and Processes 11-1

11.2 Obsolescence Information Input Provided to Supply Chain 11-2

11.3 Output Used for Prioritization of Obsolescence Issues 11-2

11.4 Involvement in Development of Obsolescence Management Tools and Solutions 11-2

11.4.1 Average Historical Usage over a Period of Time (Supply Chain) 11-3

11.4.2 Predicted Future Demand for Replacement Items (Supply Chain/Planning) 11-3

11.4.3 Current Inventory Levels...11-3

12 AVAILABLE RESOURCES FOR ADDRESSING OBSOLESCENCE ISSUES.................12-1

12.1 Overview 12-1

12.2 Supplier-Provided Resources 12-4

12.2.1 Shared Inventory Programs (PIM and others) 12-4

12.2.1.1 Pooled Inventory Management (PIM)...12-4

12.2.2 RapidPartSmart 12-4

12.2.3 Obsolete Items Replacement Database (OIRD)...12-5

12.2.4 Proactive Obsolescence Management System (POMS) 12-6

12.2.4.1 POMS PM Forecasting...12-8

12.2.4.2 POMS Prioritization Tool 12-9

12.2.4.3 Configuration Management Information System (CMIS)........................12-10

13 IMPLEMENTING SOLUTIONS TO OBSOLESCENCE ISSUES 13-1

13.1 Types of Solutions to Obsolescence Issues 13-1

13.2 Staging Solutions to Obsolescence Issues 13-2

14 REFERENCES 14-1

14.1 Cited References 14-1

14.2 Additional References 14-2

A LISTING OF KEY INFORMATION A-1

A.1 Key Information Points.. A-1

A.2 Key O&M Cost Points A-2

A.3 Key Technical Points A-2

A.4 Key Human Performance Points.. A-3

B **SUMMARY OF NUOG SURVEY DATA B-1**

C **SYNOPSIS OF CURRENT OBSOLESCENCE PROGRAMS C-1**

C.1 Detroit Edison C-1

C.1.1 Brief Program Summary C-1

C.1.2 Responsibilities C-1

C.2 Duke Energy C-3

C.2.1 Brief Program Summary C-3

C.2.2 Responsibilities C-4

C.3 South Carolina Electric & Gas C-4

C.3.1 Brief Program Summary C-4

C.3.2 Responsibilities C-5

C.4 Constellation C-6

C.4.1 Brief Program Summary C-6

C.4.2 Responsibilities C-7

C.5 Exelon C-9

C.5.1 Brief Program Summary C-9

C.5.2 Responsibilities C-10

D **QUICK-READING REFERENCE BY ORGANIZATION D-1**

LIST OF FIGURES

Figure 2-1 Basic elements of the generic process 2-1
Figure 2-2 First-level proactive obsolescence management program process map 2-2
Figure 2-3 Second-level obsolescence program implementation process map, 1 of 2 2-3
Figure 2-4 Second-level obsolescence program implementation process map, 2 of 2 2-4
Figure 2-5 Process map key 2-5
Figure 4-1 Major considerations when prioritizing obsolescence issues 4-2
Figure 4-2 Current procurement categories for most licensees 4-5
Figure 5-1 Organizations comprising the obsolescence program team 5-2
Figure 5-2 System, component, and program health reports 5-4
Figure 13-1 Obsolescence solutions and options 13-2
Figure C-1 Example of obsolete equipment identification C-7

LIST OF TABLES

Table 4-1 EPRI life cycle management sourcebooks 4-8
Table 12-1 Overview of external resources and product capabilities 12-2
Table 12-2 POMS data elements...12-7
Table 12-3 Preventive Maintenance Forecasting data elements...12-9
Table B-1 Summary of NUOG survey data (surveys conducted in 2004 and 2007)................ B-1
Table D-1 Recommended quick-reading sections referenced to organization D-2

1
EXECUTIVE SUMMARY AND INTRODUCTION

1.1 Executive Summary

The objective of this report is to provide guidance to licensees for a systematic approach that may be used to reduce the impact obsolescence has on the availability and reliability of plant equipment.

It is important to recognize that the nuclear power industry has little or no control over when a given manufacturer decides to no longer support or fabricate components identical to the ones installed in our plants. However, the industry does have resources available that may be used to proactively respond to equipment obsolescence issues and in doing so reduce the impact equipment obsolescence has on our plants.

This proactive approach includes three basic elements. First, the licensee needs to identify the scope of installed equipment and replacement items that are currently obsolete. Second, the list needs to be prioritized based upon the criticality of the obsolete equipment and likelihood that replacements for the obsolete items will be needed. Third, the licensee needs to effectively develop and implement replacement solutions in a timely manner. This approach requires participation from various plant organizations including the engineering, maintenance, operations, work planning, plant health committee, and supply chain organizations. The activities of this interdisciplinary team are coordinated by the owner of the obsolescence program.

Industry experience suggests that some plants have already experienced lost generation events or plant shutdowns rooted in lack of a spare or a suitable replacement for an obsolete component. 22.2% of nuclear plants responding to a Nuclear Utility Obsolescence Group (NUOG) survey conducted in 2007 [1] indicated they are experiencing or risking plant outages (lost generation) as a result of equipment obsolescence problems. A summary of the survey data is contained in Appendix B of this report.

During the development of this report, utility members indicated that obsolescence has impacted Equipment Reliability Index (ERI) performance indicators as noted in the bullets below. However, the actual costs associated with these impacts remain difficult to quantify.

- Increase in preventive maintenance task (PM) deferrals
- Increase in late-in-grace-period PMs
- Increasing age of red and yellow systems
- Increase in premium dollars paid to expedite

- Increase in safety system unavailability
- Increase in urgent modifications (and associated impact on other modifications)

To date, the impact of obsolescence has been mitigated due to the ability of procurement engineering, engineering, and supply chain organizations to successfully respond to emergent needs. In fact, the effectiveness of site rapid response organizations such as fix-it-now (FIN) teams tends to conceal the true impact of obsolescence and promotes a reactive culture, which may hinder comprehensive initiatives to address obsolescence issues in a truly proactive manner.

Key challenges to a proactive obsolescence program include understanding the extent of condition, identification and prioritization of obsolete equipment, and incorporating obsolescence information into existing plant processes and decision making. It is also important to make effective use of industrywide obsolescence data and obsolescence management tools.

During development of this report, the Technical Advisory Group (TAG) attempted to collect data that quantifies the financial impact of obsolescence in terms of lost generating capacity or additional expenses. Available data indicates that although obsolescence is indeed an issue, lost generation or expenses attributable to obsolescence are not being effectively tracked as a separate line-item. The TAG determined that the true costs of obsolescence are likely not captured separately, but are captured as inherent increases in normal operations and maintenance costs. This is due to the fact that equipment does not fail because it is obsolete; it fails because of a particular failure mechanism, which is typically not reported as “obsolescence” in plant failure reporting tools such as corrective action programs. Accordingly, minimal input relative to the true costs associated with obsolescence is currently available.

The basis for establishing any new program should be rooted in a business case that demonstrates return on investment, and obsolescence is no exception. Building a solid business case that addresses the approximate costs, potential savings, and major features of an obsolescence program is an effective way to obtain the resources necessary to implement and maintain the program. Therefore, if obsolescence has been identified as an organizational concern, immediate steps should be taken to track the costs associated with obsolescence.

Utilities are aware of the fact that the number of obsolete items in our existing nuclear fleet and individual plants is steadily rising, and understand that with increased reliance on obsolete items comes greater risk that obsolescence will negatively impact plant equipment reliability and production.

This report is based upon the premise that licensees can establish obsolescence programs that identify the obsolescence status of plant equipment and replacement items (obsolete or not obsolete) to all plant personnel and organizations. In turn, plant organizations and personnel can take the fact that the equipment they are working on is obsolete into consideration when performing daily activities, and provide pertinent information about obsolete equipment to the organization that owns the obsolescence program. The information provided can then be used to prioritize obsolescence issues and justify development of proactive solutions. *Proactive* in this context means well in advance of the plant’s normal T-week schedule.

The methodology outlined in this report can be incorporated into existing plant processes and used in a way that proactively identifies obsolete equipment, prioritizes obsolescence issues, and enables proactive development of replacement solutions.

1.2 Background

In November 2007, EPRI Plant Support Engineering published a technical update titled *Plant Support Engineering: Obsolescence Management – A Proactive Approach* [2]. This document discussed current industry approaches to addressing obsolescence issues as well as tools available to facilitate obsolescence management. In addition, the challenges associated with implementing a proactive obsolescence program were discussed.

1.2.1 "Firefighting" Approach to Managing Obsolescence

Perhaps one reason that some organizations have not yet established truly proactive obsolescence programs is the ability of their procurement engineering, engineering, and supply chain organizations to successfully respond to emergent needs. Nuclear power plants regularly experience and react to unplanned, emergent issues related to obsolete equipment. These emergent issues are generally discovered during the procurement cycle for an item, after parts and components are reserved for planned work as part of normal T-week planning and scheduling activities. Since T-week schedules typically range from 12 to 18 weeks before the planned start of work, the amount of time available to resolve obsolescence issues is limited. Therefore, resolution of obsolescence issues is forced to occur on an emergent or reactive basis to support normal plant operations and maintenance needs.

Solutions developed using a reactive approach can be inefficient and costly. Organizations faced with implementing the quickest solution for an immediate need may not have an opportunity to investigate the true extent of condition, or the time to thoroughly search the industry for an existing solution that may be suitable for the particular application. In addition, scheduled work may be delayed pending development of an obsolescence solution. In extreme cases, plant production is impacted.

Nevertheless, plant organizations' effectiveness at being able to resolve obsolescence issues through "firefighting" may conceal the true impact of obsolescence to a certain extent, thus serving as a barrier to implementing a proactive obsolescence management program.

Key Information Point

Plant organizations' effectiveness at being able to resolve obsolescence issues through "firefighting" may conceal the true impact of obsolescence to a certain extent, thus serving as a barrier to implementing a proactive obsolescence management program.

In addition, the ability to effectively provide replacements for obsolete items on an emergent basis may mask both the fact that the replacement was associated with obsolescence and the fact that additional costs are associated with addressing the issue in a reactive manner. These costs typically include:

- Supplier expediting fees associated with accelerating manufacturing, "working around the clock," or preempting normal production for special production runs
- Logistical expediting fees associated with transportation in dedicated vehicles, air transport, and so on
- Engineering time involved in the development of equivalency evaluations or modifications
- Costs associated with the delay of scheduled work

1.2.2 Ability to Effectively Develop Collaborative Obsolescence Solutions

A significant amount of equipment in currently operating plants is common to two or more units due to vintage and stability of manufacturers that provided equipment for nuclear power during the construction phase. Logic would indicate that ample opportunity exists for collaborative development of replacement solutions for obsolete items. However, several obstacles stand in the way of effective development of collaborative obsolescence solutions.

First, two or more operating units seldom experience the need for the same replacement solution at the same time. Second, even when obsolete items common to two or more units are identified well in advance of actual plant needs, it is difficult for the units without current demand (request for the item associated with planned and scheduled work) to obtain authorization for funding to obtain a replacement. This is due to the fact that plant organizations that authorize spending tend to be focused on scheduled work and current equipment issues, and are hesitant to authorize funding for the development of replacement solutions before a specific need for them is identified. Essentially, funding is difficult to obtain because the probability that the particular obsolescence solution in question will ever actually be needed has not been determined. In other words, the priority associated with each obsolescence issue has not been established.

Still, opportunities exist to discern shared obsolete items, and as a minimum identify those for which a solution has already been developed, along with basic details associated with the solution. Although this approach may not fully enable collaborative development of solutions, it will permit units to "piggyback" on existing replacement solutions even when the need occurs after that of the plant that originally developed the solution. Several tools available to the industry that facilitate sharing solutions are identified in Section 12 of this report.

Implementation of a proactive obsolescence program that prioritizes known obsolete items would enable more numerous and effective development of collaborative solutions. Different units would be able to identify common shared items with high priority rankings, and the obsolescence program owners would be in a better position to obtain the funding necessary to participate in the collaborative effort.

1.2.3 Understanding the Impact of Obsolescence

Although several member utilities have been successful in implementing obsolescence programs that are proactive in nature, quantitative information regarding the true impact of obsolescence is not always readily obtainable. This is because many programs are in their initial or developmental stages, and it is difficult to determine how an obsolescence issue may have adversely affected plant availability or equipment reliability.

It seems obvious that the impact of obsolescence on the current operating fleet is significant. Expenses associated with expediting delivery and transportation of replacement items as well as engineering involved in developing replacement solutions for obsolete items are substantial. However, corrective action programs (CAPs) across the operating fleet in the United States are currently not standardized. That is, industry-standard cause codes are not used, and the extent to which certain types of failures are investigated, tracked, and reported may vary. Therefore, it is difficult to develop a meaningful quantitative measure of the true impact obsolescence has on financial performance and generation. In fact, based upon input from the TAG for this report, generation loss or financial impacts of obsolescence are sometimes rolled up into other categories, and are therefore difficult to identify or measure.

In order to measure the true impact of obsolescence, a means to identify and track expenses or lost generation resulting from obsolescence needs to be established. Incorporating obsolescence cause and event codes into an existing corrective action program is one way in which tracking the costs of obsolescence might be accomplished.

Key O&M Cost Point

Incorporating obsolescence cause and event codes into an existing corrective action program is one way in which tracking the costs of obsolescence and the impact of a proactive obsolescence management program might be accomplished.

This approach would involve developing a standard set of obsolescence event-type and cause codes; training individuals to correctly document expenses, lost generation, or safety system unavailability associated with obsolescence; and developing reports that could be extracted from the system periodically to form a basis for quantifying the cost of obsolescence. In addition, this approach might provide a means to identify the plant systems, types of equipment, and parts that are prone to require attention due to obsolescence.

While detailed information related to the cost of obsolescence at the plant, fleet, and industry level is not available, the TAG was able to collect the following examples of obsolescence impacting generation.

22.2% of nuclear plants responding to a Nuclear Utility Obsolescence Group (NUOG) survey conducted in 2007 [1] indicated they have experienced or risked plant outages/lost generation as a result of equipment obsolescence problems.

During the development of this report, utility members indicated that obsolescence has impacted Equipment Reliability Index (ERI) performance indicators as noted in the bullets below. However, the actual costs associated with these impacts remain difficult to quantify.

- Increase in preventive maintenance task (PM) deferrals
- Increase in late-in-grace-period PMs
- Increasing age of red and yellow systems
- Increase in premium dollars paid to expedite
- Increase in safety system unavailability
- Increase in urgent modifications (and associated impact on other modifications)

A query of industry equipment failure information attributed to aging or obsolescence identified 85 failure reports related to obsolescence. Ten of these failures involved lost generation events.

A cursory review of industry operating experience (OE) identified the following recent examples of lost generation at U.S. plants attributable to not having a suitable replacement for an obsolete item in time to avoid downtime:

- 2008 – A plant suffered an automatic reactor trip due to failure of an obsolete 1960s vintage turbine control system.
- 2007 – A plant lost 8 days of production due to failure of an obsolete voltage isolation card in the rod control system. Plans to replace the cards with newer models had been deferred.
- 2006 – A plant suffered a reactor trip due to failure of an obsolete electronic component in the turbine control system that was also identified as a single point vulnerability (SPV).
- 2005 – A plant reduced power to 34% due to failure of an obsolete power supply in the turbine control system.

In addition, a “near miss” plant scram was noted that was attributable to challenges involved in replacing an obsolete component that had failed, as well as other instances where plant operability or system availability was challenged as the result of obsolescence.

A NUOG survey conducted in 2004 [3] suggests that 11% (3 of 27) of the respondents had experienced a loss of generation (power reduction, shutdown, or delayed startup) attributable to an obsolescence issue. When the survey was conducted again in 2007 [1], 22% (6 of 27) of the respondents indicated a clear link between obsolescence and loss of generation. One can logically conclude from these results that the impact of obsolescence increases as plants age. A summary of these surveys is contained in Appendix B of this report.

1.3 Challenges Associated with Implementing a Proactive Obsolescence Program

There are several key challenges associated with implementing an effective proactive program. These challenges are discussed below.

1.3.1 Focusing on Proactive Solutions

There will always be emergent obsolescence issues identified during execution of normal procurement and maintenance activities. However, a truly proactive program must include provisions and resources for addressing obsolescence issues before they are emergent, and even before the need to replace an obsolete item is identified during normal maintenance planning activities.

Feedback provided during the development of this report strongly suggests that maintaining a forward-looking or strategic focus often proves difficult in a production environment. One of the most important factors in establishing a proactive obsolescence management program is to obtain a firm commitment by senior management, followed by the resources required to support the program.

Key Information Point

One of the most important factors in establishing a proactive obsolescence management program is to obtain a firm commitment by senior management, followed by the resources required to support the program. Focusing on strategic, proactive solutions is difficult in a plant production environment.

The prioritization and ranking methodology typically used by plant health committees (PHCs) evaluating proposals for new projects results in a low ranking for obsolescence issues not linked to immediate plant needs. Subsequently, even high-priority obsolescence issues are addressed on an emergent basis instead of proactively.

The results of NUOG surveys [1], [3] suggest that the percentage of plants active in NUOG with a proactive obsolescence management program in place increased from 53.8% in 2004 to 77.3% in 2007. It is worth mention that this data may not accurately reflect on the state of the entire industry, as the survey respondents in both surveys cited were comprised of utilities that actively participate in NUOG.

As discussed in Section 1.2, a business case may be essential to justify the expense associated with implementation of a proactive obsolescence management program. Each organization needs to determine if the risk that obsolete equipment will have significant impact on plant operations justifies the cost associated with implementing a comprehensive proactive obsolescence management program.

1.3.2 Understanding the Extent of Condition

Identifying the population of plant equipment that is obsolete is important, and a complete list of obsolete equipment in a plant equipment database is a good starting point. To understand the true impact of obsolescence on plant operations and maintenance, an organization must also be aware of replacement parts that are obsolete, and may need to identify obsolete items in plant inventory/materials management systems. In addition, it is important to be able to determine when the replacement parts will be required for scheduled work and how long existing inventory will last before a replacement part-level solution is needed or required.

1.3.3 Prioritization of Obsolescence Issues

Because the number of obsolete items at the equipment and replacement part level increases as our fleet ages, it is not practical to expect that any organization could proactively address every obsolete item before it becomes obsolete. However, it is possible for each licensee to develop a means to prioritize the population of known obsolete items, and proactively develop solutions for the items that pose the greatest risk with respect to generation and cost.

The obsolescence program owner can analyze the equipment and replacement and identify obsolescence issues. In many cases, multiple equipment and/or parts can be logically grouped into a single issue. Likewise, several issues may be required to address a single obsolete component. For example, one issue may be required to identify qualified O-ring replacements required to perform PMs on a transmitter, while a second issue is required to identify a replacement solution for the entire transmitter.

Unfortunately, most licensees are currently not staffed to adequately determine and prioritize anticipated demands for all items identified as obsolete before they are needed to support plant operations and maintenance. As an industry, licensees have become very effective at meeting demands to support PM activities and planned outage work (within the T-week schedule), but most are not currently capable of addressing the long-range, subjective prioritization needed to address obsolescence.

1.4 Definition of Key Terms

Obsolete Equipment	Items in plant service that are no longer manufactured or supported by the original manufacturer or are otherwise difficult to procure and qualify [4] (INPO NX-1037, Revision 1[1])
Obsolescence Issue	A need (or logical grouping of needs) associated with obsolete plant equipment, for example, the need to replace an obsolete component or a part associated with an obsolete component. An issue may include a logical grouping of needs to facilitate development of a comprehensive solution.
Obsolescence Program Owner	The plant organization that is responsible for implementing the obsolescence program or process.

1.5 Acronyms

BOM – Bill of Material

CAP – Corrective Action Program/Process

CFAM – Corporate Functional Area Manager (Exelon)

CFR – Code of Federal Regulations

CM – Corrective Maintenance

CMIS – Configuration Management Information System

CMO – Central Maintenance Organization

CRMP – Configuration Risk Management Program

DE – Design Engineering

EDP – Engineering Design Package

EFT – Engineering First Team (Detroit Edison)

EPRI – Electric Power Research Institute

ER – Equipment Reliability

[1] Access to INPO reports and materials is restricted to organizations authorized by INPO. The information is confidential and for the sole use of the authorized organization.

ERI – Equipment Reliability Index

ERWG – Equipment Reliability Working Group

ESR – Engineering Service Request

FIN – Fix-It-Now

GALL – Generic Aging Lessons Learned

ID – Identification

INPO – Institute of Nuclear Power Operations[2]

IT – Information Technology

JUTG – Joint Utility Task Group

LCM – Life Cycle Management

M&P – Materials and Procurement

MC – Management Committee

MEL – Master Equipment List

NSSS – Nuclear Steam System Supplier

NUOG – Nuclear Utilities Obsolescence Group

NUREG – Nuclear Regulatory Guide

O&M – Operations & Maintenance

OE – Operating Experience

OEM – Original Equipment Manufacturer

OES – Original Equipment Supplier

OIRD – Obsolete Items Replacement Database

OSC – Obsolescence Steering Committee

[2] Access to INPO reports and materials is restricted to organizations authorized by INPO. The information is confidential and for the sole use of the authorized organization.

OVR – Obsolescence Value Ranking

PE – Procurement Engineering

P&S – Planning and Scheduling

PdM – Predictive Maintenance

PHC – Plant Health Committee

PIM – Pooled Inventory Management

PM – Preventive Maintenance

POMS – Proactive Obsolescence Management System

PRA – Probabilistic Risk Assessment

PSE – Plant Support Engineering

QA – Quality Assurance

RAPID – RapidPartSmart

SBS – Supply Based Strategies

SE – System Engineer

SNS – Southern Nuclear Services

SPOC – Single Point of Contact

SPV – Single Point of Failure Vulnerability

TAG – Technical Advisory Group

TRB – Technical Review Board

USA – Utilities Service Alliance

WO – Work Order

1.6 Use of Key Points

Throughout this report, certain key information is summarized in “Key Points.” Key Points are captured in bold lettered boxes that succinctly restate information covered in detail in the surrounding text, making the key point easier to locate.

The primary intent of a Key Point is to emphasize information that will allow individuals to take action for the benefit of their plant. The information included in these Key Points was selected by EPRI, consultants, and TAG members involved in the preparation and review of this report.

The Key Points are organized according to four categories: Key Information Related to the Subject Discussion, Operation & Maintenance (O&M) Costs, Technical, and Human Performance. Each category has an identifying icon, as shown below, to draw attention to it when quickly reviewing the guide.

Key Information Point

Key information related to implementing a proactive obsolescence program.

Key O&M Cost Point

Emphasizes information that will result in overall reduced costs and/or increase in revenue through additional or restored energy production.

Key Technical Point

Targets information that will lead to improved equipment reliability.

Key Human Performance Point

Denotes information that requires personnel action or consideration in order to prevent personal injury, prevent equipment damage, and/or improve the efficiency and effectiveness of the task.

The Key Points included in this document are summarized in Appendix A of this report. The summary restates each Key Point and provides a reference to its location in the body of the report. By reviewing this listing, users of this guide can determine if they have taken advantage of key information that the writers of this guide believe would benefit their plants.

2
PROACTIVE APPROACH TO OBSOLESCENCE MANAGEMENT

The purpose of this section is to provide a synopsis of the basic elements involved in a program that proactively addresses obsolescence issues.

2.1 Overview of the Generic Process for Addressing Obsolescence

Figure 2-1 illustrates the three major elements of the generic process, and includes references to sections in this report where additional guidance is provided.

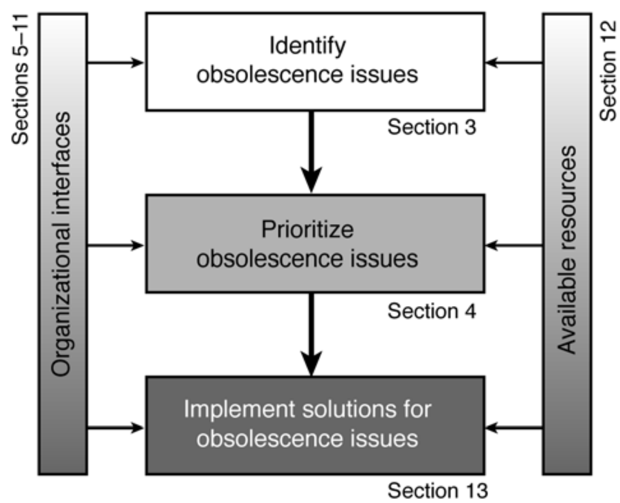


Figure 2-1
Basic elements of the generic process

The proactive approach presented in this report includes three basic elements. First, the scope of installed equipment and replacement items that are currently obsolete needs to be identified. Second, the list of obsolete equipment and items needs to be analyzed, grouped into logical obsolescence issues, and prioritized based upon factors such as the criticality of the obsolete equipment and likelihood that replacements for the obsolete items will be needed. Third, effective replacement solutions need to be developed and implemented in a timely manner.

This approach requires identification of an obsolescence program or process owner. It also requires participation from various plant organizations including engineering (for example, design, system, and so on), maintenance, operations, work planning, plant health committee, and supply chain. The activities of this interdisciplinary team are coordinated by the owner of the obsolescence program.

2.2 Proactive Obsolescence Management Process

Figure 2-2 is a first-level, three-step process map that shows the basic input, process activity, and output associated with a proactive obsolescence management program.

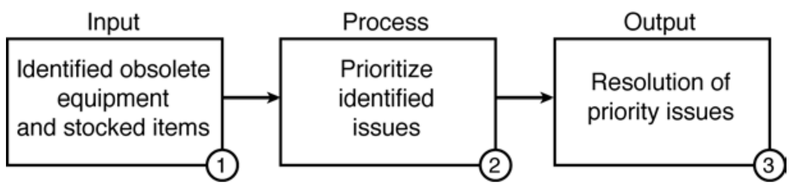


Figure 2-2
First-level proactive obsolescence management program process map

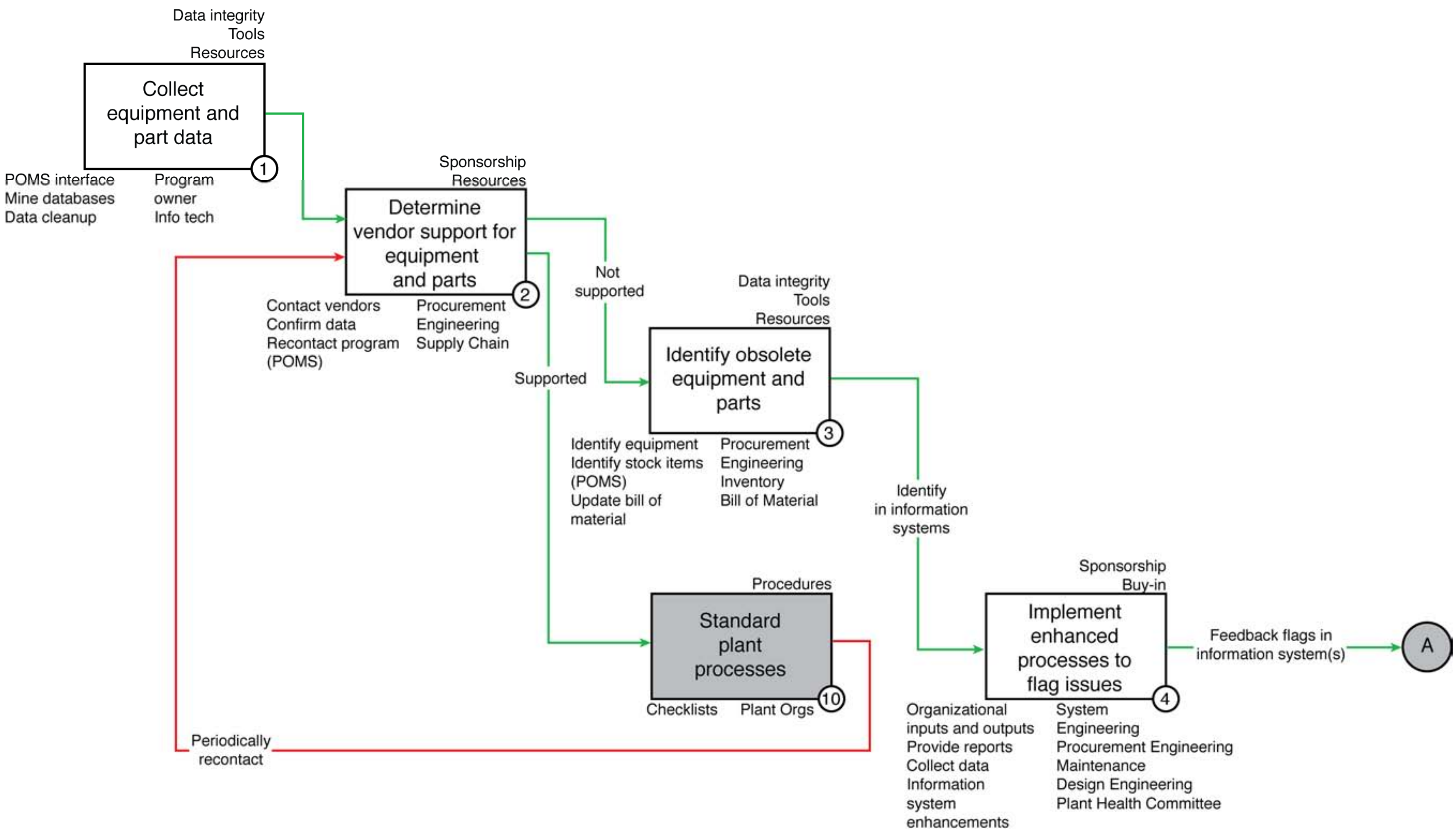
Figures 2-3 and 2-4 present a basic, second-level process map. This map enhances the simplified process by providing another level of detail that may be used when implementing a proactive obsolescence program. The first-level diagram depicts “what” needs to be done, while the second-level diagram provides a basic overview of “how” the guidance in this report might be implemented. The key to the information contained in the process elements is provided in Figure 2-5.

Each of the major elements involved in establishing and implementing a proactive obsolescence management program is depicted in the second-level process map (Figures 2-3 and 2-4).

The process map is high-level and relates typical process steps included in existing plant processes with associated proactive obsolescence program activities or elements. This section provides a brief description of the overall proactive obsolescence program process flow.

The intent of including the process map is to provide perspective on how the program elements discussed in this report fit together in practice and to emphasize plant processes and organizations that can become a vital part of a proactive obsolescence management program by integrating obsolescence considerations into day-to-day activities.

Each of the major steps included in the process map is identified and discussed briefly in this section.



POMS = Proactive Obsolescence Management System (PKMJ, Inc.)

Figure 2-3
Second-level obsolescence program implementation process map, 1 of 2

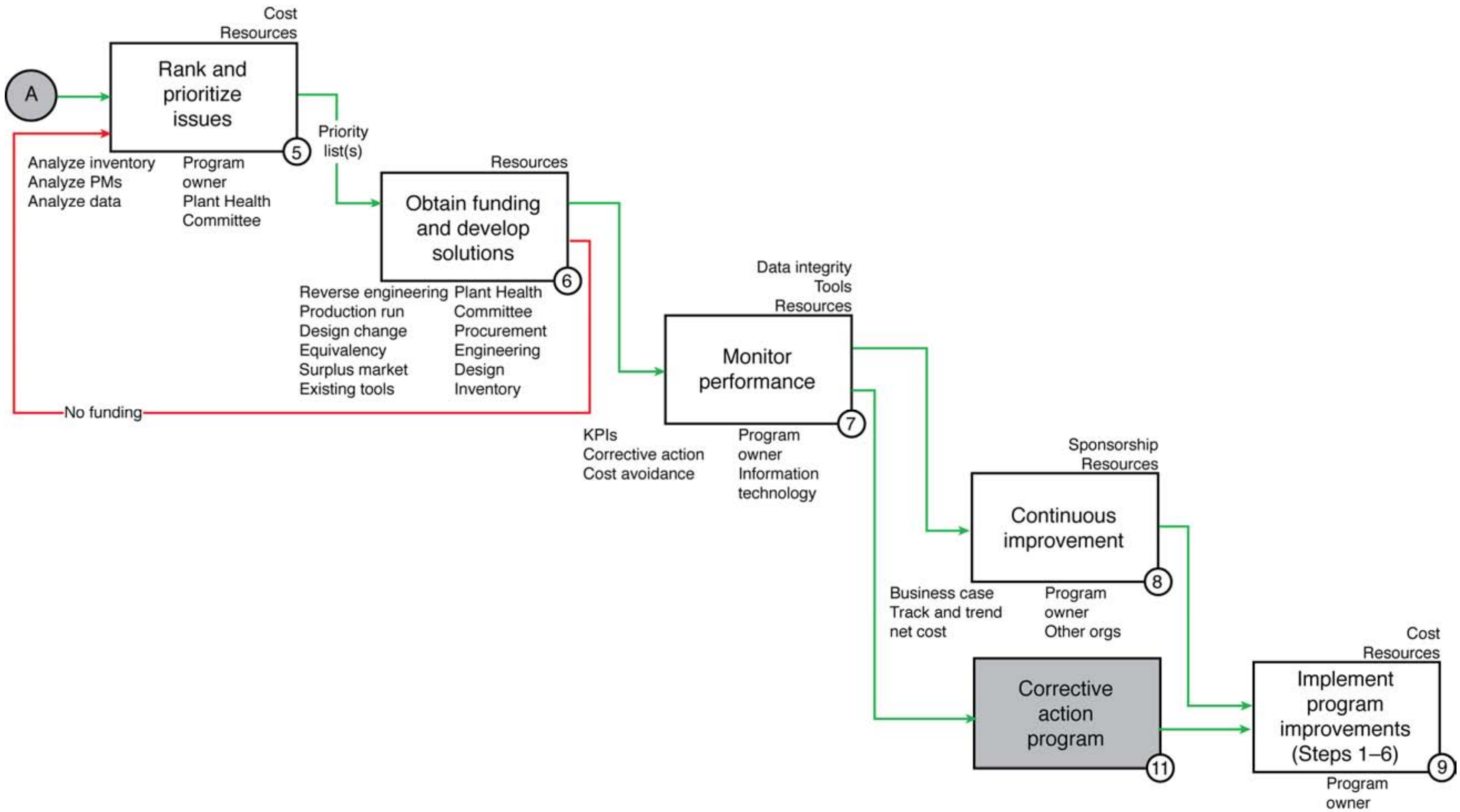


Figure 2-4
Second-level obsolescence program implementation process map, 2 of 2

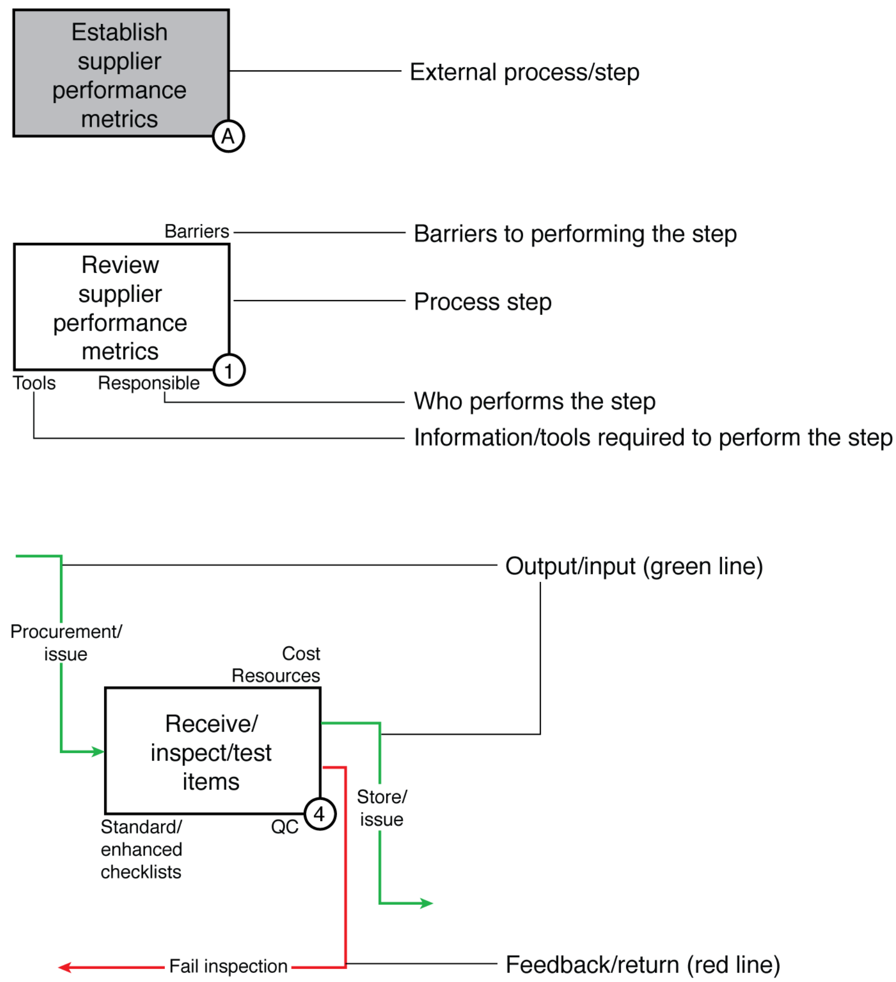
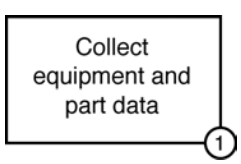


Figure 2-5
Process map key

2.2.1 Collect Equipment and Part Data

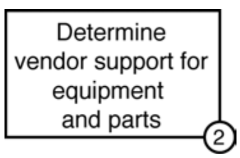


The first step in establishing a proactive obsolescence management program is to compile a list of plant equipment and replacement items associated with each piece of equipment. This information is often contained in existing plant databases, but may need to be made available for analysis to determine if vendors exist that still support the items (Step 2) and logically group the obsolete items into obsolescence issues (Step 3).

Identification of plant equipment and parts is typically overseen by the organization that owns the obsolescence program, and is accomplished using data from plant information systems (equipment databases) and available industry products. Therefore, information technology personnel are typically involved in identification of plant equipment.

Barriers to successful identification of plant equipment and parts might include inaccuracies and incompleteness in existing plant information system data, and limitations in the availability and ability of information technology resources.

2.2.2 Determine Vendor Support for Equipment and Parts



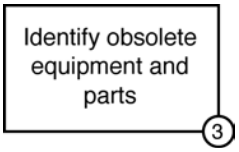
Once a manufacturer and model number are identified for plant equipment, an effort must be made to determine if the original manufacturer still supports (provides) replacement equipment and spare parts. If not, further effort must be made to determine if responsibilities for providing support for the make and model number have been transferred to a different supplier or vendor. This is an ongoing process, as suppliers may elect to stop supporting product lines that impact our plants at any time. Typically, a proactive approach involves contacting each identified supplier on a periodic (for example, annual) basis.

It is important to ensure that a vendor that offers to support an item no longer supported by the original equipment manufacturer (OEM) or original equipment supplier (OES) has been authorized to do so by the OEM or OES. Such authorization is typically accomplished by purchasing the rights to manufacture the equipment from the OEM/OES along with a complete set of original design information. Unauthorized vendors have knowingly and unknowingly provided counterfeit or fraudulent replacement items in the past. Therefore, sources other than the OEM/OES should be carefully screened before they are accepted.

Determining vendor support for equipment and parts is typically the responsibility of the supply chain organization or the procurement engineering organization on a case-by-case basis. However, most obsolescence programs use products available to the nuclear industry to determine vendor support on a programmatic basis.

Barriers to determining vendor support for equipment and replacement parts include the incompleteness and inaccuracy of existing plant data, a lack of availability of resources to systematically contact vendors, and a lack of existing industry products that provide this service.

2.2.3 Identify Obsolete Equipment and Parts

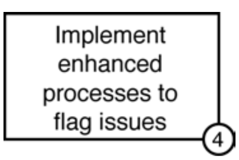


The population of equipment and items identified in Step 1 (Section 2.2.1) that is determined to be obsolete via Step 2 (Section 2.2.2) should be identified in plant information systems so that plant personnel become aware that the items are obsolete and consider obsolescence as they perform normal activities that involve the items. When plant personnel involved with the equipment or replacement items know these things are obsolete, they can provide valuable feedback to the organization (Section 2.2.4) that owns the obsolescence program regarding the items' condition, anticipated future need, and so on. The organizations that can provide feedback, and the type of feedback they might provide, are discussed in Sections 6 through 11 of this report.

Identification of obsolete equipment and items is often best accomplished by the organizations that maintain the plant equipment and parts databases, such as the design engineering, procurement engineering, purchasing, inventory, and bill of material organizations. Ideally, identification can be automated to a large extent through information system updates and interfaces (that is, between POMS results for the plant and the plant equipment database and inventory/materials management systems).

Industry tools that facilitate identification of obsolete items are discussed in Section 12 of this report.

2.2.4 Implement Enhanced Processes to Flag Issues



When obsolescence information is available to plant organizations and personnel, they can enhance existing processes to consider the fact that the equipment and replacement items they are involved with are obsolete, and can enhance existing processes to provide feedback and flag potential issues. This information or feedback is provided to the organization that owns the obsolescence program.

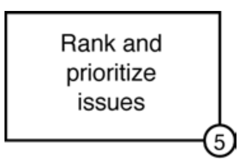
As an example, if the maintenance and planning organizations are aware of the fact that a valve they are about to perform work on is obsolete, the pre-job brief could be modified to inform the technicians that the valve is obsolete, and to prompt them to provide feedback on the condition of the valve and its internals and their best estimate of how long the valve or internals might last before requiring replacement. If the technicians believe the valve will need to be replaced in 1 year, this information is fed back to the obsolescence program owner, and can be used to better prioritize (and define) the obsolescence issue for that valve.

The organizations that can provide feedback and the type of feedback they might provide are discussed in Sections 6 through 11 of this report.

Barriers to implementing enhanced processes include lack of senior management sponsorship and/or buy-in from the organizations concerned.

Resources required to enable process enhancements include the ability for the obsolescence program owner to provide pertinent obsolescence reports to organizations that can provide feedback as well as the creation of interfaces between the various organizations responsible for addressing obsolescence and to ensure each group appreciates the various issues associated with prioritizing the obsolete items for which solutions will be developed.

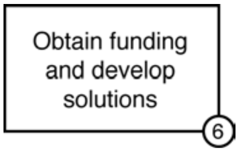
2.2.5 Rank and Prioritize Issues



Once issues are identified, and mechanisms for collecting feedback on the issues are enabled, the obsolescence program owner can prioritize the issues based upon the feedback received. Prioritization may involve several steps. For example, the total population of issues might first be stratified into high-, medium-, and low-priority issues. The high-priority issues are then ranked using a more detailed analysis to determine what the top obsolescence issues are. Ranking may be accomplished using prioritization schemes developed by plant organizations, and initial ranking may be based upon component criticality classification. Criticality classifications are discussed in Section 4 of this report.

The ability to efficiently and effectively collect and process the data requires resources that include an approved plant prioritization algorithm, as well as a tool that can be used to collect and analyze obsolescence data. In addition, the ability to analyze PM task schedules linked to obsolete items as well as existing plant inventory linked to obsolete items is required. Existing tools that facilitate prioritization of obsolete items are discussed in Section 12 of this report.

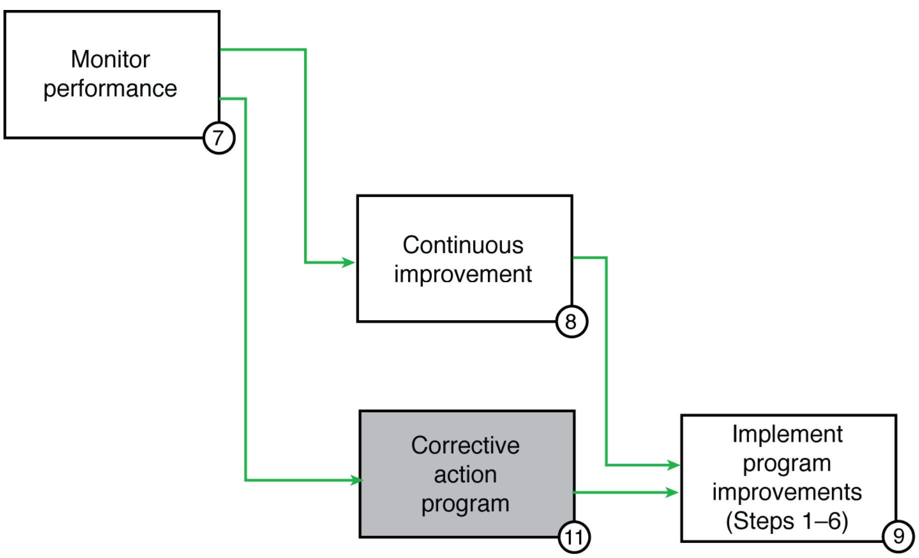
2.2.6 Obtain Funding and Develop Solutions



Once the top plant obsolescence issues are identified, funding must be obtained to pursue development of replacement solutions. The types of solutions vary from design changes and equivalency evaluations to reverse engineering replacement items. In some plants the obsolescence program might have a dedicated budget set aside for the development of solutions. In other cases, the obsolescence program owner may have to build a case for each of the top issues and present them to plant organizations such as plant health committees that determine which projects are funded.

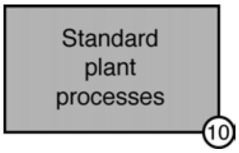
Barriers to obtaining funding may include lack of dedicated funding and resources to address nonemergent obsolescence issues.

2.2.7 Monitor Performance



As is the case with any program, it is important to monitor the effectiveness of the program and continuously seek to improve performance and efficiency. In addition to employing existing tools such as the plant corrective action system, monitoring performance may include development of key performance indicators, and collection of data related to the expense of obsolescence as well as avoided costs and lost generation attributable to the obsolescence program.

2.2.8 Standard Plant Processes



The process improvements discussed in Section 2.2.4 are integrated into existing plant processes. The organizations involved in the processes are responsible for implementing the enhancements.

Enabling enhancements may require development of checklists and other tools that specifically relate obsolescence to each standard plant process.

Barriers to enhancements may include unavailability of resources required to make procedural changes and develop ways for information to be collected and transmitted to the organization that owns the obsolescence program.

2.3 Existing Obsolescence Programs

Appendix C of this report provides brief synopses of obsolescence programs at several nuclear utilities, including how those programs are currently structured and being implemented.

This information may be used to develop new obsolescence programs or to benchmark and enhance existing obsolescence programs.

The TAG expects to provide more detailed guidance on each of the steps included in Figures 2-3 and 2-4 in a subsequent report to be developed in 2009.

3 IDENTIFICATION OF OBSOLETE EQUIPMENT/ITEMS

Knowing which plant equipment is obsolete is important, and a complete list of obsolete equipment is a good baseline. To understand the true impact of obsolescence on plant operations and maintenance, an organization must also be aware of replacement parts that are obsolete. In addition, it is important to be able to determine when the replacement parts will be required for scheduled work and how long existing inventory will last before a replacement part-level solution is necessary.

Licensees should recognize that the quality and accuracy of their current materials management information system may be a factor in their ability to determine the extent to which obsolescence is affecting them. Some plants do not have complete make/model number information incorporated into their information systems/databases, and have difficulty understanding what components are in fact installed in their plants. Therefore, these data limitations and the quality/accuracy of available data make it difficult to move forward and proactively identify and prioritize equipment for which obsolescence solutions are needed.

3.1 Background Regarding the Current Scope of Obsolete Equipment

Utilities realize that the first step in proactively addressing obsolescence is to identify the population of obsolete items currently required to support their plant or fleet. In essence, this means identifying the entire population of equipment and parts that are no longer supported by a manufacturer.

One way in which utilities are attempting to identify obsolescence more proactively is through the use of available industry tools. These tools provide utilities with information related to obsolescence, such as lists of potentially obsolete equipment in their facilities or links to existing solutions for similar obsolescence issues. While these tools do provide value, they are only a starting point for implementation of an effective proactive obsolescence management program.

The Proactive Obsolescence Management System (POMS, developed by PKMJ, Incorporated) is the most widely used obsolescence product among EPRI-member nuclear utilities. POMS is used to collect and analyze obsolete equipment data. POMS collects manufacturer model and part number information, and PKMJ contacts suppliers annually to determine if each manufacturer and model is still supported.

As of October 27, 2008, the POMS database contained equipment obsolescence data for 97 nuclear units operated by 28 utilities. Analysis of the data collected for 6.1 million equipment IDs (tag numbers) indicates that approximately 50% (3 million) of the records are not usable in their existing format.

As of October 27, 2008, obsolescence determinations have been made for 1,934,630 of the 3.1 million equipment IDs with recognizable data.

- 361,322 of these equipment IDs have been determined to be obsolete.
- 1,169,063 of the equipment IDs have been determined to be not obsolete.
- 404,233 of the equipment IDs have been identified as not recognizable by the manufacturer, or contained insufficient information for the manufacturer to make a positive determination.

Further analysis of the 361,322 obsolete equipment IDs shows that approximately 22%, or 32,871, of the unique identifiable manufacturer and model number combinations are obsolete. The true average percentage of obsolete items may be higher than 22% as obsolescence status has yet to be determined for about 50% of identifiable manufacturer/model numbers.

Key Information Point

The overall average percentage of obsolete items may be higher than 22%, based on industry data analyzed to date (via POMS).

Therefore, obsolescence is clearly a significant issue. As a minimum, 32,871 of the 3.1 million unique manufacturer and model number combinations installed in the 97 plants operated by POMS members are currently not supported by a manufacturer. The magnitude of obsolescence suggests that while it is important to be aware of the fact that thousands of installed items at any given facility are obsolete, it is essential to be able to prioritize, resolve, and develop solutions before they impact production or scheduled maintenance activities.

3.2 Determining the Scope of Obsolete Equipment Affecting Each Licensee

The term *obsolescence* is commonly used in the nuclear industry to refer to several conditions. One meaning is the condition of being out of date due to development of better or more economical products, methods, processes, machinery, or facilities. In this context, the original product, method, process, machinery, or facility may still be available for purchase and use, but a decision is made that it will no longer be used.

Another meaning of obsolescence is that the item in question is no longer manufactured or supported by the original manufacturer, or is otherwise difficult to procure and qualify. In this context, the original item is not available for use, resulting in the need for an appropriate replacement to be identified and approved for use.

This report focuses on addressing components (and their parts) that are not currently available in the marketplace but may be needed as replacements.

> **Key Information Point**
>
> The population of equipment and associated replacement items in a plant that are obsolete must be determined.

Identification of obsolete items entails collecting make and model number information for the entire population of plant equipment, and determining if the equipment is still supported by the OEM or OES. In addition, consideration must be given to determining the obsolescence status of replacement items. Certain replacement items may be available even though the original equipment is no longer supported. An example would be an O-ring that is still readily available from an O-ring manufacturer, even though the O-ring's host component, perhaps a transmitter, is no longer supported by the OEM.

This endeavor may prove challenging for the following reasons, and application of the Pareto Principle (also known as the 80/20 rule) should be considered when establishing the baseline population of items.

- Unique component identification schemes employed by licensees and NSSS suppliers have resulted in the loss of easy access to manufacturer and part number information.
- Nuances in how data was entered into plant information systems impact the accurate identification of manufacturer/model number combinations, for example SMB00 or SMB-00 or SMB-OO.
- Component identification details are used in information systems to capture information for part-level items (for example, fuses that each bear an equipment tag number/component ID).
- Many plant information systems are missing manufacturer or part number information or contain indecipherable unidentifiable information in these fields.

Once the population of obsolete equipment is identified, the population of spare and replacement items necessary to support the equipment must be determined.

3.3 Determining the Population of Inventory Items Impacted

The spare and replacement items for each obsolete component can be determined by mining information in plant maintenance, supply chain, inventory, or enterprise asset management systems. Bills of material, work order history (the parts actually used to complete work on the components), preventive maintenance tasks, and other data may be used to determine the set of replacement items needed to support each piece of obsolete equipment.

Once the required replacement items related to obsolete equipment are identified, the licensee should compare those requirements against items currently in stock. In order to determine the population of inventory items impacted by obsolescence, the licensee should develop a means to relate/link obsolete equipment to spare and replacement items currently in stock. This may be done by linking those items with unique identifiers (for example, stock codes, CAT-IDs, and so on) to the host equipment that has become obsolete. This cross-referencing or linking can be accomplished in a number of different ways, depending on the design and capabilities of the licensee's materials management information system and associated databases. Typically the following tools are available to facilitate the linking of obsolete components/equipment to existing stock items:

- BOM links (derived from Q-list, Master Equipment Lists, and so on)
- Vendor technical manuals, operating instructions, and maintenance instructions
- Work order history
- Repair/replace analysis (maintenance philosophy)
- Work order/PM activities
- Understanding of supply chain dynamics (that is, manufacturer changing part design, part QA controls, manufacturer going out of business, and so on)
- PM templates

It is worth mentioning that available tools like POMS can be used as a source of unverified (not validated by engineering) "Industry BOM" information for many obsolete components that shows the part numbers linked to equipment across the industry, and can also be used to develop unverified plant-specific bills of materials based upon data in plant information systems such as work order history, issue history, and so on. These baseline bills of material can be used as a starting point for identification of obsolete equipment.

3.4 Identification of Obsolete Equipment and Associated Parts

Once obsolete items are identified, they should be flagged in plant information systems so that plant personnel are aware of obsolete equipment and parts and can proceed with their work activities and planning accordingly.

Key Technical Point

Equipment and replacement items determined to be obsolete should be flagged in plant information systems (that is, equipment databases, inventory/material management systems, and so on). Flags should be revisited if an obsolescence solution is developed and implemented for the obsolete item.

4
PRIORITIZATION OF OBSOLESCENCE ISSUES

Prioritization of obsolescence issues is clearly a challenge, and requires integrating available obsolescence information into existing plant processes and decision making.

The ability to group related equipment obsolescence issues into a single issue should be considered. For example, if a plant identifies five models of solenoid valves manufactured by a single supplier as obsolete, the plant may decide to group them into a single issue to gain efficiencies in developing solutions for all five models. Likewise, a plant that identifies an obsolete lubricant used to perform a PM on an actuator should research other applications for the lubricant and group all uses into a single obsolescence issue.

Development of screening criteria that evaluate risks associated with identified obsolete equipment is necessary to prioritize known obsolescence issues. The screening criteria can be used to identify high-priority equipment and parts that are candidates for replacement solution development.

Effective screening requires input from many organizations including System Engineering, Design Engineering, Procurement Engineering, Supply Chain, Operations, Maintenance, Work Management, and Planning. Obsolescence information can be incorporated in existing plant processes and decisions performed by these organizations to solicit feedback that can be used to identify high-priority obsolete equipment that requires replacement solutions.

Figure 4-1 illustrates that the licensee should consider four major factors when initially prioritizing obsolescence issues and the equipment subsequently affected.

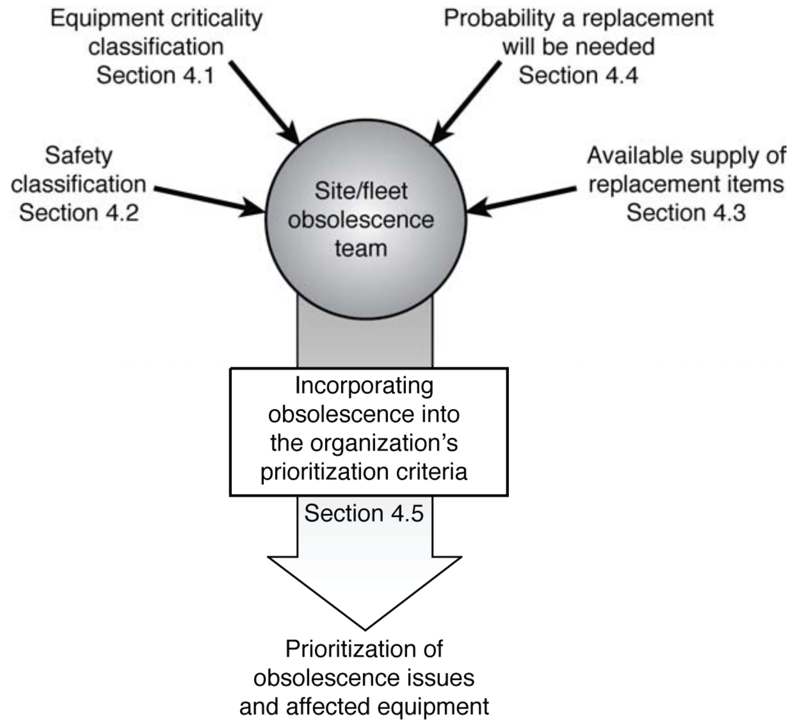


Figure 4-1
Major considerations when prioritizing obsolescence issues

Additional considerations for prioritization of plant obsolescence issues include the following:

- Technical specification applicability
- Procurement quality classification
- Environmental qualification requirements
- Fire protection
- In-service inspection and testing requirements
- Probabilistic risk analysis classification
- ASME Section XI considerations
- Seismic category
- Historical usage
- Future demand
- Historical lead times
- Current quantity in stock

4.1 Equipment Criticality Classification

One of the key factors affecting the prioritization of obsolete equipment is its plant function and resulting criticality classification. Domestic licensees have performed numerous classifications of their installed systems and components, ranging from the deterministic safety classification conducted during the 1980s to the more recent criticality classification. Obviously, equipment criticality plays a role in prioritization of issues.

4.1.1. Background

The term "critical" can be applied to items at various levels of equipment complexity. The purpose of this section is to discuss, for the purposes of this report, criticality as it relates to components, parts, and replacement items.

The term "critical" is typically defined as meaning any system, structure, component, or part that would result in the conditions noted below if it fails:

- Significant power transient or derate
- Loss of a redundant safety function
- Unplanned entry into a technical specification, for example, a limiting condition of operation
- Half scram or partial trip
- Reactor shutdown
- Actuation of emergency safeguards features
- Failure to control a critical safety function such as reactor water level and pressure, primary and secondary containment, drywell temperature and pressure, or spent fuel pool temperature and level
- Degraded capability to shut down the reactor and maintain it in a shutdown condition
- Inability to perform an emergency operating procedure, or to prevent or mitigate the consequences of accidents that could result in potential off-site exposure in excess of 10CFR100 [5] limits
- Operator workaround for performing any of the above functions or procedures

Additional considerations for defining the scope of critical equipment may also include the following:

- Plant-specific items that may limit plant productivity or plant operation
- Maintenance philosophy regarding replacement of entire components versus replacement of parts within those components
- Significant schedule constraints associated with a refueling outage

A component categorized as “noncritical” is typically one for which cost-effective preventive maintenance may make sense. While undesirable, failures of noncritical equipment are less consequential than failures of critical equipment.

A component categorized as “run to failure” is typically a component for which the risk and consequences of failure are acceptable without predictive or preventive maintenance being performed. In such cases, there is not a simple cost-effective method to extend the useful life of the component. Therefore, the decision is made to run the component until corrective maintenance is required.

4.1.2 Defining and Determining Critical Equipment/Components

Utilities classify component and equipment criticality in accordance with processes established in applicable procedures. Typically, equipment classifications include critical, noncritical, and run-to-failure.

The classification of the host equipment should be considered when developing criticality classifications for associated spare and replacement items.

Key Technical Point

The classification of the host equipment should be considered when developing criticality classifications for associated spare and replacement items.

4.1.3 Defining Critical Parts

A part may be categorized and identified as “critical” if it meets the following criteria:

- It is associated with critical equipment.
- Its failure could alter the host (critical) equipment performance so as to adversely impact plant operations.

4.1.4 Precautions for Run-to-Failure Items

As noted in Section 4.1.1, one of the typical criticality classifications for equipment is “run to failure.” This categorization affects the rigor of maintenance activities and allows the licensee to operate the equipment until it fails (without adverse impact on plant operations, safety, or availability). However, in the event these components do fail, they will have to be repaired or replaced.

Therefore, care should be taken not to summarily exclude “run-to-failure” components and associated replacement items from the population of obsolete equipment evaluated and prioritized by the obsolescence program. If it is anticipated that the equipment will be repaired or refurbished upon failing, then the licensee should ensure that obsolescence at the part level is adequately addressed.

4.2 Safety Classification

Safety classification of the obsolete inventory item is a factor in prioritization, as safety classification is typically directly related to the time required to obtain a replacement solution. Developing replacement solutions for safety-related equipment usually requires application of more extensive engineering resources (of both the plant's and the supplier's organizations) and far more lead time than required for non-safety-related items. The process used to correctly specify an item is referred to as a *technical evaluation*. Performing technical evaluations and safety classification is typically the responsibility of the procurement engineering organization.

The two major safety classification categories are safety-related, and non-safety-related. Augmented quality items are a subset of non-safety-related items.

Figure 4-2 illustrates that for safety-related components, subcomponents may be classified as either safety-related or non-safety-related, based upon their function within the component. The figure also shows that safety-related subcomponents may be procured either as a basic component (that is, from an organization with a 10CFR50, Appendix B QA program), or as commercial grade items and dedicated by the licensee under their 10CFR50, Appendix B QA program.

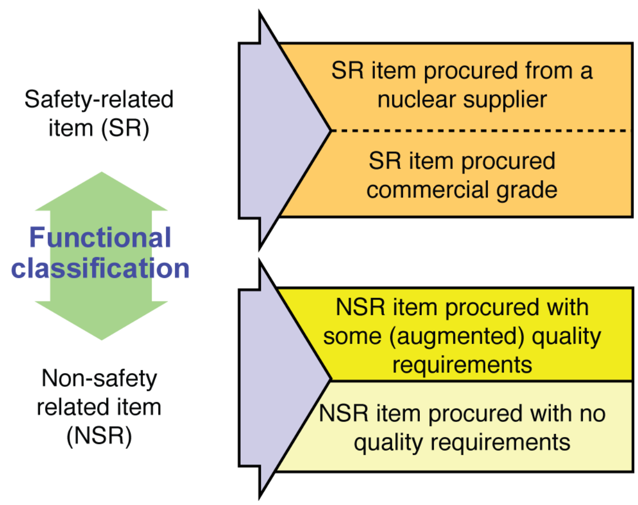


Figure 4-2
Current procurement categories for most licensees

4.3 Available Supply of Replacement Items

The available supply of replacement items is another key consideration when prioritizing obsolescence issues. If a plant has enough inventory on hand to support operation of an obsolete component for the life of the plant, obsolescence issues associated with that component would be low priority. If zero inventory is on hand, the issue may be classified as high priority.

In certain cases, the availability of replacement parts for an obsolete item might impact prioritizations. For example, if O-rings required to support maintenance and maintain equipment qualification for an obsolete transmitter are readily available from an O-ring manufacturer (and meet technical and quality requirements), then the issue associated with obsolete O-rings would be considered very low priority. On the other hand, if suitable replacement O-rings could not be obtained and upcoming PMs specify the need for them, the issue would be classified as high priority.

4.3.1 Sources of Replacement Items

Replacements for obsolete items may be obtained from several sources, including:

- Existing plant and fleet inventory, including inventory (stored) and cannibalization opportunities
- Existing supplier inventory, including that of original equipment manufacturers (OEMs), original equipment suppliers (OESs), and surplus suppliers
- Aftermarket replacement solutions provided by suppliers specializing in reverse engineering or other forms of obsolescence solutions
- Other organizations' existing inventory (for example, another licensee)

The number of available spares in inventory is the primary consideration when determining the available supply of replacement items. This information in conjunction with preventive maintenance intervals, quantity required to support preventive maintenance tasks, and equipment failure history can be used to determine the approximate date when existing inventory will be depleted and a replacement solution will be needed. Section 13 of this report provides a more detailed look at various replacement options a licensee may consider when implementing a solution to an obsolescence issue.

4.3.2 Complexity of Design

Complexity of design is a factor that should be considered when determining the availability of replacement items. Similarly, components with complex technical and quality assurance requirements such as those manufactured to meet ASME, Class 1E, and environmental qualification requirements may be assigned a higher priority, because most likely the number of options available for developing a suitable replacement will be more limited.

4.3.3 Known Capabilities of Replacement Solution Providers

Industry databases such as OIRD can be used to identify known and existing solutions for items determined to be obsolete.

In some cases, a supplier may have already engineered a direct replacement solution, while in others a supplier may have recognized expertise in a certain area that could be drawn upon to decrease the lead time and expense associated with developing a replacement solution.

Another capability that should be considered is the status of the supplier's quality assurance program on the utility's approved or qualified supplier list. Keep in mind that even when a supplier has the correct quality assurance program, it can take a fair amount of time to add the supplier to the plant's or utility's approved or qualified supplier list. A thorough understanding of a supplier's current capabilities typically facilitates implementation of the least-cost option if and when a replacement is needed for an obsolete item. Furthermore, understanding the supplier's current capabilities enables the licensee to "stage" a solution for future implementation when needed. Section 13 provides more discussion on staged solutions.

4.4 Probability That a Replacement Will Be Needed

Perhaps the most challenging aspect of prioritization is developing an effective method of understanding the probability that a replacement item will be needed for any known obsolete component or part. Three major hardware considerations affecting the probability that a replacement item will be needed for a given piece of obsolete equipment are the following:

- Condition of the installed items
- Published component lifetime
- Ability to obtain feedback from plant personnel with hands-on experience

A primary input determining whether a replacement item will be needed is the repair vs. replace philosophy for the equipment, and thus this becomes another factor affecting prioritization. In some cases it is more economical to replace the entire component rather than replace parts or assemblies installed in the whole component.

4.4.1 Condition of the Installed Items

Another primary factor that should be considered when addressing obsolescence is the condition of the equipment at the time replacement is anticipated. In addition to opportunities to obtain feedback on the current state of equipment from organizations such as System Engineering and Maintenance, opportunities also exist to assess the operating history of equipment that include reviewing the following sources of information:

- Operating experience including the mean time between failures, if any
- Corrective maintenance history (including any activities performed outside of replacement intervals)
- Results of performance trending
- Component health reports
- Corrective action reports
- Predictive maintenance (PdM) history
- Industrywide operating experience data

Another key factor is the age of equipment, and assessing how close it is to the anticipated end of life. Obsolescence may not be a much of a concern for older equipment, because it may be more beneficial to replace it with an alternative to take advantage of advances in design and related technologies. Guidance regarding aging management may be found in NUREG-1801, the "Generic Aging Lessons Learned (GALL) Report" [6] and NEI 95-10 (Revision 3), "Industry Guideline for Implementing the Requirements Of 10CFR54 – The License Renewal Rule" [7].

EPRI has also published a number of life cycle management (LCM) sourcebooks, which are listed in Table 4-1, and which may assist the user of this report with guidance regarding aging management.

Table 4-1
EPRI life cycle management sourcebooks

Report Number	Title of EPRI Technical Report
1008282	Life Cycle Management Planning Sourcebook for Nuclear Plant Service Water Systems, March 2005
1015075	Life Cycle Management Planning Sourcebooks – Chillers, December 2007
1003058	Life Cycle Management Planning Sourcebooks – Overview Report, December 2001
1006609	Life Cycle Management Planning Sourcebooks – Volume 1: Instrument Air System, December 2001
1006616	Life Cycle Management Planning Sourcebooks – Volume 2: Buried Large Diameter Piping, May 2002
1003651	Life Cycle Management Planning Sourcebooks – Volume 3: Main Condenser, March 2003
1007423	Life Cycle Management Planning Sourcebooks – Volume 5: Main Generator, July 2003
1007425	Life Cycle Management Planning Sourcebooks – Volume 6: Feedwater Heater Controls, February 2003
1007426	Life Cycle Management Planning Sourcebooks – Volume 7: Low-Voltage Electrical Distribution Systems, February 2003
1009071	Life Cycle Management Planning Sourcebooks – Volume 8: Main Turbine, January 2004
1009072	Life Cycle Management Planning Sourcebooks – Volume 9: Main Turbine Electro-Hydraulic Controls, December 2003
1009073	Life Cycle Management Planning Sourcebooks – Volume 10: Feedwater Heaters, December 2003
1013187	Life Cycle Management Planning Sourcebooks – Medium-Voltage Cables and Accessories, November 2006
1010031	Life Cycle Management Planning Sourcebooks – Medium-Voltage Switchgear, March 2006
TR-102204	Service (Salt) Water System Life Cycle Management Evaluation, May 1993

Note that additional life cycle management sourcebooks are being developed.

4.4.2 Published Component Life

The expected service lifetime of the component can also be determined using industry experience and information provided by the OEM or OES. This may vary depending on the severity of service, so care should be taken to ensure that plant-specific applications are known and factored into the determination. Consideration should be given to the fact that manufacturers often publish conservative estimates of component life.

The EPRI Preventive Maintenance Basis database [8] can be used in conjunction with site preventive maintenance (PM) strategy to define component replacement intervals, which can be captured in PM tasks.

4.4.3 Actual Condition of Obsolete Items

Feedback regarding the actual condition of the equipment or part is useful when prioritizing issues. As an example, system engineers may be able to provide insight into the performance of the obsolete equipment. Similarly, maintenance technicians and craft personnel can provide an excellent source of first-hand information regarding the condition of the equipment.

However, these individuals must be aware in advance that they are working on obsolete equipment, so obsolescence considerations should be integrated into the work planning process.

4.5 Incorporating Obsolescence Considerations into the Organization's Processes

4.5.1 Obtaining Feedback from Normal Plant Processes

Owners of an organization's proactive obsolescence management program should identify plant processes that could benefit from consideration of equipment known to be obsolete. Identification of these processes requires input from the involved plant organizations that are discussed in detail in Sections 5 through 11 of this report.

Once the processes and decision-points are identified, the types of reports necessary to communicate the required obsolescence information and the individuals to whom the information should be provided can be determined.

For example, the way in which a mechanic approaches maintenance of a component or the way in which a planner plans the job may be different when they are aware of the fact that the component is obsolete and know how many replacements are currently available.

In this example, conduct of a work order and work order planning would be two processes that could benefit if obsolescence considerations are overtly incorporated into the processes.

Key Human Performance Point

For the mechanic, provisions would be made to identify that the item is obsolete early in the work order instructions and in the pre-job brief.

In addition to notifying the mechanic that the component is obsolete, the pre-job brief should request that the mechanic record his or her opinion of the component's condition. A standard question may then be added to the post-job review to solicit the mechanic's opinion, and that information could then subsequently be captured in the plant information system for use in effective prioritization.

For the planner, a means of identifying the component as obsolete in planning information systems will be established to ensure that the planner is aware the equipment is obsolete before planning the job.

A job instruction, checklist, or guideline for how to approach planning for obsolete equipment might be provided to planners to remind them to consider repair before replacing, save uninstalled items for reverse engineering activities, and so on. In addition, a method for capturing and processing any comments or ideas the planner has relative to the obsolete equipment would be established so that this information is fed back to the obsolescence program for analysis as part of the normal planning process.

An effective prioritization program enables development of solutions well in advance of scheduled work. In addition, an effective program considers input from maintenance, engineering, and supply chain organizations when determining the appropriate type of obsolescence solution (for example, equivalency evaluation, design change, reverse engineering, and so on).

4.5.2 Typical Plant Prioritization Criteria for Programs

Prioritization is based on assessing the various types of risk associated with performing (or not performing) the work activities. It is important to note that obsolescence is currently not included as a stand-alone consideration in the obsolescence programs reviewed by the TAG. To ensure that obsolescence is weighted appropriately in an organization's prioritization algorithm and to facilitate tracking costs associated with obsolescence, obsolescence itself can be considered as a key prioritization factor.

Key Technical Point

Obsolescence should be included as a discrete factor that is considered in plant prioritization algorithms.

5
OBSOLESCENCE PROGRAM OWNERSHIP

5.1 Program Ownership

Responsibility for ownership of a proactive obsolescence program should be clearly and consistently assigned to one plant organization. However, successful program implementation requires the active participation of several (additional) key plant organizations. Therefore, strong executive or senior management sponsorship is required.

The purpose of this section is to discuss some of the factors that may be considered when determining which organization should lead a proactive obsolescence program team. As used in the context of this report, *program* simply refers to the documented activities and processes in place to address obsolescence in a proactive manner.

5.1.1 Supply Chain Versus Engineering

Typically, obsolescence program leadership is provided by either the supply chain organization or the engineering organization.

By their nature, supply chain organizations such as Purchasing and Procurement Engineering have typically been the first plant organizations to discover an item is obsolete, and are on the front line of the obsolescence issue. Traditionally, this discovery occurs when an attempt is made to purchase the item to support planned work, and resolution of the obsolescence issue is required in short order. In addition, supply chain and procurement engineering organizations usually are the first to know when suppliers stop supporting plant equipment, or when responsibility for supporting plant equipment is transferred from one supplier to another through commercial transactions such as mergers and acquisitions.

As a result, Procurement Engineering often takes the lead in finding or coordinating solutions for emergent or reactive obsolescence issues. However, by their nature, supply chain organizations such as Purchasing and Procurement Engineering are not in a position to address proactive obsolescence management without support of other plant organizations. This is because the procurement engineering and supply chain organizations are typically not in a position to evaluate the health of plant equipment or determine when and how often planned work on obsolete equipment will occur.

Typically, mechanisms are already in place for plant engineering organizations to obtain information about the health of plant equipment. In addition, the engineering organization is in large part responsible for equipment reliability and asset management.

Maintenance organizations are able to best determine when, how often, and what types of work will be performed on plant equipment. When taking a proactive approach to obsolescence management, information about the health of plant equipment and future planned work is an essential ingredient in prioritizing obsolescence issues.

Regardless of the organization that assumes ownership of the program, industry experience has proven that successful implementation is a team effort. Roles and responsibilities must be clearly defined and followed, and the processes should be appropriately documented and mapped using process flowcharts.

Sections 6 through 12 of this report describe the various roles, responsibilities, and contributions various organizations at the site/fleet should have in identifying and resolving obsolescence issues.

Figure 5-1 provides an overview of the organizations that should be active participants and heavily involved in the proactive obsolescence program team.

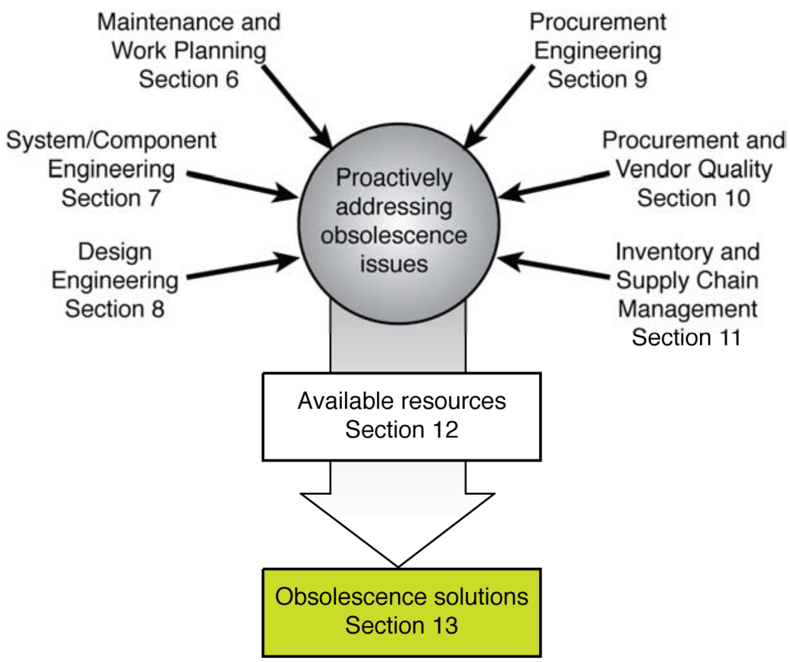


Figure 5-1
Organizations comprising the obsolescence program team

5.1.2 Identify the Need as Early as Possible

As discussed above, procurement engineering or supply chain organizations cannot address obsolescence alone. Cooperation from other organizations is required in order to be proactive. If the licensee is depending on these organizations alone to be the first to identify and then resolve an obsolescence issue, identification will typically occur after work is planned, and resolution will be reactive instead of proactive.

Most licensees have information systems and reporting capability that can be used as a foundation to develop an automated means to identify obsolete items and store information about the items that can be used to determine the likelihood that a replacement will be needed.

Key Human Performance Point

Communication between and participation of various groups is the key to a successful proactive obsolescence management program.

5.2 Plant Health Committee Involvement

The plant health committee can play a key role in a proactive obsolescence management program, as this organization often determines which projects go forward and eventually get funded. Strategic obsolescence-related projects may be competing with other projects to address tactical equipment issues at the plant health committee level.

Benchmarking of current proactive programs revealed that Engineering is sometimes responsible for issuing an equipment obsolescence program health report each quarter and includes relevant performance indicators as well as a summary of completed and open actions. Self-assessments/benchmarking activities and plans may also be documented in the quarterly equipment obsolescence health report.

In addition, a system can be established to prioritize the resolution of all identified obsolete items. This priority system takes into consideration (1) the component function within a plant system, (2) maintenance and failure history, (3) available spares, and (4) system priority. This prioritized list can be utilized for input into the station long-range plan, obsolescence program health reports, and system/component health reports.

5.3 Introduction to Component/System Health Reports

EPRI report 1009745, *System, Component, and Program Health Reporting* [9], provides valuable guidance and examples for the component engineer when communicating the current status of a given component. It also describes ways in which a licensee can effectively integrate reporting at the program, system, and component levels.

Input used to feed into a plant’s health reporting system such as system, component, and program health reports might also prove as useful input to a proactive obsolescence management program. Figure 5-2 illustrates the types of information typically provided to the plant equipment reliability review board.

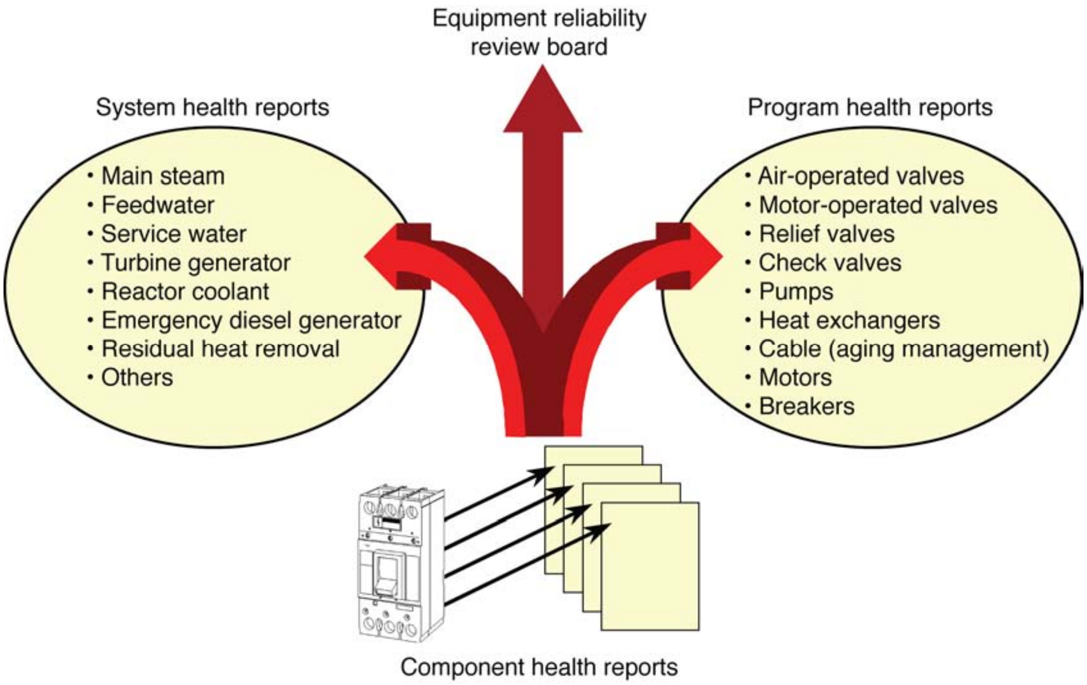


Figure 5-2
System, component, and program health reports

6
MAINTENANCE AND WORK PLANNING ROLE

6.1 Decisions and Processes

The work planning organization may be the first group to identify that an item is obsolete if they are interfacing with the supplier. If this is the case, the information should be communicated to the organization that owns the obsolescence program as soon as possible. These individuals can also assist when determining the extent of condition (that is, the number of impacted plant applications) once an obsolete component has been identified. Other decisions and processes affecting obsolescence program implementation are as follows:

- Input to the overall maintenance philosophy regarding whether certain types of components are typically repaired with replacement parts (that is, fix in place) or replaced in their entirety
- Input regarding prioritization efforts (high, medium, low) based on maintenance history
- Prioritization of work based on knowledge of equipment obsolescence
- Identification and/or correction of inaccurate or incomplete item data in plant databases

6.2 Obsolescence Information Provided to Maintenance

The obsolescence program can provide the following types of information to the maintenance work planning organization:

- Identification of obsolete equipment included in the T-week schedule
- Identification of obsolete spare and replacement items associated with obsolete equipment
- Requests that obsolete equipment and parts be saved after they are uninstalled, for use in activities such as reverse engineering

Key Technical Point

It may be appropriate to ask Maintenance to save obsolete equipment and parts after they are uninstalled for use in the future development of obsolescence solutions (for example, for use in reverse engineering).

6.3 Prioritization Information Provided by Maintenance

The work planning organization can provide the following types of information to the obsolescence program owner to facilitate the effective prioritization of obsolescence issues:

- Maintenance strategy (repair vs. replace) for a given piece of equipment (to determine what items will be needed).
- As-found information relating to obsolete equipment (condition, remaining life).
- Condition monitoring information.
- When notified that equipment is obsolete, Maintenance can include obsolescence information in the pre-job brief and document actual condition of obsolete equipment and parts during the post-job review (and in information systems) for use in prioritization efforts.

Key Technical Point

The pre-job brief can be used to increase awareness that the equipment on which the maintenance activities are being performed is obsolete, and therefore special care may be warranted during work activities.

6.4 Involvement in Development of Obsolescence Management Tools and Solutions

The maintenance and work planning organizations contribute to developing obsolescence management tools in the following manner:

- Identify reports or information that might be useful to Maintenance in prioritizing obsolete equipment and part needs.
- Identify where information should be available in plant information systems typically used by Maintenance personnel.
- Assist in development of a mechanism for projecting replacement of obsolete items well in advance of the normal T-week schedule for work anticipated on obsolete equipment.
- Assist in development of a mechanism for notifying the supply chain organization when items required for work on obsolete items are not in stock well in advance of the T-week schedule (for example, based upon scheduled PMs and existing inventory).

The maintenance and work planning organizations contribute to developing obsolescence management solutions in the following manner:

- Contributing to the development of the site repair vs. replacement policy or philosophy

7
SYSTEM/COMPONENT ENGINEERING ROLE

The purpose of this section is to describe the role the system/component engineering organization should have in addressing the obsolescence issue. These roles and responsibilities will vary significantly depending on the organizational structure at each licensee's facility, given that the roles of system and component engineers often overlap and may be performed by the same individual(s). Additional guidance regarding typical roles and responsibilities of these individuals is provided in EPRI report 1011896, *Guidelines for Effective Component Engineering* [10].

7.1 Decisions and Processes

7.1.1 Maintenance Basis Process

Information developed as part of the following processes may provide useful input into a proactive obsolescence program:

- The Maintenance Basis process, including Maintenance Basis development and control and Maintenance Basis changes
- Condition-based/predictive maintenance
- System reliability meetings
- Work week management
- System documentation

7.2 Obsolescence Information Input to System Engineering

The obsolescence program owner can provide the following types of information to the appropriate system engineers within the engineering organization:

- List of obsolete equipment in the system (internally from the site and externally from POMS)
- Available solutions (replacements/equivalents) for obsolete equipment

7.3 System Engineering Output for Use in Prioritization of Obsolescence Issues

The system engineers can provide the following types of information to the obsolescence program to facilitate the effective prioritization of obsolescence issues:

- Identification of high-risk obsolete equipment (for example, near end of life, poor performance, upcoming major maintenance, and so on)
- System/component heath reports (that is, identification and tracking of obsolescence issues associated with a given system/component)
- Impact of obsolescence and recommendations to address equipment reliability gaps
- Information gathered from owners groups regarding the performance and reliability of particular components
- Changes to PM activities so they are evaluated for impact on inventory
- Obsolescence value rankings to determine system vulnerability

7.4 Involvement in Development of Obsolescence Management Tools and Solutions

System Engineering can contribute to developing obsolescence management tools in the following manner:

- Recommending design modifications/maintenance (sponsoring solutions for system/component level obsolescence issues and those requiring design modification/maintenance)

The system engineers can contribute to developing obsolescence management solutions in the following manner:

- Recommending design modifications that subsequently determine major components that will be replaced or those that will be repaired
- Identifying the need for enhanced maintenance activities
- Identifying the impact obsolescence had on recovering from equipment failures during failure analysis
- Identifying the impact obsolescence had on equipment failure due to deferred maintenance during failure analysis
- Recommending or performing equivalency evaluations for proposed replacement items, if appropriate per site procedures
- Reviewing a planned solution to ensure that it is in line with overall plans for the system (include in recommendations to PHC and other committees involved in changes)

8
DESIGN ENGINEERING ROLE

8.1 Decisions and Processes

Decisions and processes performed by design engineers that affect obsolescence program implementation are as follows:

- Implementation of plant-specific design modifications for obsolete items as directed by the plant health committee
- Implementation of corporate design modifications for obsolete equipment as directed by the fleet, if applicable
- Identification of potential obsolete equipment through supplier interface to evaluate emergent plant issues
- Consideration of subcomponent obsolescence when specifying equipment to support a new design
- Selection of a new or standardized design that has a low likelihood of future obsolescence issues

8.2 Obsolescence Information Input to Design Engineering

The obsolescence process can provide the following types of information to the appropriate design engineers within the engineering organization:

- List of obsolete equipment in the system (internally from the site and externally from POMS)
- Available solutions (replacements/equivalents) for obsolete equipment (as provided in industry databases like OIRD, POMS, and so on)
- Applicable design, procurement, equipment, and material specifications, updated to include current requirements
- Plant design as-built information (for example, vendor manuals, as-built drawings, bills of material, and so on)

8.3 Design Engineering Output for Use in Prioritization of Obsolescence Issues

Design engineering can provide the following types of information to the obsolescence program to facilitate the effective prioritization of obsolescence issues:

- Selection of the optimum change process (design change vs. equivalency) after consultation and coordination with the procurement engineering organization
- Obsolescence issues learned through other design modification activities

8.4 Involvement in Development of Obsolescence Management Tools and Solutions

Design engineering can contribute in the following way to the development of obsolescence management tools:

- Scoping anticipated design modifications/maintenance in a manner that may simultaneously address obsolescence issues

The design engineers may contribute to developing obsolescence management solutions in the following manner:

- Performing design modifications for major components that will be replaced or those that will be repaired
- Performing equivalency evaluations, if appropriate per site procedures
- Ensuring the design modification generically considers similar equipment (that is, extent of condition) to possibly reduce the number of obsolete components in the plant
- Ensuring solutions are captured in industry databases (for example, OIRD, POMS, and so on)

9
PROCUREMENT ENGINEERING ROLE

9.1 Decisions and Processes

Decisions and processes performed by procurement engineers that affect a proactive obsolescence program implementation include the following:

- Performing equivalency evaluations for obsolete components and piece parts
- Developing commercial procurement requirements to minimize future obsolescence concerns with the supplier (for example, continued support, provisions for obtaining design information, and so on)
- Learning of component/part obsolescence through supplier interface during day-to-day resolution of procurement/restocking issues
- Determining the most appropriate and cost-effective obsolescence options and solutions
- Identifying other plant applications for an obsolete item (that is, being proactive and replacing other like items within the extent of condition simultaneously)

9.2 Obsolescence Information Input to Procurement Engineering

The obsolescence program owner can provide the following types of information to the procurement engineering organization:

- Identification of stock items (parts and components) that are obsolete
- Available solutions (replacements/equivalents) for obsolete equipment (as provided in industry databases like OIRD, POMS, and so on)
- A list of top priority items that require replacement solutions

9.3 Procurement Engineering Output Used for Prioritization of Obsolescence Issues

The procurement engineering organization should provide the following information to the obsolescence process to facilitate the effective prioritization of obsolescence issues:

- Information obtained from tracking the number of procurement requests that were/are for obsolete equipment

- Equipment/parts that will require an equivalency evaluation in order to be replaced (typically flagged electronically in the materials management information system)
- New vendor capabilities with respect to resolving obsolescence issues
- Information gained as a result of involvement in industry efforts targeted at collaborative development of obsolescence solutions

9.4 Involvement in Development of Obsolescence Management Tools and Solutions

The procurement engineers contribute to developing obsolescence management tools in the following manner:

- Learning of component/part obsolescence through supplier interface during day-to-day resolution of procurement/restocking issues
- Updating plant inventory systems to reflect new information and requirements applicable to items identified as obsolete, even in cases when they are not being procured
- Identifying component/part obsolescence through supplier interface during day-to-day resolution of procurement/restocking issues
- Performing equivalency evaluations for obsolete components and piece parts
- Ensuring internally developed solutions are uploaded/captured in industry databases (for example, OIRD, POMS, and so on)

10
PROCUREMENT ROLE (PURCHASING AND CONTRACTS) AND VENDOR QUALITY

10.1 Decisions and Processes

Decisions and processes performed by the purchasing/contracts and vendor quality organizations that can impact a proactive obsolescence program include the following:

- Keeping current with suppliers who may be going out of business, reorganizing, or merging
  - For auditors, this can be determined during the conduct of an audit.
  - For purchasing agents, this can be determined as a purchase requisition is initially processed.
- Implementing purchases of replacement items for obsolete components

10.2 Obsolescence Information/Input to Procurement

The obsolescence process can provide the following types of information to the purchasing/contracts and vendor quality organizations:

- List of suppliers associated with equipment determined to be obsolete
- List of high-priority product lines that require support due to obsolescence
- Lists of replacement items and components that should be purchased to support the life of the plant when a supplier communicates that it is discontinuing support to a product line

10.3 Procurement Output for Use in Prioritization of Obsolescence Issues

The purchasing/contracts and vendor quality organizations can provide the following types of information to the obsolescence program owner to facilitate the effective prioritization of obsolescence issues:

- Information regarding anticipated or emergent supplier changes (that is, reorganization, mergers, going out of business, and so on)
- Current/accurate lead times based on recent purchases of other similar replacements
- Information/feedback regarding supplier current capabilities to support certain product lines

10.4 Involvement in Development of Obsolescence Management Tools and Solutions

The purchasing/contracts and vendor quality organizations can contribute to developing obsolescence management tools in the following manner:

- Development of an automated means of learning about and reporting emergent component/part obsolescence issues through supplier interface during day-to-day resolution of purchasing issues and periodic surveys of suppliers or commercially available information regarding the viability of supplier organizations
- Communicating information regarding supplier changes (that is, reorganization, mergers, going out of business, and so on) to the obsolescence program owner
- Sharing information/feedback regarding supplier current capabilities

11
INVENTORY AND SUPPLY CHAIN MANAGEMENT

11.1 Decisions and Processes

Supply chain management can play a key role in an effective obsolescence management program by considering obsolescence in the following types of processes:

- Supply chain organizations can develop a means to flag obsolete stock codes in information systems and establish measures to prompt action when inventory of obsolete items falls below established levels.
- Supply chain organizations can develop means to link obsolete item stock codes with recommended replacement item stock codes in information systems.
- Obsolete plant equipment and parts known to be obsolete can be electronically cross-linked to known existing solutions using industry tools such as those discussed in Section 12 to identify or “stage” solutions to potential obsolescence issues prior to their occurrence.
- Supply chain organizations identify and address emergent obsolescence issues using available tools and industrywide sources of data like those discussed in Section 12.
- Supply chain personnel have good opportunities to gain insight into upcoming changes in suppliers’ organizations that might impact continuing support of current product lines.
- Reports that show parts and equipment required for scheduled work on obsolete equipment can be used to screen upcoming work to determine or identify near-term obsolescence issues, and also may be used to predict future long-term demand (quantities). This information can be used to predict when existing inventory will be depleted so that solutions can be implemented before depletion.
- Solutions to obsolescence issues by suppliers, such as new product lines or recommended replacements, may be taken into consideration.

11.2 Obsolescence Information Input Provided to Supply Chain

The obsolescence process can provide the following types of information to the inventory and supply chain organizations:

- Obsolete stock codes or catalog identification numbers in plant information systems
- Notifications provided by the vendor quality organization when serious quality issues arise (for example, a supplier having audit findings precluding the procurement of safety-related items)
- New obsolescence solutions by others (for example, suppliers, other licensees, captured in OIRD, and so on)

11.3 Output Used for Prioritization of Obsolescence Issues

The supply chain and inventory management organizations can provide the following types of information to the obsolescence process to facilitate the effective prioritization of obsolescence issues:

- Suppliers that have recently experienced management or facility changes, mergers, or acquisitions
- Notification to the obsolescence process when made aware of obsolete items by suppliers
- Communication of possible solutions
- Communication of optimum and current stocking levels for replacement items

11.4 Involvement in Development of Obsolescence Management Tools and Solutions

The supply chain and inventory management organizations can contribute to developing obsolescence management tools in the following manner:

- Physical and electronic identification of inventory items identified as obsolete to prevent unintended sale or disposal
- Identifying and recommending suppliers of replacement items for obsolete components and parts
- Recommending optimum stocking levels for replacement items

The supply chain and inventory management organizations can contribute to developing obsolescence management solutions in the following manner:

- Identifying the need to procure alternate items
- Identifying the need to perform equivalency evaluations for obsolete components and piece parts
- Providing obsolescence issues (and in some cases obsolescence solutions) to OIRD

11.4.1 Average Historical Usage over a Period of Time (Supply Chain)

A key source of information that should be considered as prioritization criteria is the average historical usage of replacement items over a designated period of time. This should provide the quantities and intervals at which replacement items have been required in order to perform both preventive and corrective maintenance activities. Licensees should also look for trends indicating changes in the frequencies between maintenance activities or the quantities/types of items needed.

11.4.2 Predicted Future Demand for Replacement Items (Supply Chain/Planning)

When provided with historical usage of the replacement items, the team should be able to extrapolate and predict what the demand will be for the remaining life of the equipment. Again, trending should be factored into this estimate, as well as any industry data available regarding adverse trends in equipment performance as it ages.

11.4.3 Current Inventory Levels

The supply chain organization can assess the adequacy of current inventory levels to determine if anticipated demands will be able to be met with stock or if additional supplier sources will be needed. Inventory data can be gleaned from the following sources:

- Site-level inventory
- Fleet-level inventory
- Industry levels captured in obsolescence products available to the industry
- Site inventory levels of subcomponent parts—information that should be considered because depending on the scope of subcomponent parts in inventory, it may be feasible to rebuild a whole component if the necessary parts are available

Several licensees have developed a graded approach to establishing inventory levels both at a given plant and within their fleet. The graded approach considers risk associated with not having a given spare, anticipated demand for the item, and costs associated with obtaining it. Additional guidance regarding the development of an effective critical spares program is provided in EPRI report 1011861, *Considerations for Developing a Critical Parts Program at a Nuclear Power Plant* [11].

12
AVAILABLE RESOURCES FOR ADDRESSING OBSOLESCENCE ISSUES

12.1 Overview

The purpose of this section is to discuss the various internal and external resources available to licensees to proactively address obsolescence issues and develop cost-effective and timely solutions. An overview of the various product capabilities is provided in Table 12-1.

Table 12-1
Overview of external resources and product capabilities

	Collaborative Development of New Solutions	Prioritize Industry Issues	Utilities Identify Their Extent of Condition	Prioritize Utility Issues	Shared Inventory Data	Shared Inventory Items	Share Existing Replacement Solutions for Obsolete Items	Share Existing Equivalency Evaluations and Obsolete Make/ Model Information	Vendors Access Utility Data to Proactively Develop/Recommend Pertinent Solutions	Utilities Share Existing Solutions	Guidance for Developing and Implementing an Effective Plant Obsolescence Program
EPRI	X	X									X
POMS		X	X								
POMS PM				X							
POMS Obsolescence Manager				X							
POMS Prioritization Tool				X							
POMS CMIS							X	X		X	
RAPID™					X		X				
OIRD							X	X	X	X	
PIM/Alliances						X					
USA OIRD Pilot							X			X	

Table 12-1 (continued)
Overview of external resources and product capabilities

	Collaborative Development of New Solutions	Prioritize Industry Issues	Utilities Identify Their Extent of Condition	Prioritize Utility Issues	Shared Inventory Data	Shared Inventory Items	Share Existing Replacement Solutions for Obsolete Items	Share Existing Equivalency Evaluations and Obsolete Make/ Model Information	Vendors Access Utility Data to Proactively Develop/Recommend Pertinent Solutions	Utilities Share Existing Solutions	Guidance for Developing and Implementing an Effective Plant Obsolescence Program
USA Obsolescence Initiative – EOS									X	X	
NUOG		X									X

12.2 Supplier-Provided Resources

Several products designed to facilitate the management of obsolescence are currently available to the nuclear generation industry. The most widely used tools include:

- Pooled Inventory Management (PIM)
- RapidPartSmart (RAPID)
- Obsolete Items Replacement Database (OIRD)
- Proactive Obsolescence Management System (POMS)
- POMS Preventive Maintenance Forecasting (POMS PM)
- POMS Obsolescence Manager
- POMS Configuration Management Information System

12.2.1 Shared Inventory Programs (PIM and others)

Shared inventory programs are arrangements between units and/or plants to maintain a pool of inventory that is available to the plant that needs it first.

12.2.1.1 Pooled Inventory Management (PIM)

An example of a shared inventory program is PIM. The PIM program is a collaborative shared inventory program that includes 25 owners of 53 U.S. nuclear generating units that procure and store long lead-time and high-cost equipment. Equipment included in the program can be used by a member's nuclear unit if a failure of a similar component should occur at their facility. The PIM program is organized under the Pooled Equipment Inventory Company. The day-to-day operations of the PIM program are conducted through a management contract that is currently held by Southern Nuclear Services, LLC (SNS), an affiliate of the Southern Company.

PIM equipment is stored and maintained in a centrally located warehouse that meets the applicable requirements of ANSI N45.2 [12].

In recent years, the PIM program has expanded its scope beyond long lead-time, high-cost emergency equipment. This allows the program to address issues involving smaller components, critical spares, and obsolescence.

12.2.2 RapidPartSmart

In October 1992, recognizing that vendors of safety-related material were beginning to abandon the nuclear industry, eight utilities owning and operating nuclear plants began using the Readily Accessible Parts Inventory Database – RAPID, to pool their on-hand nuclear plant inventory and when necessary, make it available to "participants in need."

Today, RAPID (a membership service of Scientech, a Curtiss-Wright Flow Control company) aggregates the on-hand inventory of every nuclear power plant in North America. RAPID makes this information available to its members. RAPID also provides a wide array of databases and web-based tools designed and developed to directly interface OEMs and equipment suppliers with utility purchasing, engineering, and maintenance organizations; to support utility investment recovery efforts; to proactively address equipment obsolescence; and to provide direct communication and collaboration between members and industry focus groups. RAPID can be used by utilities to:

- Locate sources to fulfill emergent part needs
- Identify multiple sources for routine restocking of parts
- Avoid purchases by reserving material for contingent need
- Survey industry supply status to reset stocking levels
- Communicate and manage multisite inventories within one company
- Liquidate surplus material
- Match utility supply demands to industry supplies
- Identify replacement manufacturers for discontinued parts
- Display items in stock that are obsolete and the replacement solutions for them

12.2.3 Obsolete Items Replacement Database (OIRD)

In 2000, the Nuclear Utility Obsolescence Group (NUOG) and Scientech worked together to design and develop the Obsolete Items Replacement Database (OIRD), and to seamlessly integrate it with the inventory databases in RAPID.

The initial utility data entered in OIRD were the contents of the EPRI Obsolete Item Database (OID), and consisted of item equivalency evaluation information provided by EPRI-member utilities.

The development of OIRD enabled participants and their OEM and/or vendor firms to begin sharing information about components and spare parts that have been determined to no longer be manufactured, or no longer exist in their original form. Information shared includes manufacturer model and part number, replacement solutions, and the replacements' supporting engineering equivalency evaluations.

Entry of data to OIRD is accomplished by an online interface or can be submitted in "bulk" to RAPID for upload. When members add an obsolete item to OIRD, a notification that the item is obsolete and information about its replacement solution, if provided, are automatically sent by e-mail to all utility members having the obsolete item listed in the inventory data pool. If an obsolete item is added and a replacement solution is unavailable, both the member utilities having the item in inventory and RAPID vendor members are notified. Member utilities stocking an item listed in OIRD that was added without an associated solution are notified when the obsolete item listing has been updated with replacement solution information.

Recognizing that all nuclear plants participating in both NUOG and POMS are also members of RAPID, PKMJ and Scientech, working closely with NUOG, are identifying and capitalizing on the synergies between the two programs to avoid duplication of services and/or the routine tasks and/or processes required of the utility to support both programs. A seamless interface has been established between the two programs to share the inventory and installed component data submitted by member utilities. If an item is identified by the POMS OEM/vendor contact initiative to be obsolete and it does not already exist in OIRD, it is automatically added to OIRD. POMS notification reports are available to its members at rapidpartsmart.com along with access to individual plant/fleet and industrywide obsolescence reports compiled by POMS from the obsolescence data maintained by both programs. POMS/RAPID members can gain access to either program from the RAPID or POMS web site to share and/obtain information related to obsolescence.

Key Human Performance Point

Obsolete identifications and equivalency evaluation solutions may be uploaded to RAPID OIRD database when feasible, and subsequently shared with other users.

12.2.4 Proactive Obsolescence Management System (POMS)

The Proactive Obsolescence Management System (POMS) is a service designed to determine what installed equipment is no longer supported by the manufacturer. This is done by collecting equipment information from member utilities and contacting each manufacturer of installed equipment on a regular basis to determine if the model number is still supported. This information is made available to members through a web-based application.

Tools developed to address deficiencies in bills of material (BOMs) led to the inception of POMS. Originally, equipment information was collected for plant equipment and linked to associated spare and replacement items. The resulting data was used to leverage multiple stations’ existing BOM data to create a single bill of material for each installed piece of equipment.

PKMJ analyzed sample data from several different nuclear plant sites and determined that a significant number of shared manufacturer model numbers were installed. PKMJ initiated a program to contact the suppliers of installed equipment to determine if the equipment was still supported, and offer the service of analyzing equipment information and contacting suppliers to utilities to minimize the impact of multiple utilities contacting the same suppliers on a regular basis and consolidate industry equipment information in a single location.

Installed equipment/component information is collected from each participating POMS member. The required fields for this information are listed in Table 13-2. This information is analyzed and a distinct list of model numbers by manufacturer is generated. The POMS Vendor Contacting Team then contacts all manufacturers once a year to determine if each model number is still supported.

Table 12-2
POMS data elements

Equipment Data	BOM Data	Stock Data	WO History Data
Site Name	Equipment Tag Number	Site Name	Equipment Tag Number
Equipment Number	Stock Number	Stock Number	Associated Stock Number
Manufacturer		Manufacturer	WO Start Date
Model Number		Manufacturer Part Number	WO Completion Date
Equipment Type		Description	WO Number
Equipment Description		Stock Level	WO Description
Criticality Classification		Stock Reorder Point	WO Status
System Name		Obsolete	
System Number		Quality Class	
Quality Class			
Single Point of Vulnerability Classification			
ASME Classification			

Plant equipment data is gathered from utilities' information systems by working with their information technology departments. There are two ways data is collected: (1) data can be transferred directly from the utility to the POMS data team, or (2) the data can be uploaded via the RAPID Gateway, which was modified to automate the process of uploading data to POMS. The information gathered includes work orders, inventory, bills of material, and master equipment lists. Utilization of the RAPID Gateway automates the data transfer process and allows utilities to keep their information current with minimal impact on resources.

In addition to gathering data from utilities, POMS incorporates third-party databases such as OIRD industry equipment performance indices. OIRD provides utility-entered part-level obsolescence information, and industry performance indices provide a record of equipment failures for the industry. Industry failure data can be used as input for prioritization of obsolescence issues.

The POMS Vendor Contacting Team contacts the manufacturers one time per year to ensure that the data is current. The POMS vendor contacting process collects the following information for installed equipment:

- Whether or not the item is obsolete
- The vendor-recommended replacement
- Whether the vendor supports spare parts

- Whether the vendor provides refurbishment services
- Any additional vendor comments
- Vendor contact information (name, phone, e-mail, and so on)

Information provided by vendors is used to populate and update POMS. This information is supplied to each participating utility through the online POMS searching tool, the online POMS reports, and OIRD notifications. OIRD notifications are generated in POMS and are distributed through RapidPartSmart. The RapidPartSmart and POMS tools are integrated to allow easy navigation between systems. This is beneficial to POMS members because RapidPartSmart contains utility inventory.

The POMS Vendor Contacting Team has experienced excellent success in tracking down and receiving information from vendors. Of approximately 13,000 vendors currently in the POMS Vendor Contacting program, only 7 have elected not to support the initiative. Overseas vendors have been very supportive, with an average response time of one week. On average, the POMS Vendor Contacting Team makes eight calls before obtaining obsolescence information.

12.2.4.1 POMS PM Forecasting

PM Forecasting uses maintenance information such as what parts and quantity of parts are required for maintenance, scheduled maintenance dates, and equipment obsolescence data to forecast when obsolescence issues will impact site schedules. For most sites, about 85% of weekly activity is repetitive work. The objective of PM Forecasting is to enable nuclear facilities to determine when the available stock of a specific obsolete part or piece of equipment will be depleted. The required fields needed for PM Forecasting are listed in Table 12-3.

POMS has the capability to assess preplanned maintenance work and existing inventory to determine when inventory of required parts will be depleted. This tool extrapolates usage of replacement items (based on actual usage, and scheduled future PMs) and estimates when those items currently in stock will be depleted.

Table 12-3
Preventive Maintenance Forecasting data elements

Equipment Data
Single Point Vulnerability
Maintenance Plan Data
Maintenance Plan Number
Maintenance Plan Description
Maintenance Plan Next Schedule Date
Maintenance Plan Frequency
Maintenance Plan Interval
Maintenance Plan Parts
Maintenance Plan Part Quantity
Maintenance Plan Part Cost
Maintenance Plan Steps
Maintenance Plan Step Hours

The PM Forecasting module extrapolates obsolescence impact to planned preventive maintenance work over five-, ten-, and twenty-year time frames. With this information, plant organizations can predict when obsolescence issues will impact site work schedules and use this information to prioritize obsolescence issues. A PM Forecasting Impact Graph can be produced that indicates which equipment, parts, and preventive maintenance tasks will be affected by obsolescence and when the impact will occur based upon available inventory and planned maintenance. This graphical representation of an obsolescence impact can be used as an aid in prioritizing and planning for the timely development of solutions to future obsolescence issues.

12.2.4.2 POMS Prioritization Tool

The Obsolescence Manager is a software tool designed by PKMJ to facilitate the prioritization and resolution of obsolescence-related issues. This tool enables licensees to identify the highest-impacting obsolete issues by utilizing both site-specific and industrywide data. The Obsolescence Manager quickly provides a prioritization of all identified obsolete issues, utilizing an industry-tested algorithm customized for each site. Suitable action plans can be developed utilizing the Proactive Obsolescence Management System (POMS), PM Forecasting, and CMIS.

12.2.4.3 Configuration Management Information System (CMIS)

The CMIS application designed by PKMJ assists engineers with the process of creating Design Changes, Equivalency Changes, and Temp Modifications. CMIS is set up to maximize automation of data sharing, data integrity, and time savings. CMIS is customized to match each site's procedural requirements. In addition, CMIS tracks progress and status throughout the equivalency development and is available to all site departments. CMIS has the capability to clone packages across fleets to improve engineering efficiency. CMIS integrates into site-specific data management systems to ensure that configuration is maintained from the development of the package through post-installation records updating.

13
IMPLEMENTING SOLUTIONS TO OBSOLESCENCE ISSUES

13.1 Types of Solutions to Obsolescence Issues

Figure 13-1 illustrates the various options available to a licensee for addressing obsolescence issues. The optimum solution should be determined on a case-by-case basis. However, experience suggests that the sooner the obsolescence issue is communicated and addressed by the interfacing organizations comprising the obsolescence management team, the less costly the selected solution will be.

Figure 13-1 captures the types of obsolescence solutions typically available, and illustrates that one of the first aspects to be considered when developing a solution to an obsolescence issue is to determine whether the obsolete item will be replaced in its entirety or repaired. This decision is often based on the prevailing maintenance philosophy at the site and the size/type of item determined to be obsolete. This issue is illustrated in the left-hand column of the figure.

The next issue to address is to determine whether the required replacement component or part is available, or if an alternative item must be evaluated to determine its suitability. This issue is illustrated in the center column of the figure and should be implemented using existing site procedures for item equivalency evaluations. One option that may be considered when an equivalent component is not feasible to procure or has been determined to be unsuitable for the intended application is to perform a design modification.

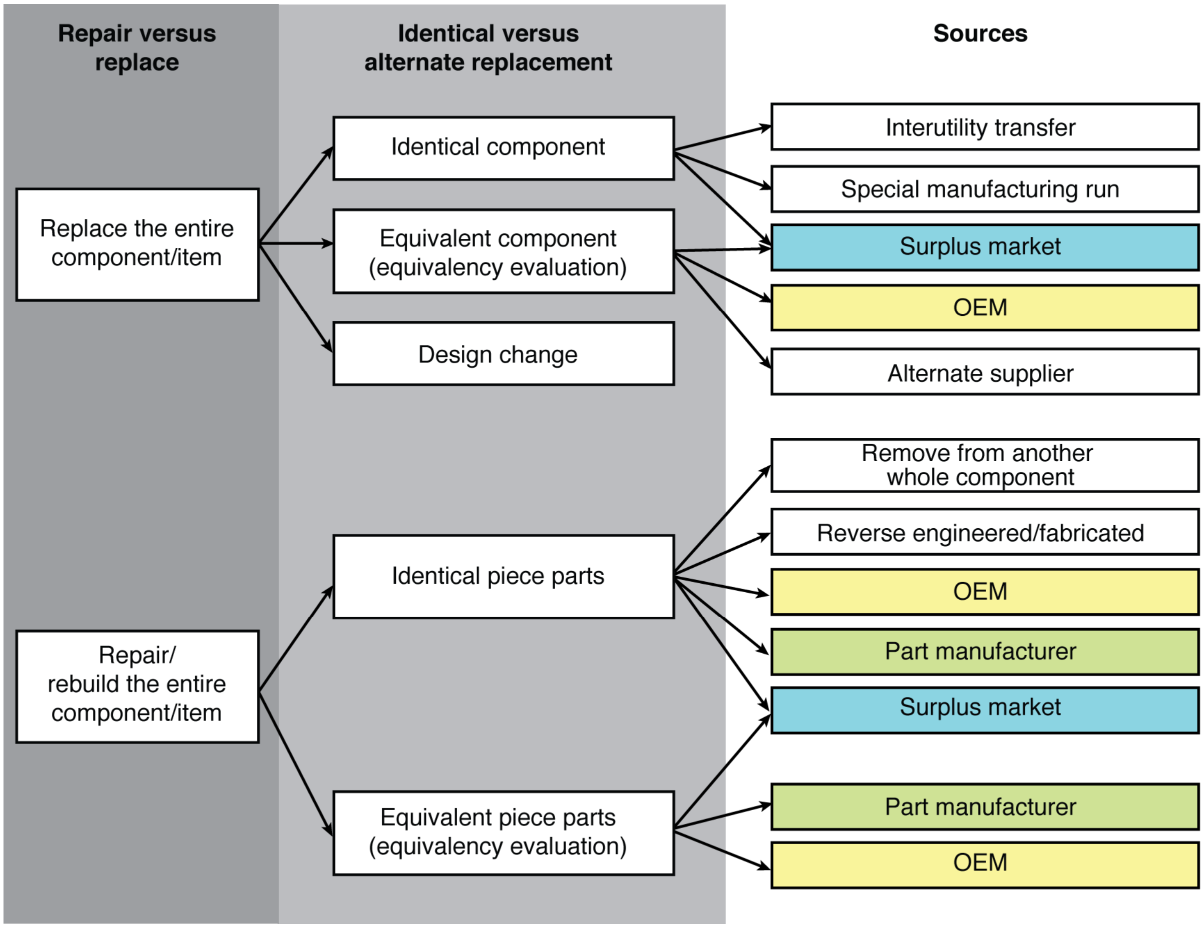


Figure 13-1
Obsolescence solutions and options

13.2 Staging Solutions to Obsolescence Issues

As noted in Section 4 of this report, a thorough understanding of a supplier's current capabilities typically facilitates implementation of the least-cost option if and when a replacement is needed for an obsolete item. Furthermore, understanding the supplier's current capabilities enables the licensee to "stage" a solution for future implementation when needed.

The concept of staging solutions is introduced in this report. Staging a solution entails preparing to use a known solution, without actually fully implementing the solution. This can be accomplished by identification and documentation (in plant information systems) of a success path to use of an existing solution or development of a new replacement solution.

The objective of a staged solution is to minimize the lead time required to obtain replacement items without unnecessarily incurring the expenses of solution development and maintaining replacements in inventory.

Staged solutions can involve various degrees of completeness, from a simple annotation in plant information systems to a completely approved, ready to build design that has been arranged in advance with the supplier.

To illustrate the concept of a staged solution, consider the following example:

> A plant uses a number of obsolete safety-related Model 22 L-Tech power supplies in critical applications. To date, the plant instrumentation and control organization has been able to successfully repair and rebuild the power supplies. At present, two (2) spare power supplies exist, and uninstalled power supplies are rotated back into stock after they are repaired.
>
> There is a good chance that repair and rebuilding will support operation of the power supplies for the life of the plant, but failure of several part-level items in the power supply would render it useless.
>
> Using existing industry databases, the plant obsolescence program team determined that We Buildem, Inc. has reengineered replacements for several similar L-Tech power supplies for other plants, and after being contacted We Buildem has estimated the total time to reverse engineer and furnish a replacement for Model 22 power supplies is 9 months. Since the plant has two (2) spares, the obsolescence program team has decided not to process a purchase order at this time to We Buildem. This is because the obsolescence program has determined that the probability a third replacement will be needed in less than 9 months is low, and We Buildem is already on the licensee's qualified supplier list for supplying power supplies.
>
> However, the obsolescence program team will stage the known solution now.
>
> In this example, staging will consist of the following actions:
>
> - We Buildem, Inc. will be added as a supplier for this item in the site's information system and linked to the plant's stock code or catalog identification number.
> - The plant will ask We Buildem to maintain any engineering work done to develop their proposal, and let them know they are staging the solution. In addition, the plant will provide We Buildem with a request to furnish copies of appropriate documents to the plant.
> - The correspondence between the plant and We Buildem will be scanned to an electronic format, linked to the stock code or catalog identification number, and maintained in the plant information system (or by the obsolescence program).

Use of a staged solution minimizes incurring unnecessary expenses and inventory, but also greatly reduces lead time in the event a replacement is ever required. A staged solution is based upon known availability of supplier capabilities, but not necessarily existing supplier inventory.

It is worth noting that there is some risk that a staged solution could become obsolete in the period of time between when the solution is identified and when the solution is required to support the plant.

14
REFERENCES

14.1 Cited References

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11. *Considerations for Developing a Critical Parts Program at a Nuclear Power Plant.* EPRI, Palo Alto, CA: 2007. 1011861.

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[3] Access to INPO reports and materials is restricted to organizations authorized by INPO. The information is confidential and for the sole use of the authorized organization.

14.2 Additional References

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A
LISTING OF KEY INFORMATION

A.1 Key Information Points

Key Information Point

Key information related to implementing a proactive obsolescence program.

Referenced Section	Page Number	Key Point
1.2.1	1-3	Plant organizations' effectiveness at being able to resolve obsolescence issues through "firefighting" may conceal the true impact of obsolescence to a certain extent, thus serving as a barrier to implementing a proactive obsolescence management program.
1.3.1	1-7	One of the most important factors in establishing a proactive obsolescence management program is to obtain a firm commitment by senior management, followed by the resources required to support the program. Focusing on strategic, proactive solutions is difficult in a plant production environment.
3.1	3-2	The overall average percentage of obsolete items may be higher than 22%, based on industry data analyzed to date.
3.2	3-3	The population of equipment and associated replacement items in a plant that are obsolete must be determined.

A.2 Key O&M Cost Points

Key O&M Cost Point

Emphasizes information that will result in overall reduced costs and/or increase in revenue through additional or restored energy production.

Referenced Section	Page Number	Key Point
1.2.3	1-5	Incorporating obsolescence cause and event codes into an existing corrective action program is one way in which tracking the costs of obsolescence and the impact of a proactive obsolescence management program might be accomplished.

A.3 Key Technical Points

Key Technical Point

Targets information that will lead to improved equipment reliability.

Referenced Section	Page Number	Key Point
3.4	3-4	Equipment and replacement items determined to be obsolete should be flagged in plant information systems (that is, equipment databases, inventory/material management systems, and so on). Flags should be revisited if an obsolescence solution is developed and implemented for the obsolete item.
4.1.2	4-4	The classification of the host equipment should be considered when developing criticality classifications for associated spare and replacement items.
4.5.2	4-10	Obsolescence should be included as a discrete factor that is considered in plant prioritization algorithms.
6.2	6-1	It may be appropriate to ask Maintenance to save obsolete equipment and parts after they are uninstalled, for use in the future development of obsolescence solutions (for example, for use in reverse engineering).
6.3	6-2	The pre-job brief can be used increase awareness that the equipment on which the maintenance activities are being performed is obsolete, and therefore special care may be warranted during work activities.

A.4 Key Human Performance Points

Key Human Performance Point

Denotes information that requires personnel action or consideration in order to prevent personal injury, prevent equipment damage, and/or improve the efficiency and effectiveness of the task.

Referenced Section	Page Number	Key Point
4.5.1	4-10	For the mechanic, provisions would be made to identify that the item is obsolete early in the work order instructions and in the pre-job brief.
5.1.2	5-3	Communication between and participation of various groups is the key to a successful proactive obsolescence management program.
12.2.3	12-6	Obsolete identifications and equivalency evaluation solutions may be uploaded to RAPID OIRD database when feasible, and subsequently shared with other users.

B
SUMMARY OF NUOG SURVEY DATA

Cited throughout this report are results of surveys conducted by NUOG that validate much of the guidance provided. Table B-1 provides a brief summary of those survey results, and how those results are trending between the times when the survey was conducted (that is, 2004 and 2007).

Table B-1
Summary of NUOG survey data (surveys conducted in 2004 and 2007)

Survey Question:	Survey Year	
Does/Has your plant……..?	2007	2004
Have a program lead assigned? (yes responses)	75.5%	80%
Have a procedure? (yes responses)	60.5%	66.6%
Have a program based on NX-1037 [4][4]? (yes responses)	86.4%	61.2%
Use a proactive approach? (yes responses)	77.3%	53.8%
Performed an assessment? (yes responses)	34.8%	20.7%
Publish an Obsolescence Health Report? (yes)	36%	3.4%
Developed obsolescence performance indicators? (yes)	70%	24.1%
Track obsolete items? (yes)	48.4%	50%
Have a defined prioritization process for obsolescence? (yes)	74.2%	64.9%
Included obsolescence In System Health Reports? (yes)	79.3%	82.8%
Included obsolescence in budgeting process? (yes)	45.5%	New
Have inventory reduction prevention in place? (yes)	57.1%	69%
Seen obsolescence result in generation loss? (yes)	22.2%	11.1%

The data included in these surveys may not represent actual industry averages, as the survey participants consist primarily of utilities active in NUOG.

[4] Access to INPO reports and materials is restricted to organizations authorized by INPO. The information is confidential and for the sole use of the authorized organization

C
SYNOPSIS OF CURRENT OBSOLESCENCE PROGRAMS

The purpose of this appendix is to provide a synopsis of how EPRI-member utilities have implemented proactive obsolescence management programs. Please note that the information provided is a snapshot representative of each program at the time this report was being developed.

The synopses are provided for information so that EPRI members can benchmark and glean ideas that may be considered for use in developing or enhancing their own obsolescence programs.

C.1 Detroit Edison

C.1.1 Brief Program Summary

The obsolescence program at Detroit Edison is owned by the Engineering First Team organization, and is about 5 years old.

The scope of the program is to ensure that equipment obsolescence vulnerabilities critical to equipment reliability and plant availability are identified and solved in a timely manner.

Detroit Edison participates in NUOG, RAPID, USA/STARS Obsolescence Team, PIM, and EPRI's Joint Utility Task Group.

Detroit Edison uses POMS, CMIS, and RAPID.

C.1.2 Responsibilities

The Engineering First Team has the overall responsibility for the obsolescence program. Requirements include the following:

- Issue Quarterly Obsolescence Program Health Report
- Conduct periodic Self-Assessments and Benchmarking
- Update Obsolete Item Replacement Database (OIRD) on a monthly basis with obsolescence issues with and without a solution

- Provide training and/or coaching to appropriate personnel on the use of industry tools
- Maintain a prioritized list of known obsolescence issues
- Solve component and part level obsolescence issues using Equivalent Replacement Evaluation Process, reverse engineering, and RapidPartSmart (RAPID)
- Maintain the integrity of the Spare Parts databases
- Review proposed inventory reductions recommended by Supply Chain for obsolescence risk

Other organizations that have responsibility include:

- Plant Support Engineering
- System Engineering
- Performance Engineering
- Modification Core Teams
- Work Control
- Maintenance
- Supply Chain

The Plant Support Engineering organization is responsible for:

- Ensuring design margins are maintained/understood for design changes
- Preparing Design Change Evaluations
- Maintaining overall control of the Design Processes

The Systems Engineering organization is responsible for:

- Maintaining the individual system and component health reports and identifying and tracking all obsolescence issues associated with their individual systems. Including a summary of obsolescence issues and an obsolescence rating.
- Assisting in prioritizing the backlog of obsolescence issues by determining the functional score and forecasting expected stock usage as outlined in the Engineering Handbook.
- Sponsoring solutions for system- and component-level obsolescence issues and those issues requiring Modifications [as determined by Plant Support Engineering (PSE) or the Engineering First Team (EFT)].

The Performance Engineering organization is responsible for:

- Ensuring the Obsolescence Program is aligned with the Station Reliability Plan and Life Cycle Management Programs

Modification Core Teams are responsible for:

- Preparing Engineering Design Packages (EDPs) for authorized Modifications

The Work Control organization is responsible for:

- Assuming responsibility for the cycle plan, to schedule and set priorities based on the plan and impact on the station
- Conducting the 26-week and 52-week meetings to identify critical issues, including obsolescence, to ensure work is scheduled and completed as required

The Maintenance organization is responsible for:

- Developing work packages for equivalent replacements, cannibalization activities, or modifications
- Installing design changes and equivalent replacements
- Supporting walkdowns with Engineering to identify installation issues for replacements potentially requiring installation instructions
- Implementing the cannibalization process when necessary

The Supply Chain organization is responsible for:

- Communicating obsolescence issues discovered during the purchase order process to Material Engineering
- Communicating proposed inventory reduction recommendations to the Engineering First Team so that an obsolescence risk review may be performed

C.2 Duke Energy

C.2.1 Brief Program Summary

Duke Energy's obsolescence program is incorporated into the Critical Spares program. The Critical Spares program was about 6 months old during the development of this report. The Critical Spares program is owned by the Obsolescence Critical Spares Working Group, which is comprised of the nuclear Supply Chain organization and site engineering groups. The Critical Spares program scope includes Category A components with initial focus on long lead-time items.

The program was started due to loss of equipment availability as follows:

- Rotor pole failure: 332.75 hours of unavailable time were accumulated for Oconee Unit 1 (went into outage) and 614.19 hours were also accumulated for Oconee Unit 2 and Unit 3
- Motor failure: 426.9 hours of SSF unavailability

The program's mission includes:

- Evaluate what critical spares are needed
- Obtain critical spares that can be obtained
- Identify obsolete critical spares and obtain a solution

Duke Energy participates in NUOG, and the EPRI JUTG.

Duke Energy uses POMS and RAPID.

C.2.2 Responsibilities

The organization responsible for the program includes one Engineering Lead at each site, one Nuclear Supply Chain GO Lead for Critical Spares, and one Nuclear Supply Chain GO Lead for Obsolescence. The Fleet Leader is a full-time position; all others are part-time.

Site Leads performed assessment at their sites to determine long lead-time CAT A components with consideration given to SPVs as top priority.

The organization tracks critical spares once they are entered into the process.

C.3 South Carolina Electric & Gas

C.3.1 Brief Program Summary

The proactive obsolescence management program at South Carolina Electric and Gas is called the Station Obsolescence Program and was about six years old during development of this document.

The program is currently working in accordance with the third revision of the procedure/program, and a new revision is currently being developed.

The program owner is the Materials and Procurement (M&P) organization.

The program tracks obsolescence equipment and subcomponents from the identification of the issue until it is resolved (replacement available and approved for use) or until a Plant Modification has been initiated and is being tracked under that process.

The mission of the program is to proactively identify obsolescence concerns, evaluate the potential plant impact, and schedule/resolve concerns in a timely manner, based on risk ranking.

All issues are identified and ranked in the Plant Health Committee (PHC) list of health risks which are reviewed at PHC meetings and posted on the PHC web page for review by site personnel.

Active concerns are tracked under the site's corrective action process (CAP), with action plans and due dates.

The administrative controls for the program are under M&P but the process implementation is shared sitewide.

The SCE&G Materials and Procurement group participates in NUOG and POMS. The SCE&G Plant Support Engineering (PSE) organization participates in the Equipment Reliability Working Group.

SCE&G uses POMS to:

- Identify obsolete components
- Identify potential sharing opportunities with other utilities

SCE&G uses RAPIDS/OIRD to:

- Identify obsolete components and potential solutions
- Share solutions with other utilities

C.3.2 Responsibilities

M&P, PSE, and Design Engineering (DE) involvement in the obsolescence program is on a supplemental basis. They have no full-time assignments to this function.

M&P administers the program. When an issue is identified, Materials Management:

- Captures it in SCE&G's corrective action process
- Generates and scores a health risk for the Plant Health Committee review
- Updates the OIRD as required (initially and when resolution is identified)
- Evaluates options for resolution
- Presents recommendations to PSE for agreement
- Tracks status (through CAP) until a resolution is reached
- Completes resolution, if the resolution can be completed as an equivalency

Plant Support Engineering:

- Reviews the recommendation from M&P to ensure that they are in line with their plans for the system
- If the replacement can't be performed under an equivalency, submits a plant modification

Design Engineering is responsible for:

- Processing plant modification
- Updating drawing/design documents impacted by equivalency

C.4 Constellation

C.4.1 Brief Program Summary

Constellation's Equipment Obsolescence Program was about 3 months old during development of this document. Engineering is the organization that owns the obsolescence program.

The program is intended to provide an outline for management of obsolete systems, structures, and components (SSCs), and will provide the basic obsolescence work requirements for Design, System, and Procurement Engineering groups.

The Equipment Obsolescence Management Program addresses obsolete SSCs through existing fleet and station processes at three of Constellation's plants.

The Equipment Obsolescence Management Program provides a framework for managing and integrating obsolescence issues utilizing established station tools and processes. Obsolete equipment will be identified and resolved in a proactive manner, minimizing impact on station reliability and availability.

The obsolescence program is intended to identify and correct obsolescence issues before they challenge plant operation. The program's focus is to resolve obsolescence issues efficiently. The use of available industry solutions will minimize system design changes and reduce man-hours searching and resolving obsolete issues. The improvement in identification and resolution will reduce the number of future plant operation challenges.

A key element of this program will be the participation in industry-sponsored obsolescence initiatives and the use of industry obsolescence data to streamline the development of resolution strategies, and to benefit from industry experience.

Constellation uses information in POMS to directly load obsolete equipment tag numbers in the applicable system health reports. Displayed in Figure C-1 are a short description, criticality classification, and SPV status of each component for the system engineer (SE). Also provided is a hot link directly back to the POMS equipment search results screen via the view button for each component should the SE need additional information from POMS. This helps the SE determine the importance of the component and where else it is installed in the plant. Display from one of the system health reports is shown. There is a scroll tab to the right (not shown) that allows the SE to scroll through and see all obsolete components in their system.

Component	Component Description	Classification	SPV	Actions
FA-400	AMSAC BLOCKED IND -RELAY	CHM	Yes	View
FA-400A	1A AFWP START RELAY AMSAC	CHM	Yes	View
FA-400B	1B AFWP START RELAY AMSAC	CHM	Yes	View
FA-400C	TDAFW START & TURB TRIP	CHM	Yes	View
FA-400D	TDAFW START & TURB TRIP	CHM	Yes	View
FA-400E	3/4 FWF <25% RELAY AMSAC			

Figure C-1
Example of obsolete equipment identification

Obsolete item information is identified on either an Engineering Service Request (ESR) or via the plant corrective action program. Most items end up as an ESR, which is evaluated by the Technical Review Board (TRB) and/or Plant Health Committee (PHC) for further prioritization, possible assignment, and resolution. Constellation is currently working to identify plant top-ten items.

No formal metrics have been established yet, as none are required by the fleet directive procedure.

Constellation has established an Obsolescence “hit” Team at one plant to ensure adequate implementation of the fleet directive. It is expected that as the program matures, enhancements will be made to program implementation requiring more detailed prioritization, tracking, and trending of obsolescence issues.

One of Constellation’s plants is currently participating in NUOG. Constellation is also involved in the Equipment Reliability Working Group.

Constellation uses RAPID for part searches and possible obsolete item solutions. Constellation also updates the OIRD with newly discovered obsolete items and equivalent replacements.

All system engineers and most procurement engineers (PEs) have been provided access to POMS and RAPID. Initial training has been given to a group of subject matter experts (SMEs) from the Ginna plant so that they can aid others in the use of RAPID, OIRD, and POMS.

C.4.2 Responsibilities

Organizations involved in the obsolescence program include Corporate Engineering, Systems Engineering, Design Engineering, Component Engineering, Procurement Engineering, and Work Planning.

There are no full-time staffing levels for the Obsolescence Program. There is no full-time assigned program manager at any of the three sites. All program activities are accomplished by existing plant personnel.

The Site Engineering Services Manager is responsible for:

- Sponsoring the station's Equipment Obsolescence Management Program and providing management direction and guidance
- Ensuring adequate resources are available for program management

Component Engineers:

- Monitor industry and third-party databases for applicable obsolescence issues
- Identify system obsolescence issues and planned actions in Component Health Reports
- Develop engineering solutions for identified obsolete items
- Participate in industry-sponsored efforts to address obsolescence, such as NUOG
- Coordinate resolution strategy

System Engineers:

- Monitor industry and third-party databases for applicable obsolescence issues
- Identify system obsolescence issues and planned actions in System Health Reports
- Develop engineering solutions for identified obsolete items
- Participate in industry-sponsored efforts to address obsolescence, such as NUOG
- Coordinate resolution strategy

Procurement Engineers:

- Execute Supply Based Strategies (SBS)
- Develop equivalency evaluations for identified piece part obsolete items
- Support industry-sponsored efforts to address obsolescence, such as NUOG

Design Engineers:

- Develop engineering solutions for identified obsolete items
- Standardize components whenever possible

Planners:

- Investigate Supply Based obsolescence strategies

C.5 Exelon

C.5.1 Brief Program Summary

Exelon's Equipment Obsolescence program was about 2 years old during the preparation of this report. The program is owned by Plant Engineering.

The Obsolescence Steering Committee (OSC) is chaired by the Site Obsolescence Process Manager and consists of obsolescence single points of contact (SPOCs) from Site Procurement Engineering, System/Plant Engineering, Design Engineering, Maintenance, CMO, Work Management, and Operations.

The objective of the program is to proactively identify, prioritize, and resolve obsolete equipment issues in a cost-effective and timely manner so as to continue to support plant maintenance activities and subsequently ensure a high level of equipment reliability.

Plant management, corporate engineering, plant engineering, design engineering, BSC Supply Management, maintenance, maintenance planning, operations, and work management organizations are involved in the resolution of obsolescence issues.

The scope of the program includes:

- Identification of obsolete items to OSC and SPOC when discovered during the course of business
- Establishment of system controls if an item is identified as obsolete
- Repair of obsolete items
- Review and evaluation of pending work orders and associated material request reservations for obsolete items and comparison of this demand with stock levels
- Updating of POMS from PIMS and PassPort biweekly via scheduled file transfer protocol (FTP) of data from information system queries
- Identification of obsolete items during the work management process
- Prioritization of obsolete equipment
- Conduct of Obsolescence Steering Committee meetings at least once per quarter as determined by the Obsolescence Process Manager. A minimum attendance of three members and the Obsolescence Process Manager (or his/her designate) are required to form a quorum.
- Review of the numerical Obsolescence Value Ranking (OVR) output from Obsolescence Manager in POMS and overall obsolescence total score
- Recommendations on how to resolve the obsolescence issues
- Evaluation of possible in-house, fleet, or third-party solutions for top-ranked items and use of the obsolescence information available to provide informed solutions on the best options to repair or replace, with minimal work rescheduling in the corrective maintenance process

Exelon representatives actively participate in ERWG and NUOG.

C.5.2 Responsibilities

Exelon Nuclear VP-Engineering and Equipment Reliability CFAM:

- Assigns responsibilities to ensure implementation of this process

Corporate Engineering:

- Provides governance and oversight of the obsolescence process across the fleet
- Maintains control of solutions for multiplant obsolescence items in PassPort and/or PIMS
- Coordinates and develops solutions for the plants to implement in accordance with fleet procedures for multiplant obsolescence items
- Compiles the Performance Indicators for corporate and fleet rollup on a quarterly basis

Plant Engineering (Process Manager and Owner):

- Provides a single point of contact (SPOC) to the site Obsolescence Steering Committee
- Enters the Site Top Thirty obsolescence items into Portfolio Director
- Assigns a Site Obsolescence Process Manager and Owner

Obsolescence Process Manager (Reports to Site Plant Engineering):

- Prioritizes work, reporting upwards, coordinating efforts and resources, obtaining funding, establishing a site obsolescence budget, evaluating this process effectiveness and making sure this process is in alignment with the equipment reliability process and other station processes
- Owns the site Equipment Obsolescence Process and chairs the Site OSC (Obsolescence Steering Committee)
- Maintains the Top Ten List by additions or updates received from the Site Obsolescence Steering Committee
- Issues site obsolescence performance indicators prepared by the Site OSC on a quarterly basis

Design Engineering:

- Develops site-specific solutions for obsolescence concerns outside of the Procurement Engineering work scope (that is, Item Equivalencies)
- Provides a single point of contact to the Obsolescence Steering Committee
- Maintains 5 proactive obsolescence resolution slots on the engineering 40 lists or on-deck list and more slots on the 40 pending lists or below the 40-list threshold for other Top Ten Obsolescence items waiting scheduling and resolution

Site BSC Supply Management:

- Develops site-specific solutions for the site Top Ten obsolescence items requiring item equivalency evaluations
- Labels the SCN (PIMS) or Cat ID (PassPort) of each item found obsolete in POMS as obsolete
- Checks RAPID and other available resources for purchase of obsolete In-Kind replacement
- Adjusts the stocking strategy for the item to address short- and long-term solutions
- Provides a single point of contact to the Site Obsolescence Steering Committee
- Reviews POMS and runs repairable and obsolete PassPort/PIMS reports to identify obsolete parts issues for E-28 and E-15

Maintenance/CMO:

- Provides a single point of contact to the Obsolescence Steering Committee.

Maintenance/Craft:

- Removes old obsolete/repairable parts from plant systems and returns them to BSC Supply when directed by a work order/work request
- Updates the D034 panel in PassPort with the equipment manufacturer and model number

Maintenance Planning:

- Identifies parts not previously ordered for use on-site and initiates documentation to procure those parts
- Identifies parts flagged repairable or obsolete during the work planning process and provides guidance to Maintenance in work orders/work requests to return those repairable or obsolete parts removed from plant systems to BSC Supply

Operations:

- Provides a single point of contact to the Obsolescence Steering Committee

Work Management:

- Provides a single point of contact to the Obsolescence Steering Committee
- Inserts cycle plan items and any new PHC sponsored obsolescence items into schedule
- Prepares for schedule review meetings
- Reviews long lead-time parts (>24 weeks)
- Determines if work requires rescheduling by T-20 due to parts unavailability

D
QUICK-READING REFERENCE BY ORGANIZATION

The purpose of this appendix is to provide a synopsis of sections in this report that contain essential information for individuals from the organizations included in Table D-1.

Table D-1
Recommended quick-reading sections referenced to organization

Section Reference	Management	Maintenance/ Work Planning	System/ Component Engineering	Design Engineering	Procurement Engineering	Purchasing and Contracts	Vendor Quality	Inventory and Supply Chain	Plant Health Committee
1	X	X	X	X	X	X	X	X	X
2	X	X	X			X	X		X
3		X		X		X			
4		X	X	X					
5	X		X	X	X			X	X
6		X			X			X	X
7			X		X			X	X
8				X	X			X	X
9					X			X	X
10					X	X	X	X	X
11					X			X	X
12					X	X	X	X	X
13	X				X	X	X	X	X
14									
A	X	X	X	X	X	X	X	X	X
B	X		X	X	X				X
C	X								X
D	X	X	X	X	X	X	X	X	X

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